Mobile Technology to Support Didactic Strategies

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***Abstract* — This paper discusses the uses of the results of external assessments in educational assignments to improve the quality of elementary teaching. The challenge of disseminating such results is highlighted in an intuitive and attractive way. It also refers to the repercussions of the implemented mobile application, which is aimed at improving the current educational environment. In this way, the importance of the use of technologies in numerous areas, in this case, in education, is proven with the development of this work. The elaborate mobile application was tested and evaluated by the target audience of interest and the article shows the results obtained through the evaluation.**

Keywords-application; external assessments; educational quality.

I. INTRODUCTION

Education evaluation in Brazil has become a State policy based on the reforms, policies and educational actions implemented since the 1990s. Since then, discussions about Brazilian educational problems in both basic education and higher education have been based on the dissemination of information produced by the evaluation processes implemented, with a focus on large-scale, centralized and standardized exams, pointing out the students' strengths, profit and are expressed by rates in scores form or concepts.

It has been emphasized that from the 1970s the post-graduate *stricto sensu* had already had an assessment led by the Coordination of Improvement of Higher Level Personnel (Capes). Basic education began to be evaluated by the Basic Education Assessment System (Saeb) and the higher by the National System for the Assessment of Higher Education (Sinaes).

After this process, everyone became involved in the planning of didactic situations that favor development of the competences and skills that have not yet been built or that are in the process of construction. Therefore, this allows the teacher to carry out real and significant interventions through diversified tasks, bringing about critical and collective reflection for overcoming difficulties and for advancing towards improvement in learning.

Education and technology came to be seen no longer separately, but as a necessary alliance. Teaching practice has changed constantly as new demands and learning needs as well as great amounts of information acquired at a surprising speed. Thinking about it, the teacher, who needs to master these changes and has little time, also needs the support of technology to optimize time, find interesting content, prepare lessons, communicate with students and more. The tool created to help access the information of the evaluations already mentioned thus helps to inform the daily planning of the teacher for the classroom.

This paper has the objective of examining the assessment system for basic education in Brazil, with emphasis on the Palmas Educational Assessment System-SAEP. Besides presenting concepts and objectives of the main systems of assessment, it tries to discuss some of weaknesses in the way that the data are made available. The paper was divided into the following forms: In Section 2, the assignments are related. In Section 3, the proposal is presented for creating of the tool. I Section 4, the methodology used for creation and implementation of the tool are shown. Section 5 presents the results through the use of its didactic application, closing in Sections 6 and 7 with the acknowledgment, future assignments and references.

II. RELATED ASSIGNMENTS

The Saeb introduced in the early 1990s was initially based on the quantitative results of a test applied to a sample of students and was changed in 2005. There were two components: the National Assessment of Basic Education (Aneb). This is a large-scale examination applied in a sample of schools, and the National Assessment of School Income (Anresc), known as the Brazil Test, which is also a large-scale examination applied to all students. The Brazil Test was introduced in 2005 as an evaluation instrument based on the application of large-scale exams in order to evaluate the performance in Portuguese and Mathematics of all students enrolled in the educational systems, which made it possible to disseminate the results by school unit. In 2007, the Basic Education Development Index (Ideb) was introduced, which began to combine the results of the students in the examinations of the Brazil Test with the approval rates by school (school flow). Based on these indicators, schools and

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education networks were classified on a numerical scale. Based on these two indicators - Brazil Test and school flow - the Ideb began a major media campaign, in which the instrument that indicates the quality of Brazilian basic education, also serves to mount rankings of schools and states of the federation. The policy of rankings in basic education was then established.

It is possible to develop a system of evaluation aimed at improving the quality of education - including teaching, learning and institutional management with the aim of transforming the current school into an institution dedicated and committed to the democratization of knowledge and education, as well as with the transformation of society [1]. In this way, to evaluate implies in taking of decision with a view to refining the improvement of institutional quality and providing accountability accounts the society.

In this context, contemporary theorists such as [2]-[5] have innovated conceptions of evaluation and contributed to the evolution of the teaching and learning process. In this perspective, assessment is a qualitative appreciation of relevant data in the process of teaching and learning that assists the teachers in making decisions about their work. Therefore evaluation is a reflection on the level of quality of school work. Thus, large-scale evaluation must also be perceived in the same way.

