Empowering Teachers' Self Assessment of Their Own Practice on Student's Oral Skills

EVALOE Decision Support System

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Abstract: School is an essential context that contributes to children's communicative competence. Decision Support Systems (DSS) are tools that can help teachers to assess their own practice and to make decisions to improve it (Gregg, 2009). Our aim is the construction, implementation and validation of a digital Decision Support System (EVALOE-DSS), conceived as a teacher empowerment tool for self-assessment and decision making about their teaching practice concerning students' oral skills. Participants are 4 teachers and their groups of students of 4 diverse schools. The research procedure includes: 1) design and development of a DSS for different type of schools; 2) researcher assessment of one classroom observation using EVALOE-DSS; 3) weekly teacher self-assessment of classroom observation and decision making using EVALOE-DSS; 4) analysis of self-assessments, decision making and changes in teaching practices; 5) teacher-researcher assessment of the helpfulness of DSS and introduction of changes. EVALOE-DSS is a multimedia tool consisting of 30 items that assess 5 dimensions: teaching management, instructional design, communicative functions and teacher strategies, students' communicative functions, and students' management. It includes, also, a brief description of each item and a variety of resources to help teachers to make decisions and introduce the actions in their teaching practice.

1 INTRODUCTION

Although computers have been integrated into areas related to educational management in many countries since the 1970s, the integration of Decision Support Systems (DSS) is still very recent and represents a major challenge. The majority of published works focus on the development of systems to improve general aspects of school organization (Sadahiro and Sadahiro, 2012) or systems to improve student performance (Xu and Wang, 2006). Few works focus on the construction of systems aimed at improving the practice of teachers, with the ultimate goal of contributing to the development of students' competences. This paper reports our research in the application of a first version of a DSS in the teaching and learning of oral language by a teacher of early childhood education.

1.1 Communicative Competence at School

Catalan education law which develops the organization of curricular teaching and development in all educational stages defines the school as a space of communication. A space where children can learn to talk by talking and interacting with their mates and with competent adults, in the classrooms, when in these classes the conversation is the focus. On the other hand, these regulations establish the ordering of primary education and places great emphasis on affirming that communicative and linguistic competence should be the basis of all learning. This development is the responsibility of all the areas of the curriculum. Thus, educational legislation makes clear that oral language plays a major role in the

development of school activities: children must learn to speak, listen, expose and dialogue.

The conceptual framework that we have recently presented, Gràcia, Galván-Bovaira, and Sánchez-Cano (2017), descriptively reviews seven perspectives of study that address the issue, identifying strategies and activities that prioritizes to teach and learn using oral language in classroom. As a result of the study we point out that teaching strategies are diverse and the most frequent activities are oral presentations and debates. We provide an overview of the current situation and state that programming and defining the objectives is required for teaching-learning the systematized oral language. It should be noted that, among the seven perspectives, the Conversational Methodology (CM) is at the basis of our research.

1.2 Assessment Scale of Oral Language Teaching: EVALOE

Given the great importance of language interactions inside the school context and the need for teachers to be aware of the pragmatics of language, the Oral Language Assessment Scale in the School context - EVALOE (Gràcia et al., 2015a) was constructed with the aim of providing an instrument for specialists in language development (speech therapists, counsellors, educational psychologists ...). This framework have to be able to assess the skills and strategies used by teachers to promote the development of oral competence in the classroom.

EVALOE is an instrument that allows the specialists to explore the interaction between the teacher and the students in the classroom, both the teacher's performance and its consequences in the students' performance, elaborated from a socio-pragmatic and eco-functional perspective of the acquisition of language. It consists of two parts. The first is an observation scale with a total of 30 items grouped into three areas (Context and Management of communication, Instructional Design and Communicative Functions and Strategies). The second part includes a set of questions to develop a semi-structured interview with teachers, in order to evaluate the aspects included in the first part in more depth and taking as a reference their teaching practice.

The methodological proposal that is at the base of the construction of EVALOE is the Conversational Methodology (CM). CM understands the classrooms as communicative spaces in which teaching and reflection on oral language is an end in itself, as well

as an instrument to help students learn contents related to all subjects (Gràcia et al., 2015b).

1.3 The Use of DSS in Education

At present, the figure of a professional who reflects and / or questions his practice emerges as part of the competences of the curricula in any discipline and especially in education (Mauri et al. 2016; Susinos and Rada, 2016). The discussion with other professionals (speech therapists, educators, psychologists ...) and in a further stage individually, allows teachers to generate knowledge about their practice, which promotes a better understanding of it, at the same time that transforms it and also transforms its environment (Farrel, 2007).

