Analysis Of The Inclusion Of Pseint As An Initial Programming Language In South America

Albert Miyer Suarez Castrillón[1], Sir-Alexci Suarez Castrillon[2], Thomas Edison Guerrero Barbosa[3]

[1] Faculty of Engineering and Architecture, GIMUP Research Group. Universidad de Pamplona, Colombia.

[2] Faculty of Engineering, GRUCITE Research Group, University Francisco de Paula Santander Ocaña, Colombia.

[3] Faculty of Engineering, University Francisco de Paula Santander Ocaña, Colombia.

ABSTRACT:

This research analyzes the inclusion of the Pseint programming language in educational institutions in South America, as a language for the beginning of programming logic through instructions in Spanish. The institutions with a registered profile that are listed in the Sourceforge platform are analyzed, from the 9 countries that speak the Spanish language, although the language is used by a large number of teachers, they are not taken into account unless they maintain this registered profile. It is shown that the countries with more institutions adopting the language are Colombia at 25.73%, Argentina at 18.93%, and Peru at 17.48%, and the proximity of each country is analyzed to know its influence.

Keywords: South America, Pseint, programming logic, Spanish syntax, pseudocode.

1. INTRODUCTION

The programming logic and its teaching from an initial course is a complex task, because it needs analysis and mathematical knowledge to code the solution. Generally, most educational institutions start with pseudocode, which is a language that resembles natural language, being non-regular and low level (Kwon & †, 2022; Wang, 2021), although it allows a first model of how the program can be developed, it presents difficulties when it comes to see its execution. Another tool used are the Flowcharts, which allow developing a program by means of symbols or figures that have a specific function, connected by flow lines (Tiwari & Prasad, 2015); the two tools although widely used are usually directly replaced by high-level languages, due to the changes that must be made afterwards to be able to program.

Generally, the programming languages with which a programming course is started in South America can be high-level languages such as Java (Elshiekh & Butgerit, 2017), Python (Velaora

& Kakarountas, 2019) or C++ (Soon, 2019); where at the beginning their concepts are complex and in most cases gamification must be used to learn and apply them. Among the problems are the analysis and mathematical formulation, in addition to the concepts about conditional structures, repetitive, matrices, vectors, input and output data, where each language has a different technical coding, thus the English language is used as a language. One more problem that accumulates for students from South America where the language is Spanish, and while they adapt to the English language they may spend time to begin to really understand the logic of programming.

The previous problem has been solved with the Pseint programming language developed by Pablo Novara (2004), as a tool for teaching programming logic through a very powerful pseudocode that maintains the same tools of a high-level language and with instructions in Spanish (Genbeta, 2020; Laura-Ochoa & Bedregal-Alpaca, 2022), which allows the student to focus directly on the programming logic, without having to know all the technical coding in English. Pseint is being used from Mexico to Argentina and also in educational institutions in Spain. The language itself becomes a didactic tool even for learning other subjects such as linear algebra (Beúnes Cañete et al., 2019); in electronics subjects as a methodological teaching strategy (Arellano et al., 2014), in the end it can be used in any area of mathematics (Cruz-Barragán et al., 2019).

This research analyzes the use of the Pseint programming language in all South American countries, in order to know the implementation of the language in the subjects of beginning to programming, above high-level languages such as Java, Python or C++, due to its coding in Spanish without having to complicate with the syntactic analysis.