The evaluative act is thus perceived as inherent and indispensable, during any educational process that takes place in a constant work of action-reflection-action, as in [6], to educate is to act as subject, is to question the world in which we live in order overcome the contradictions, committing ourselves to this world to constantly recreate it.

Based on the history of educational assessments and the need for growth and increasing information in educational networks, the idea came about of creating a tool that facilitates the access and dissemination of important data about the evaluation system of the municipal network of Palmas -TO.

Palmas Educational Assessment System (SAEP) is characterized as an external evaluation that aims to provide consistent, periodic and comparable indicators of the Municipal Teaching Network of Palmas that can guide the agents involved in the educational system in the quest for improving the quality of teaching.

The assessment was an action requested by the Municipal Department of Education to for the Evaluation, Statistics and Training Board, aiming to present the index of non-literate students in the classes of 5^{th} to the 9^{th} grade of elementary school. The process was initiated based on a pre-diagnosis carried out by the teaching units of the aforementioned network, raising the abilities of students with difficulties in the construction of reading, interpretation and writing development.

The diagnostic assessment is an inquiry instrument and it intends to contribute to the construction and resignification of a differentiated understanding for the teaching and learning process and to the evaluation practice from an action-reflection-action perspective. In this regard, the diagnostic assessment is considered to be a diagnostic tool that will allow the teacher to observe and become familiar with the characteristics of the students' thinking, what they know and what they need to know in order to learn, in order to develop a diversified work and to make progress learning.

In other words, the goal is to know the real development zone (what the student has already learned and performs with independence and understanding alone). That will enable interventions in the proximal development zone (which is still in the process of maturation) and take the pupils to the potential development zone (in which the student is able to perform independently after mediated learning).

Any process that was planned in such a way makes it possible to diagnose the learner's level of learning about their writing and reading construction process. The instrument was composed of questions that assesses the student's competence and their ability to read and interpret a text, using as a mechanism the ability to find explicit information and infer implicit information. To verify the level of writing construction, the mechanism used was the ability to write canonical and non-canonical words and the production of a text.

After the application assessment instrument was carried out by the schools in question, the Board of Statistical Evaluation and Training, through specialists in the areas of Portuguese Language and Literacy carried out the correction of the task, analyzing the construction and interpretation of the student, verifying the level of each student, and then tabulating and to condensing the data.

III. PROPOSAL

Two decades ago, large-scale educational evaluations were carried out in Brazil to inform education departments in the formulation of educational policies and schools in improving pedagogical practices and management. However, it is difficult for managers and education professionals to understand the results of these assessments and to use them to subsidize educational action.

Aiming to broaden the debate and the use of evaluations as a strategy for improving quality in education, the proposal of the application aims directly at teachers offering inputs for reading the results of external evaluations and stimulating proposals that focus on improvement of educational processes.

The pedagogical reading and interpretation of external evaluation results is a starting point. Identifying, for example, the information in the Brazil Test bulletins that provide clarification about student learning broadens the perception of teaching practices, as well as management practices. This reading goes beyond knowing the averages of performance and comparing them with those of other schools and systems. This reading should direct efforts towards understanding what actually happened to that generation of students who took the test and what could have produced the result in question. This movement is what turns a result into a point of

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support to understand, criticize and eventually change the pedagogical process. The detailed analysis of the distribution and variability of the students' performance in the proficiency scales is what makes the difference in reading and interpreting the results, and what enables a deeper knowledge of the school performance and from this, to make decisions and rethink interventions.

Little is known about the consequences and effects of evaluation policy on the organization of school work, and in particular on pedagogical action. However, some studies indicate that it is possible to affirm the existence of movements that intensify the use of external evaluations and their results by educational networks and schools in Brazil, in the articulation and organization of pedagogical work [7]-[9].

Since the release of the results of the first assessments in 1995, the researchers have had to face the challenge of disseminating them so that they could be understood by the school community, parents and all interested in knowing the levels of performance of a given population of pupils [10].