In order to establish new ways to solve the difficulties in this complex process, the use of technology and DSS is considered a new challenge in the world of education. In recent years DSS have increasing relevance as a complementary instrument in the traditional advice provided to professionals, aimed at empowering them to define and clarify to take more accurate decisions and to consider the consequences that each of them entails (Eom and Kim, 2006).

As indicated at the beginning of this section, the use of DSS in the field of education is still in an initial phase. Recent research points out advantages and potentialities in its use, both for the planning of processes of content teaching and learning (Kalay and Chen, 2002), as to envisage decisions related to structural and organizational changes in the school (Sadahiro and Sadahiro, 2012). However, there are already some studies highlighting the possibility to use this kind of tools to help in the decision-making process in the field of special education (Gregg, 2009) or in virtual learning contexts (Xu and Wang, 2006).

This article brings to light the usefulness of DSSs in the educational field, and, more precisely, the intention of empowering teachers and helping them in their decision-making regarding their educational practice, their discursive strategies, and communication management as well as the adaptation to the environment, then contributing to the development of the linguistic competence of kindergarten and primary school students.

In this sense, the aim of the study is the construction, implementation and validation of a digital Decision Support System (EVALOE-DSS), conceived as a teacher empowerment tool for self-assessment and decision making about their teaching practice concerning students' oral skills.

2 METHODS

2.1 Participants

In this pilot phase of the study, the participants are 4 teachers and their groups of students. Two of them are kindergarten level teachers and two are primary level teachers. Four diverse schools participated in the study: two inclusive schools, one international school and one bilingual intermodal school (oral-signed language). All teachers had more than 5 years of professional experience in the involved institutions.

2.2 Procedure

The research procedure includes: 1) design and development of a DSS for different type of schools; 2) researcher assessment of one classroom observation using EVALOE-DSS; 3) weekly teacher self-assessment of classroom observation and decision making using EVALOE-DSS for 6 months; 4) analysis of self-assessments, decision making and changes in teaching practices; 5) teacher-researcher evaluation of the helpfulness of DSS and introduction of changes.

At present, the first and second phases have been developed and the third is in progress. Regarding the first phase, researchers linked to the field of the psychology of education and researchers of the area of computer science have worked together for 7 months to transform the EVALOE instrument into a DSS for teachers. The principal criteria from the psychology perspective that have been introduced at the time are the following: 1) to transform an external evaluation into a self-assessment tool; 2) to stablish the differences between the items complexity degrees; 3) to simplify the way teachers have to structure and deliver their answer; 4) to transform the second part of the original instrument, which initially was an interview between the teacher and the observer (external evaluator), in a set of supports for the teacher to take more adapted and accurate decisions; 5) to advise that the teacher is able to know its level of resolution at the end of the self-assessment, before decisions taking and the introduction of the suggested changes. At the technical level, the criteria have been the following: 1) to move from an external questionnaire system to a self-developed solution; 2) to build a model which conceptualises the needs of the DSS; 3) to design a data model with the purpose of enabling an object-oriented system; 4) to display different media based support elements associated to each item, such as videos or pictures describing the desired behaviour,

and to afford a user-friendly way of accessing this support media; 5) to automate the process of choosing which items will compound the teacher's self-assessment; 6) to automate the process of proposing new elements to be introduced in forthcoming classes.

Regarding the second phase, four classroom observations of four different teachers have been made later assessed by two researchers with the EVALOE-DSS tool. In this case, researchers will only use the tool with this assessment function during the process of monitoring and controlling its usefulness.

3 RESULTS

The implemented solution is an online platform which integrates all the necessary features of user management, questionnaire operation, help tools and results viewing among others. It also has two main engines: one responsible for generating the digital questionnaires with the corresponding items, and the other responsible for guiding teachers in their decision on how they can improve their teaching practice.

3.1 Use of the DSS

Teachers are invited to sign in and use the tool when the expert registers their basic information. After receiving an email and choosing their password they will have access to the EVALOE-DSS, but they will not be able to answer a self-assessment until the expert had done a first evaluation of a class of the teacher. This first evaluation fulfilled by the expert is composed of the 30 items in the EVALOE scale, whose answers will automatically generate the first

Table 1: Item examples of each dimension.

