Visión Electrónica
Más que un estado sólido

UNIVERSIDAD DISTRITAL
FRANCISCO JOSÉ DE CALDAS

VISIÓN ELECTRÓNICA

A RESEARCH VISION

Mathweb, web platform for the teaching of mathematics in secondary basic. Preliminary results

Mathweb, plataforma web para la enseñanza de la matemática en básica secundaria. Resultados preliminares

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ABSTRACT

The students of basic secondary education require a platform that provides them with more interactive learning of mathematics. MathWeb Education arises because of the low performance of mathematics in the country's educational institutions and also because of the low results in the ICFES tests in the area of mathematics. There is a need to move from a traditional model of teaching mathematics to the use of TICS with a different learning methodology. Brunner's learning methodology is incorporated into the platform, student learning is guided, dynamic and tests their knowledge. The objective is to socialize preliminary results based on the market study carried out in the participation of the phase discovery of digital business in person of apps.co at the end of 2019, the approach of the students' problem in learning mathematics was validated, thus obtaining a value proposition for our project and development of a small prototype as a platform.

RESUMEN

Los estudiantes de básica secundaria requieren de una plataforma que les brinde aprendizaje de las matemáticas de forma más interactiva. MathWeb Education surge por el bajo desempeño de las matemáticas en las instituciones educativas del país y también por los bajos resultados en las pruebas ICFES en el área de las matemáticas, se necesita pasar de un modelo tradicional de enseñanza de las matemáticas al uso de las TICS con una diferente metodología de aprendizaje. Se incorpora la metodología de aprendizaje de Brunner en la plataforma, el aprendizaje del estudiante es guiado, dinámico y pone a prueba su conocimiento. Se tiene como objetivo socializar resultados preliminares con base al estudio de mercado realizado en la participación de la convocatoria Fase Descubrimiento de negocios digitales presencial de apps.co a finales del 2019, se validó el planteamiento del problema de los estudiantes en el aprendizaje de las matemáticas así obteniendo una propuesta de valor para nuestro proyecto y desarrollo de un pequeño prototipo como plataforma.

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1.   Introduction

At present there is a deficit the learning of mathematics in students of secondary basic because of the few trained personnel and didactic material for the students to have a more productive learning at the national level In Colombia the percentages of performance on the national test ICFES are already low that learning is obtained through mechanical procedures that are not related in the application of these topics in everyday life.

Students living in rural areas have few materials to learn mathematics in a more practical way and with staff trained in this area, there is a major global problem where students are not receiving the minimum knowledge in reading and math [9]. MathWeb aims to reach all those students who require learning in a more dynamic and interactive way with the real world and who can enjoy in the course of their learning or reinforcement in mathematics.

2.   Problem statement

There is currently a learning deficit Colombia mathematics in the educational institutions of the country by the few personal to teach and didactic material for that this matter lets of to be so theoretical which implies that graduate school students do not want to enter a career related to mathematics [8]. The results of the ICFES tests in mathematics are the lowest since learning is by means of mechanical procedures that are not related to the application of this matter in life (Table 1).

Table 1. Results in the test math in Caldas period 2019-4 [4]

Aggregation level	Average	Deviation
Colombia	253 ●	50 ●
ET	254	49
Urban officials ET	255 ●	47 ●
Rural officials ET	231 ●	41 ▲
Private ET	300 ▼	44 ▲
GC 1 ET	225 ▲	38 ▲
GC 2 ET	243 ●	44 ▲
GC 3 ET	272 ●	47 ●
GC 4 ET	316 ▼	38 ▲

ET: Educational establishments

Internationally according to a UNESCO publication *"More than 617 million children and adolescents are not achieving minimum proficiency levels (MPLs) in reading and mathematics, according to new estimates from the UNESCO Institute for Statistics (UIS)"* [9]. Most students who have learning problems are attending classes the which is sought to improve the quality of education (Figure 1-3).