Currently, the test is being conducted and the results are passed on to the Assessment Board, which tabulates, and condenses the data and produces reports that are made available to the teacher on the site of the SAEP, where they can be worked on in the classroom. This is shown in Figure 1, below:

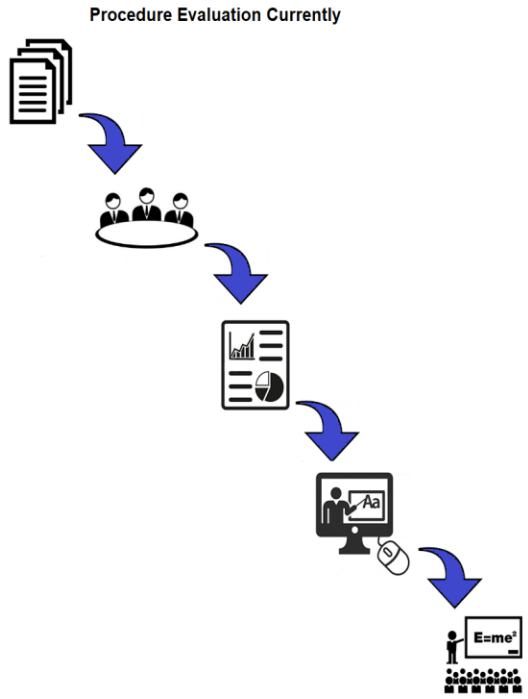

Figure 1. Flowchart of the Procedure Evaluation Currently

With the application, the test results are then passed on to a server, which interprets and presents the data on a smartphone application, more clearly and efficiently, and accessible to all teachers. This process is illustrated in Figure 2 below.

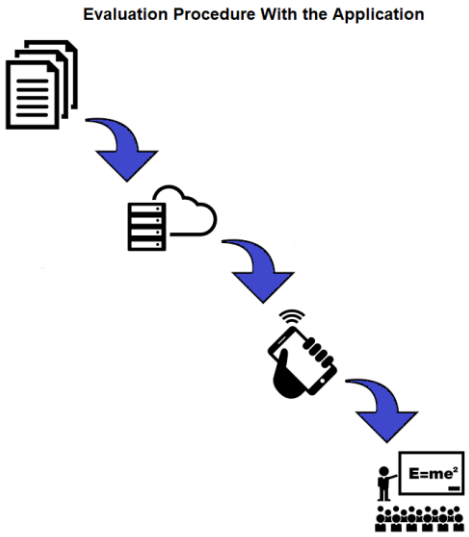

Figure 2. Flowchart of the Evaluation Procedure With the Application

Thus, the proposal of this paper is to enable the Generation of Reports on the Indicators of Quality of the Education of the System of Educational Evaluation of Palmas - SAEP, a form to facilitate the access to the information by the teacher in the classroom, making the diagnosis of the learner's level of learning more intuitive, quick and effective.

IV. METHODOLOGY

In this section, the necessary methodology will be shown on how to carry through the proposal presented in previous section 3, with the intention of later presenting the obtained results of entire process.

A. *Materials*

The materials used in this study are the following related ones:

- Computer - System Linux Ubuntu
- Ionic Framework 2.0
- JavaScript Object Notation (JSON)
- Google Forms

B. *Methods*

In this context, the Ionic is inserted in a framework for developing applications for mobile devices that aims for the implementation of hybrid applications for fast and easy development. The framework is the easiest way for the web developer to create, develop and scale multiplatform mobile applications. It offers to many libraries a simplified development and helps to produce apps with a presentable appearance, without giving much work to the developer, and does not require much knowledge, merely Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and Javascript.

The diverse advantages of if using the Ionic framework have brought about the necessity for a light format combined with its work for data exchange and makes reading simpler.

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With this the applications program was developed in the Ionic framework with information consumed by a JSON archive, a light format for data exchange. JSON is in text format and is a completely independent language because it uses conventions that are familiar to C and familiar languages, including C ++, C #, Java, JavaScript, Perl, Python and many others. These properties make JSON an ideal data exchange format.

C. Field Work

Field research is the type of research that seeks to find information directly from the population surveyed. It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems and develop new theories.

Similar to a thermometer, which shows the temperature on a scale, the Palmas Educational Assessment System is an instrument that will point out the pupil learning on a scale, more specifically, the percentage reached in the evaluated descriptors. Combining these results with the easiness of using applications, the tool was developed and then evaluated through a form.