2. METHODOLOGY

The Pseint language is used from Mexico to Argentina and even in Spain; but the analysis will only be carried out based on the countries of South America, which have Spanish as an official language, taking into account the number of institutions that teach it as part of their subjects. In total there are 10 countries: Argentina, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela (Figure 1).
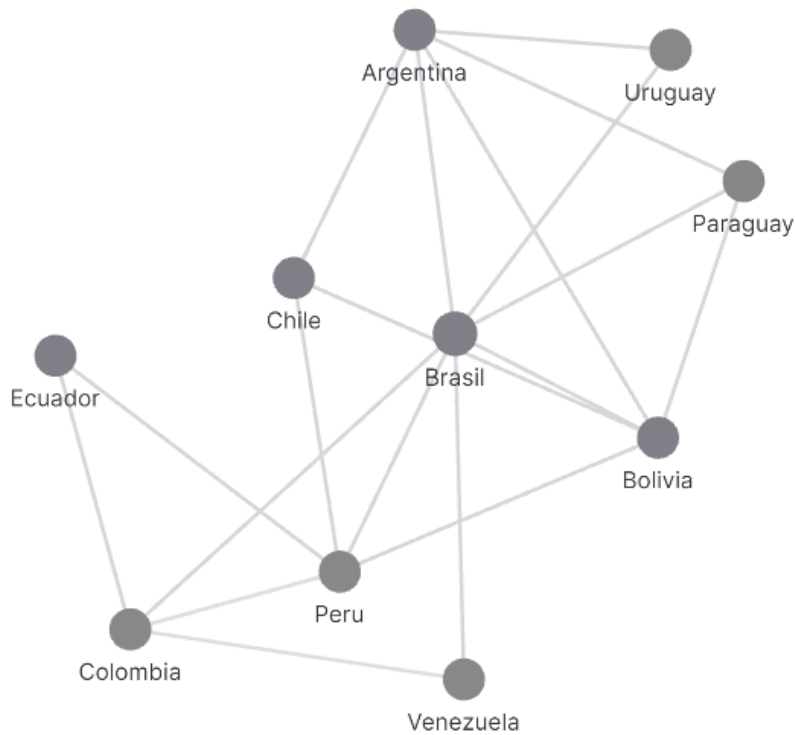
Figure 1. Connection of countries by their border limits in South America.

Knowing the penetration of the Pseint language in South American educational institutions is complex because the program is free and there is no record as such of who may be using it. However, it can be customized according to the program, faculty or university, requesting to be added to the language list. This configuration data is found in the language options (Figure 2), from where the database is taken to know the country of configuration and use of the programming language.