Figure 1. Proportion of children and adolescents not achieving MPLs in mathematics and reading, by SDG region [9]
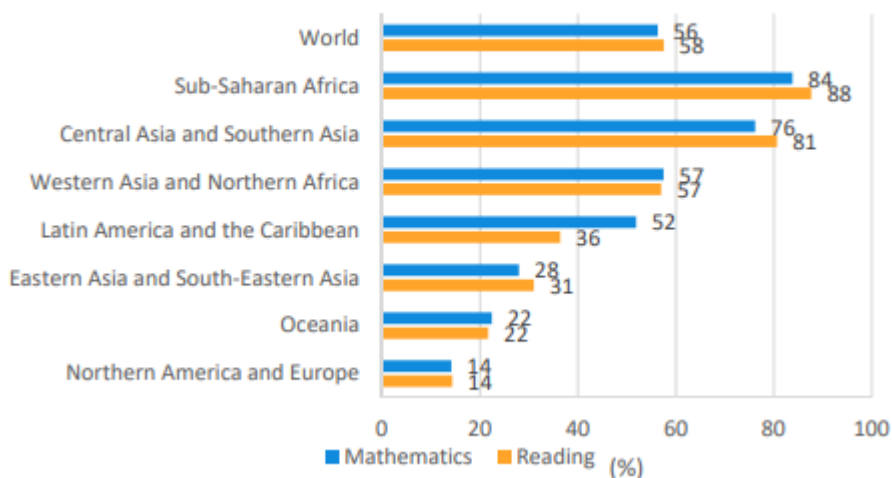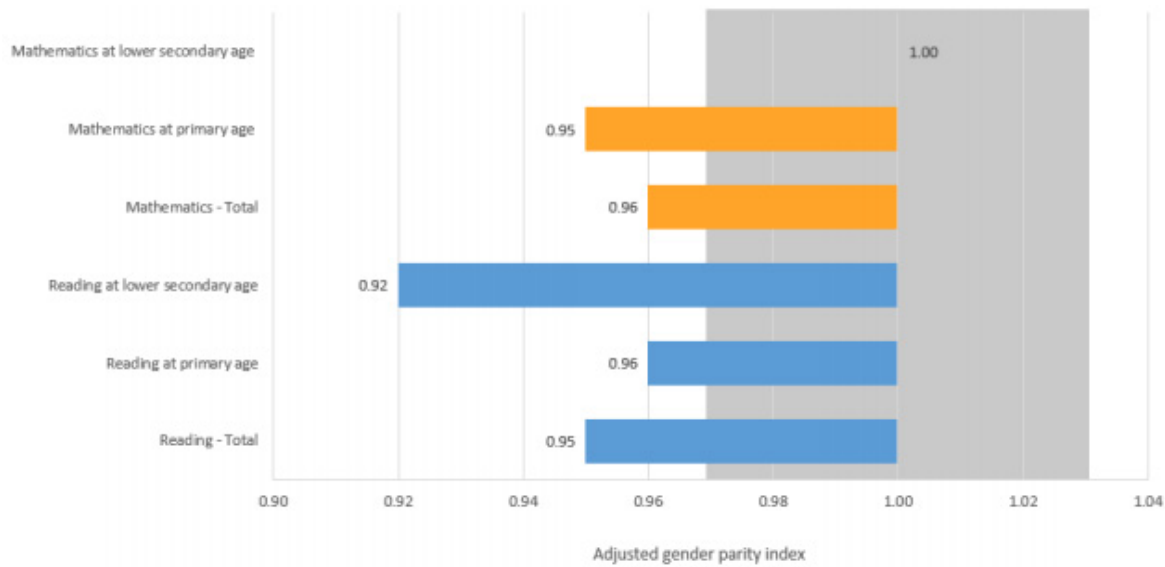
Figure 2. Adjusted gender parity index for children and adolescents not achieving MPLs in mathematics and reading, by level and learning domain [9]

Note: GPIA <0.97 indicates male disadvantage; GPIA >1.03 indicates female disadvantage.