A.Instructional design
Pupils self-evaluate their communicative behavior
B.Teacher's management
During the work session, the furniture, pupils and teacher adapts to the characteristics of the activity
C.Pupils' management
During conversation, discussion and/or debate activities we adopt a network format
D. Communicative functions and teacher strategies
I expand the pupils' sentences.
E. Pupils' communicative functions
The pupils synthesize and/or extract conclusions

self-assessment questionnaire to be completed by the teacher. In Table 1 we present one item example of each of the 5 dimensions in that these items are grouped. This questionnaire generator can be understood as an engine that follows a set of defined criteria based on the whole history of responses and adds or removes the appropriate items on the given questionnaire.

At this point the first self-evaluation is available for the teacher, in this case of N items resulting from the questionnaire generator following the algorithm of Figure 1. As mentioned before, every single item has associated different media elements which will guide the teacher through each answer. When the last item is assessed, a summary is shown.

```
1   items_set <- add_medium_and_high_scored_items
2
3   if (items_set not_contain_a_high_complexity_item)
4   then items_set <- add_high_complexity_item
5
6   if (items_set not_contains_item_from_each_scope)
7   then items_set <- add_an_item_from_each_remaining_scope
8
9   while (items_set < 15) do {
10      scope <- next_scope
11      items_set <- add_lowest_complexity_item_from_scope(scope)
12  }
```

Figure 1: Algorithm which generates the first self-evaluation resulting from first assessment.

Once this self-assessment is completed, the DSS engine takes the necessary data to determine which 6 items may be the best to be introduced in the next classes, so the teacher must choose 3 out of this 6. Then, when the next class will have finalised (one class each week), the teacher will do the next self-assessment composed by the items determined by the questionnaire generator. This process is summarised in the Figure 2, showing the use case of a first evaluation performed by the expert on the first class, followed by three self-assessments to be answered by the teacher after the classes.
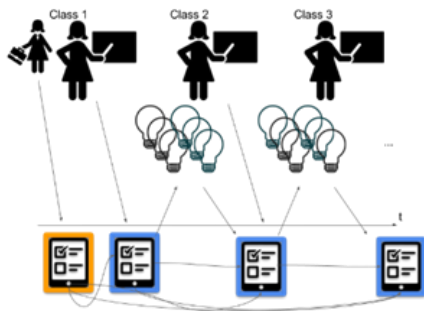

Figure 2: Chronological use of EVALOE-DSS by a teacher through 3 classes. In orange, the first evaluation completed by the expert. In blue, the following self-evaluations of the teacher with their recommended items.

In Figure 3 we present an example of how an item of a self-evaluation is displayed, showing several information of its scope or complexity, and other controls such as the three levels which a teacher can answer. The red-tick button corresponds to a score of 0 (I and or/ my pupils haven't included/done this action in my classroom), the yellow is 1 point (I and /or my pupils have included/done this action in my classroom with low frequency), and finally the green one scores with 2 points (I and /or my pupils have included/done this action in my classroom frequently) the item.
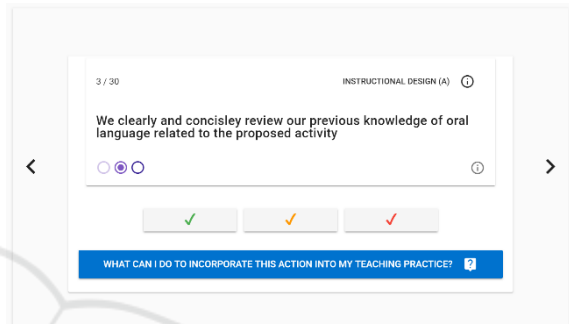

Figure 3: Display of an item.

Every item has linked several media elements to help teachers how to incorporate the action into their teaching practice, such as video, audio or pictures. In Figure 4 an example is presented.
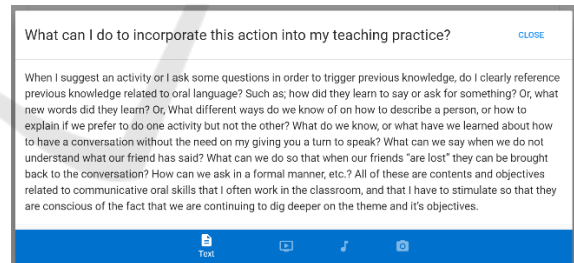

Figure 4: Pop-up with help of an item.