The Pseint programming language presents quite powerful tools for the realization of programs and allows to strengthen the logic of programming by means of simple commands. Among which are the input and output data and different mathematical functions. It also has the conditional and repetitive structures suitable as high-level languages, and the possibility of executing step by step with a desktop test system according to the execution. It also allows the handling of arrays and functions, with which it is possible to make quite advanced programs to later pass to a high-level language, knowing the logic of the structures (Figure 3).
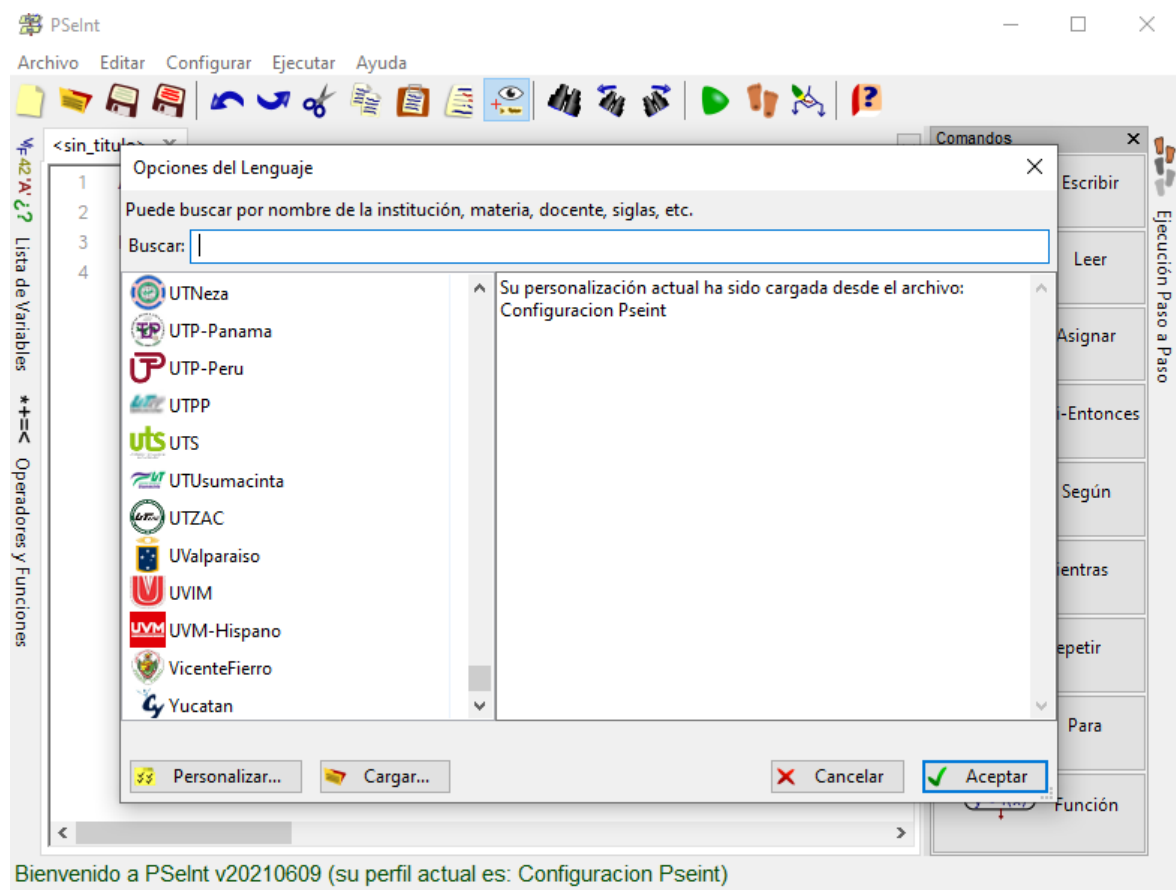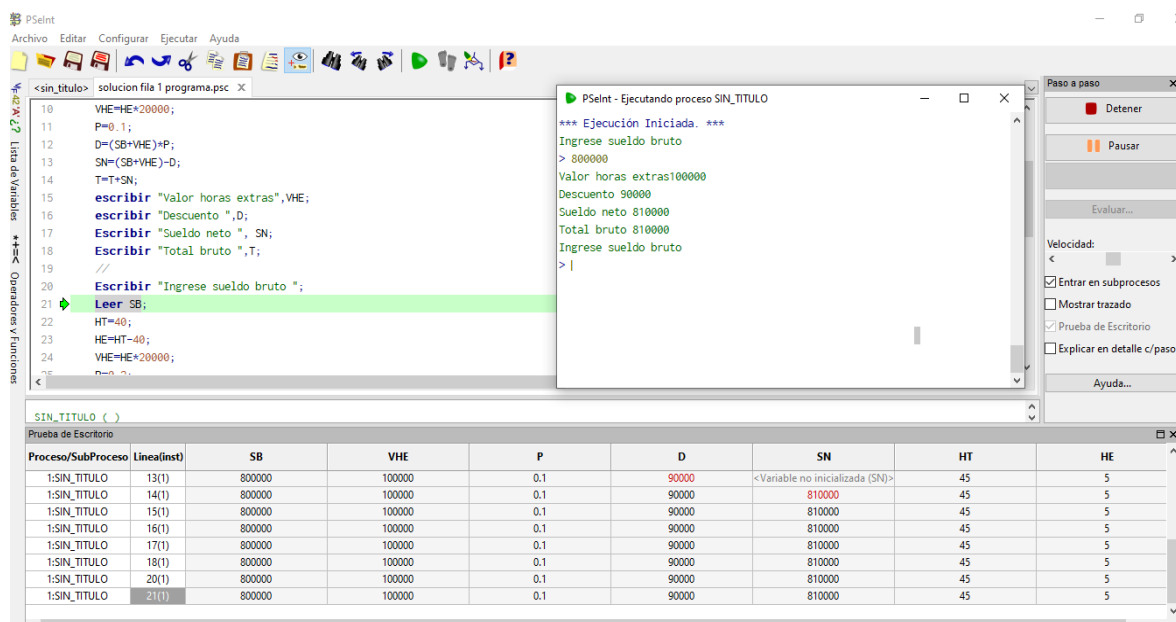
Figure 2. Pseint configuration.