Figure 3. Adjusted gender parity index for children and adolescents not achieving MPLs in mathematics and reading, by level, learning domain and SDG region [9]
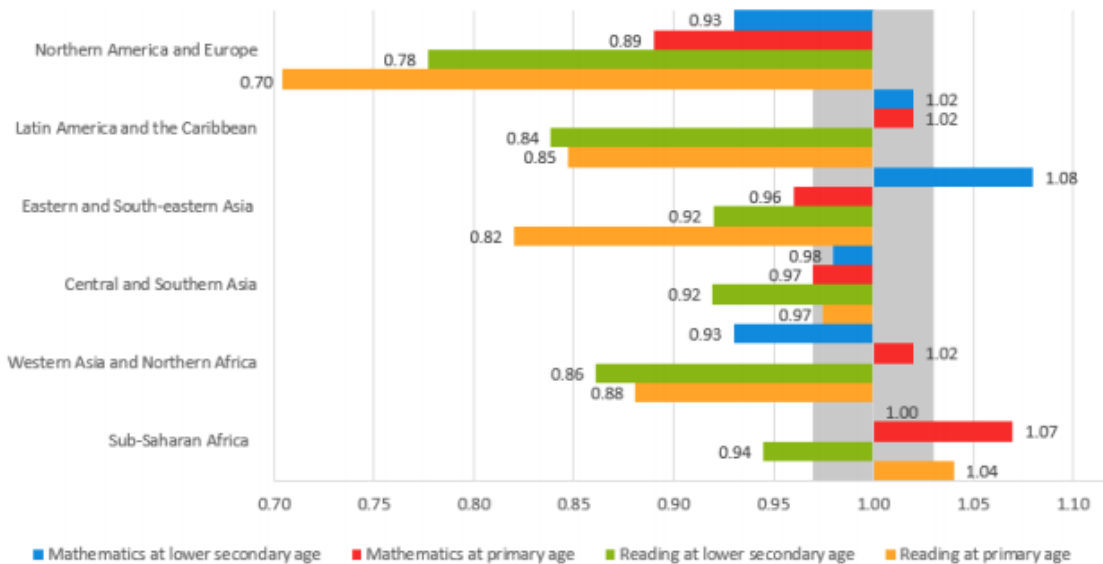

Note: GPIA <0.97 indicates male disadvantage; GPIA >1.03 indicates female disadvantage.

3. Justification

Social networks are currently being used massively, especially by young people [7]. There are several social platforms or networks, most for purely social interaction (Figure 4), however some of these networks are used to establish knowledge networks, negotiation and scientific interaction.

Therefore, social networks have a different purpose than learning, so is important to develop specific networks for interaction between people who choose to use them to improve their learning by building a community on a specific topic.

Figure 4. Social platforms with active accounts [5]
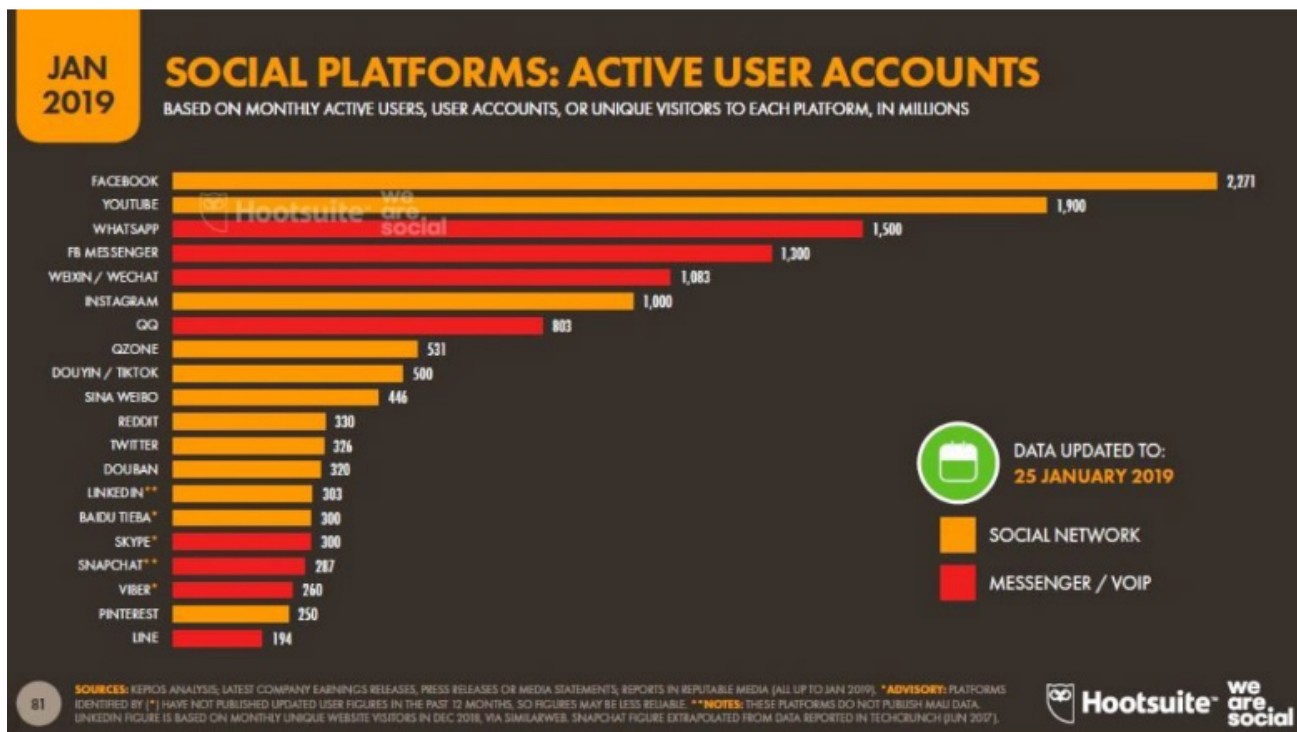
4. Objectives