Finally, when the self-evaluation is completed, the teacher is expected to take the decision of incorporating 3 out of 6 items into the following class. This is done in the DSS screen presented in Figure 5.
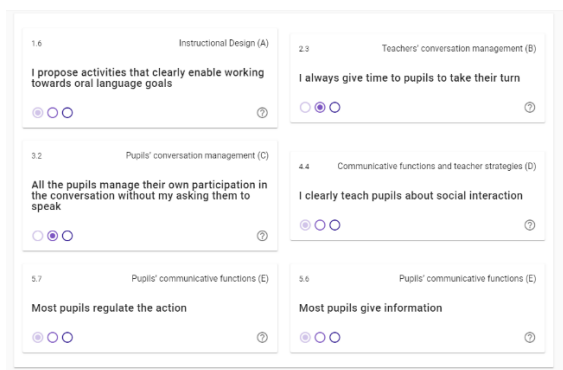
Figure 5: Screen showing the 6 proposed items to be potentially included in the following activity. The teacher will select 3 of them.

3.2 Technical Architecture

The implementation of EVALOE-DSS is splitted into two main components: An Application Programming Interface (API) developed in Java using Spring Framework, and a Single Page Application (SPA) developed in Javascript using Vue JS Framework. This architecture uncouples the user interface (SPA) from the domain interface (API) as shown in Figure 6, so changes in how visual elements are displayed can be easily done without affecting how the model objects may communicate between them and vice versa.
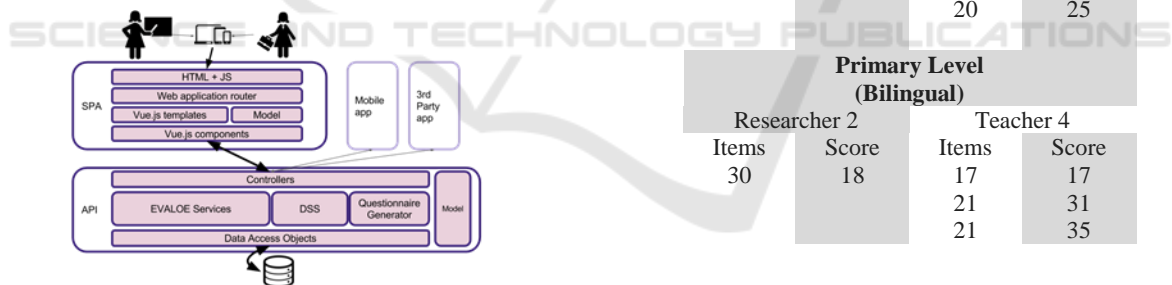

Figure 6: Architecture of the application. This uncoupling allows a better maintenance, and an easier extendibility of functionalities such as connectivity with 3rd party apps.

3.3 Assessments, Self-Assessments and Decisions

As we have explained before, the second phase of the research has been the assessment of one classroom observation using EVALOE-DSS by the researcher and the third phase has consisted on weekly teacher self-assessment of classroom observation and decision making using the tool. In Table 2 we present the results regarding these assessments and self-assessments. Scores show that teachers tend to score

higher than researchers, even taking into account the number of items in each questionnaire. For example, Teacher 1 scores 18 in a questionnaire of 16 items or 24 in a questionnaire of 18 items, while Researcher 1 scores 19 in the questionnaire of 30 items. Also, data show that the number of items of the questionnaire increases each week except in the case of Teacher 4.

Table 2: Scores of current assessments made by the four teachers and two researchers.

Kindergarten (Catalan)			
Researcher 1		Teacher 1	
Items	Score	Items	Score
30	19	16	18
		18	24
		22	28
		26	40
Kindergarten (English)			
Researcher 1		Teacher 2	
Items	Score	Items	Score
30	18	16	20
		21	33
Primary Level (Catalan)			
Researcher 1		Teacher 3	
Items	Score	Items	Score
30	9	15	22
		20	25
Primary Level (Bilingual)			
Researcher 2		Teacher 4	
Items	Score	Items	Score
30	18	17	17
		21	31
		21	35

4 CONCLUSIONS

Our preliminary results show that we have been able to construct a DSS with the criteria that we established after the analysis of the EVALOE as an external assessment instrument in paper support during a project successfully developed during 2012-2015.

Secondly, we conclude that EVALOE-DSS on-line platform has been used as an external instru-ment by the researchers and as a self-assessment and DSS tool by four teachers working in different type of schools at different educational levels.

Finally, at present researchers and teachers are contributing to detect different types of problems or limitations that it is necessary to check in order to improve its usability.

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