Figure 3. Desktop test in Pseint

3. RESULTS

The data are obtained from the Pseint configuration version 20210609 (Sourceforge, 2022), obtaining 206 institutions in the list of profiles configured for South America. The analysis is

performed by zones, by reviewing the border between each country, to know if the proximity influences the use of the programming language, taking as a reference two countries for their geographical location by connecting them in a bordering way with most of them, such as Colombia and Argentina.

Figure 4 shows Colombia's border with four countries: Venezuela, Ecuador, Peru, Panama and Brazil. Panama is left out of the study because it is from Central America and Brazil because of its Portuguese language. Figure 5 shows the percentages of use with institutions that have an enrolled profile, and Colombia has 39.26% of the total number of institutions among the 4 countries, and it can be seen that it is a more predominant area for the use of the Pseint language due to the proximity between the teachers of these countries. It is relevant that Ecuador and Venezuela are almost equal in percentage with 24 and 22 institutions using it, therefore an international mobilization of students can take place without affecting the curriculum.

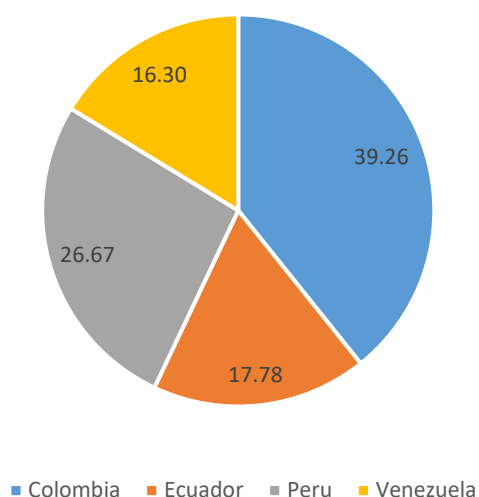**Figure 4.** Colombia's border limits.

Figure 5. Percentage of use of Colombia's border boundaries.

The countries of Bolivia, Uruguay, Paraguay, Chile and Brazil are located bordering Argentina (Figure 6); Brazil is excluded from the study because of its language. Argentina is a large country in terms of territory and has large universities, which, together with Chile, maintain a constant internationalization of their programs. Figure 7 shows that Argentina maintains a higher percentage thanks to the use of Pseint in 39 institutions, obtaining 54.9%, while Chile is second with 32.4%; it is striking that Bolivia, Paraguay and Uruguay do not have registered profiles of educational institutions or at least very few, although it can be observed that it is used, which shows that the proximity between countries is not a reference for using the same programming languages at the beginning of a course.
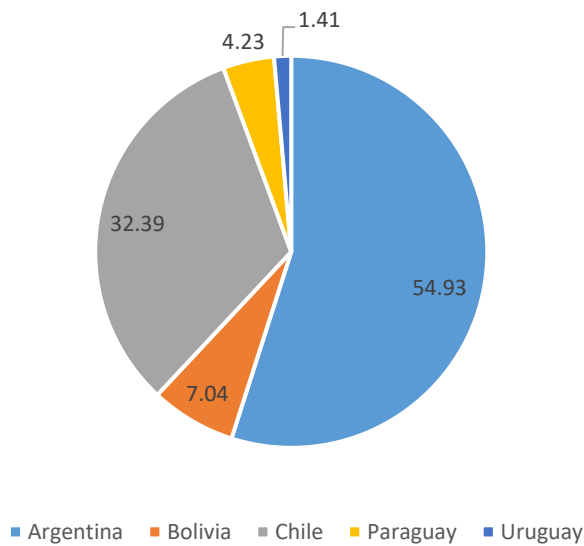
Figure 6. Argentina's border limits.