4.1. General objective

Support math learning processes through a web platform.

4.2. Specific objectives

- Design a tool to evaluate the learning of mathematics education basic secondary.

- Implement social interaction web application for maths learning and support.

- Evaluate the differences in learning a specific subject of mathematics between developed tool and traditional method.

5. Theoretical reference

The methodology for learning mathematics to be carried out in the project is based on Bruner's theory of learning where the student is considered to be learning through guided learning, "*Therefore, the teacher's job is not to explain one finished content, with a very clear beginning and end, but to provide the right material to stimulate his students through strategies of observation, comparison, analysis of similarities and differences*" [6].

Social Networking Theory by Charles Kudashin tries to describe and explain the interactions between groups of people, institutions, entities or any other entity, people are more likely to know each other [2].

6. Methodology

The overall methodology of the project is based on the model of requirements lifting, analysis, design, development and implementation, development testing and pilot validation for the software.

6.1. Implementation of the platform

The ideal methodology for software development is the SCRUM methodology. In SCRUM the team monitors the progress of the project and gives priority to the main development of the web platform for its functionality [3].

6.2. Methodology of working with TICS

The methodology of working with ICTS will allow us to carry out the evaluation of the platform since

currently people can more easily access a computer or cellular [1] Developing the tool compares the result of using the platform and the traditional model of teaching.

6.3. Pilot tests

To take the pilot tests will take groups of students from different educational institutions who have not study a specific subject of mathematics we will assign a part of the sample of students using the platform and the rest will receive master class so that at the end of to study completely the subject is carried out an evaluation verifying that the platform is so effective and efficient.

The application will be put into operation to the general public so that they can apply for tutoring by teachers enrolled in MathWeb Education and trained to give classes on specific subject where the tutor will give monitors and ultimately will have a qualification by the user who requested the service.

7. Results preliminary

7.1. Research results

MathWeb was at the "*Fase de Descubrimientos de Negocios Digitales*" in accompaniment to APPS.co of the Ministry of TICS, Caldas University and SENA-Manizales SBDC Business Development Center in late 2019 where a market study was made aimed to reach all those students of secondary basic who need to reinforce or are interested in mathematics, to be part of a social network and to have tutors with the competence of teaching methodology of guided learning.

The following is the results of a survey involving 28 students from private schools, public high school and first semester college students (Figure 5).