All the Portuguese and mathematics teachers from the two schools that were presented the applications responded to the form and two others from the group of the Post-graduate *Lato Sensu* in *Telemática* of IFTO. This is shown in Figure 3.

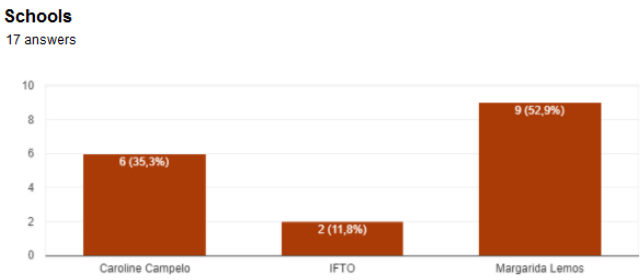

Figure 3. Amount of people per school

The form presented to the users (teachers) was answered accordingly to their opinion of the application, on a linear scale, organized accordingly to the Likert scale, ranging from 1 if they completely disagreed with the affirmation, and up to 5, in the case of full agreement.

All statements written for this research are listed below.

1. The application information is presented in a clear way.
2. The application information is of great relevance to the teacher's planning.
3. The data shown in the application makes it possible to identify where the biggest learning deficit lies in relation to the descriptor in the disciplines evaluated.
4. The navigation in the application is in an intuitive form.
5. One can always access information that is of one's own interest.
6. The application enables faster identification of the deficits of each class and consequently the implementation of possible solutions.
7. It is imagined that most people would learn to use this system quickly.
8. The students benefit from the idea of the application, where they will be able to improve in the areas of learning in which they have difficulties.
9. The information accessed will significantly contribute to quality planning in order to obtain better results in internal and external assessments.
10. Compared to the previous form of access to results, the application speeds up this access and offers a faster and more efficient way of showing and then planning for recovering or maintaining the results.

Such research had a previously calculated sample of 15 people, which counted on all teachers mentioned of the two schools presented in the application. Besides the 15 teachers, as already mentioned, two more users also answered the form.

In many cases, it is possible to determine the minimum sample size in order to estimate a statistical parameter. These formulas work with the idea that the population where the sample is located is so large that it can be considered infinite. However, many populations are not considered large enough compared to the samples, which is the case of the study in question [11]. For the circumstances already highlighted, the population available for the two schools present in the application are 15 teachers.

Thus, the formula used in this situation to determine the sample (n) was based on the average population and is shown in (1) that follows [11].

$$n = \frac{N.\sigma^2.\left(Z_{\frac{\alpha}{2}}\right)^2}{(N-1).E^2+\sigma^2.\left(Z_{\frac{\alpha}{2}}\right)^2} \quad (1)$$

Where:

n = Number of individuals in the sample;

N = Size of the population;

$Z_{\frac{\alpha}{2}}$= Critical value that corresponds to the desired degree of confidence;

σ = Standard deviation of the studied variable;

E = Margin of error.

The values of all variables mentioned above are described in Table 1 below.

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TABLE I. VARIABLES AND VALUES FOR THE DETERMINATION OF THE SAMPLE

Variables	Values
N	15 teachers
$Z_{\frac{\alpha}{2}}$	1,96
σ	1,18
E	0,03 (3%)
n	14,96

The critical value considered is associated with a degree of confidence of 95%. The standard deviation was determined through an assumption of the 15 teachers' answers to one of the questionings of the applied form. Thus, it reached a sample value close to 15 and which could be summed up to this value.

V. RESULTS

In this section, we will present the results, which were obtained through the application of the form described in the previous section.

The 10 statements written for the form can be related to the navigability/layout or the idea of the application, where the division was of 5 topics for each relation.

In the first evaluated scenario, the statements covered the way in which the application was presented, more precisely, its navigability and appearance. The topics that describe this situation are 1, 3, 4, 5, and 7. All the answers to the 5 affirmations of this first scenario were compiled in the graph of Figure 4 below.