Figure 5. Percentage response of students with deficits in math learning
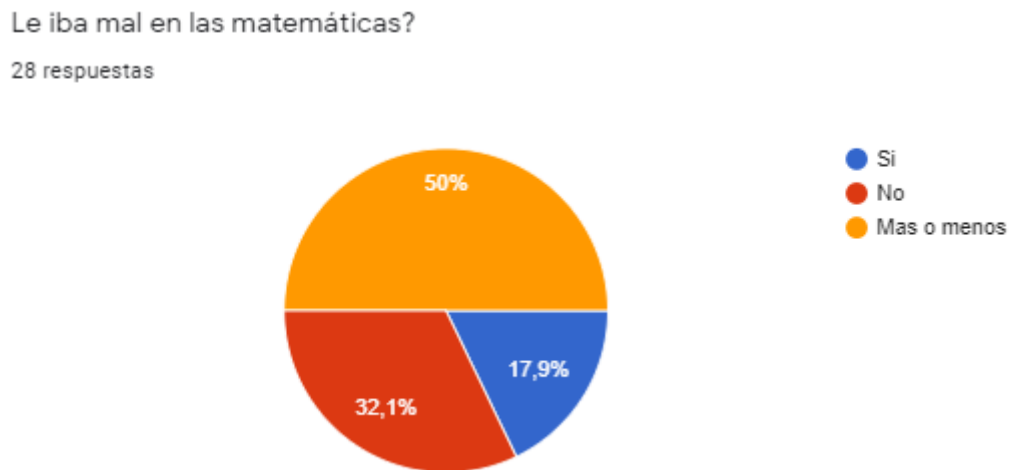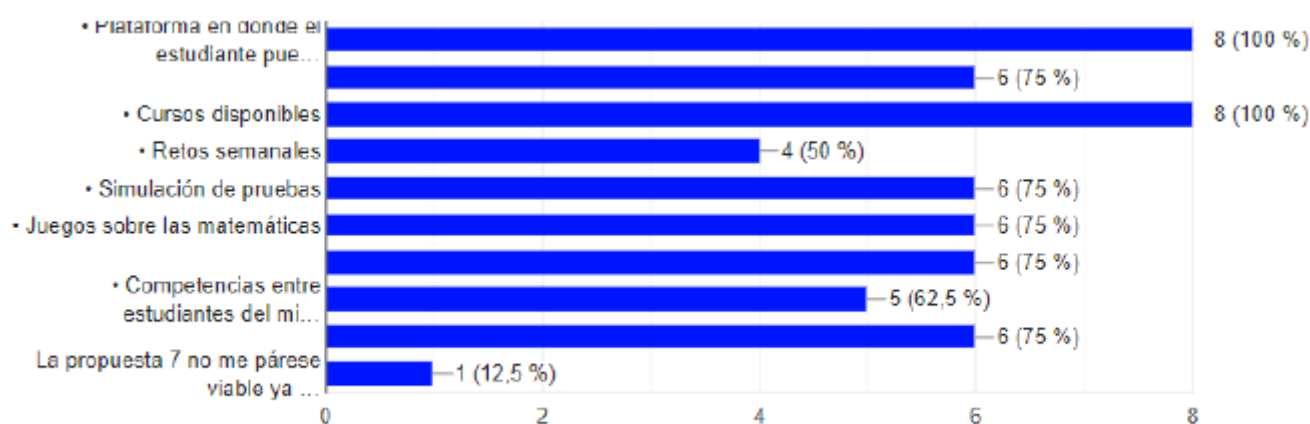

Source: own.

The following results were obtained based on the target market analysis based on the study of the 28 students.

- **Causes of student underperformance in mathematics:** Teacher methodology, do not understand them, consider them complex and many exercises to solve.

- **Consequences:** Low grades in mathematics in school, lack of motivation and frustration in not understanding them.

- **Deficiency in current solutions:** Traditional teaching methodology, non-personalized material for students, very extensive videos, extensive documents and lack of tutors available.

A survey was conducted on students in the Caldas region, we obtained the following results from validation activities for functionalities to be incorporated into the platform (Figure 6).

Figure 6. Features to incorporate into the web platform

Source: own.

7.2. Value proposition

Students accessing the tutoring service will be able to improve their performance on a specific maths subject by 90% based on the currently validated Brunner learning methodology always fulfills the responsibilities assigned by MathWeb Education and the tutor.

8. Impacts

A pleasant web platform is expected to provide support to students in the area of mathematics, have a dynamic and applied learning where learning can be evaluated, have monitors and also belong to the community which will be able to: share or obtain material to support your learning, post and belong to specific groups that focus on an area of mathematics study.

9. Conclusion

The study of the learning deficit mathematics concludes that is necessary from a traditional model of teaching to another model of learning where the student can learn in a guided manner and discover why the study of mathematics is needed.

Currently with the advancement of technology and access to we can make use of TICS to provide support to students in distant areas and using Brunner's learning methodology, developing a dynamic platform that can make use of teachers and students from rural and urban areas to support the learning of mathematics in secondary school.

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