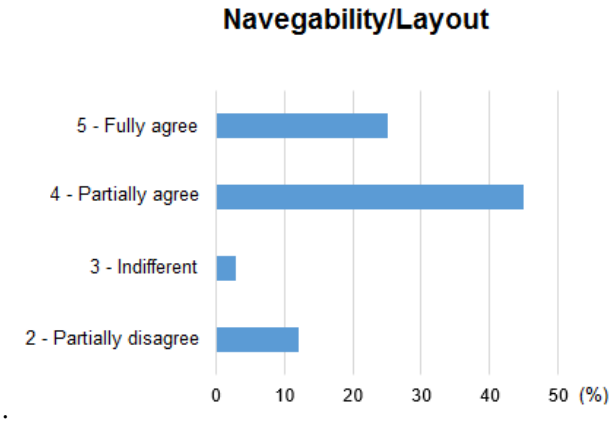

Figure 4. Results of statements related to navigability and layout

Analyzing Figure 4, it is possible to affirm that the questions obtained a considerable negative percentage. Affirmative answers were approximately 25 %, while the other 75 % had some parameters that they disagreed with. Clarity of information and access were the items that stood out most in the research as the least well evaluated. It is believed that the improvement of these two factors is essential for the application to be somewhat attractive and well spread.

In the second evaluated scenario, the idea of the application, its relevance and contribution were the items evaluated. The statements that are part of this second situation are 2, 6, 8, 9 and 10. The answers to these five affirmations can be seen in the compilation of Figure 5 that follows.

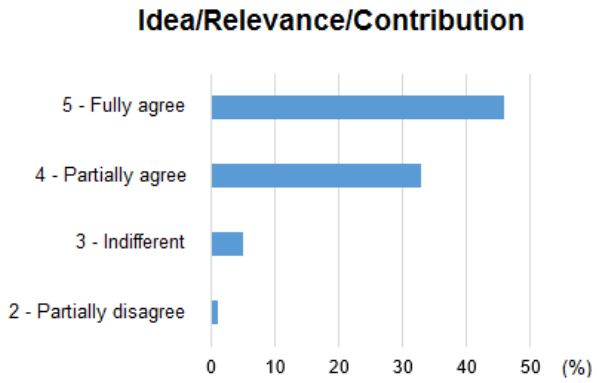

Figure 5. Results for statements related to the idea, relevance and contribution of the application

In this scenario, it is possible to realize the difference of acceptability for the situation analyzed previously. The relevance of the application is evident in the results obtained from field research. A better planning by the teacher for implementing later on a possible solution for one given situation was the most accepted item in the research.

The most rejected statement, the one with the most negative responses, is directly related to the clarity of the information in the application. The most viable explanation for such rejection is given in the little information of what the descriptors would be and what they are related to. The results are exposed directly, without a previous detailing of each line evaluated. Figure 6 shows this disagreement.

Figure 6. Result for statement 1

The most approved affirmation, and that can be considered as one of the most important, is the comparison with previous form of accessing the results. This assertion can be proved in the Figure 7.

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Figure 7. Result for statement 10

The test application speeds up the access to results, offers a faster and more effective way to show present and then plan to recover or keep the indicators.

VI. CONCLUSIONS

The conception of evaluation as a broad process of informing decision-making in the context of the teaching systems is recent in Brazil. It should be understood as a process that aims at contemplating skills and abilities, the curriculum itself, students study habits and the teaching strategies of the teachers. In also involves management styles of the directors and the resources they offer, to improve the performance of their work.

Evaluation is then a necessary process and condition for qualitative and quantitative targets to be established and monitored, and to ensure that the latter are reached. With this in mind, evaluation can foster in schools and networks a systematic interpellation into the quality of their practices and results, link the contributions of the external evaluation with the culture and the devices of self-evaluation of schools and strengthen their capacity to develop their autonomy, regulating the functioning of the educational system.

Thus, it is necessary to observe the information coming from the assessment as evidence of the teaching and learning process, showing the trajectories of students, schools and the network itself, in order to support pedagogical decisions and reconfigurations.

This whole scenario of strategies for the improvement of learning is facilitated by the use of technologies, making it faster to identify the deficiencies of each class in each discipline of each school. Applications such as these bring more intuitive, quick, and effective ways of identifying some problem. It is worth highlighting, therefore, the importance of investing, technologically speaking, in education in general.

Future missions will be for improving the application, both in layout and in new functions. An additional suggestion of new work is faster notifications for each specific type of user.

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