Figure 7. Percentage of use of Argentina's border boundaries.

If we analyze in general the 9 Spanish-speaking countries under study in South America, we find the following distribution of institutions using the programming language (Table 1). Where Colombia, Argentina and Peru maintain the lead in the implementation for institutions that start with programming logic courses, with which languages such as Java, Python or C++ are taught after the introductory course, so that students understand the programming logic and only have to switch to technical words in English to continue learning new languages.

Table 1. Language use in Pseint in South America with registered profiles.

Country	Quantity	Percentage
Argentina	39	18.93
Bolivia	5	2.43
Chile	23	11.17
Colombia	53	25.73
Ecuador	24	11.65
Paraguay	3	1.46
Perú	36	17.48
Uruguay	1	0.49
Venezuela	22	10.68

4. CONCLUSIONS

The beginning to programming is complex when you do not have knowledge of the English language, in South American countries, since the official language is Spanish, making it a hard task and with delays to understand the logic, that is why Pseint a programming language created in Argentina and as instructions in Spanish, can give the student a chance to dive into the logic of programming, forgetting the complexity of the language. The results show that the programming language has penetrated in all the countries of South America and is the official language to start in an initial programming course.

REFERENCES

Arellano, N., Fernandez, J., Rosas, M. V., & Zuñiga, M. E. (2014). Estrategia metodológica de la enseñanza de la programación para la permanencia de los alumnos de primer año de Ingeniería Electrónica. Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología, 13, 55-60.

Beúnes Cañete, J. E., Vargas Ricardo, A., Beúnes Cañete, J. E., & Vargas Ricardo, A. (2019). La introducción de la herramienta didáctica PSeInt en el proceso de enseñanza aprendizaje: Una propuesta para Álgebra Lineal. Transformación, 15(1), 147-157.

Cruz-Barragán, A., Martín, A., & Lule-Peralta, A. (2019). PSeInt Technological tool to develop logical-mathematical intelligence in structured computer programming. Journal of Technology and Innovation, 22-30. https://doi.org/10.35429/JTI.2019.19.6.22.30

Elshiekh, R., & Butgerit, L. (2017). Using Gamification to Teach Students Programming Concepts. OALib, 04(08), 1-7. https://doi.org/10.4236/oalib.1103803

Genbeta. (2020). PSeInt, un intérprete de pseudocódigo para empezar a estudiar programación. https://www.genbeta.com/desarrollo/pseint-interprete-pseudocodigo-para-empezar-a-estudiar-programacion

Kwon, K., & † H. (2022). Logical Pseudocode: Connecting Algorithms with Proofs.

Laura-Ochoa, L., & Bedregal-Alpaca, N. (2022). Incorporation of Computational Thinking Practices to Enhance Learning in a Programming Course. International Journal of Advanced Computer Science and Applications (IJACSA), 13(2), Art. 2. https://doi.org/10.14569/IJACSA.2022.0130224

PSeInt. (2004). https://pseint.sourceforge.net/

Soon, C. (2019). The moderating effect of logic in the learning of C++ computer programming using screencasting. Malaysian Online Journal of Educational Technology, 7, 88-96. https://doi.org/10.17220/mojet.2019.02.006

Sourceforge. (2022). PSeInt. https://pseint.sourceforge.net/index.php?page=descargas.php

Tiwari, N., & Prasad, L. (2015). INTERNATIONAL JOURNAL OF INNOVATIVE TRENDS IN ENGINEERING (IJITE) A Comparative Study: Reverse Engineering Flowcharting Tools. INTERNATIONAL JOURNAL OF INNOVATIVE TRENDS IN ENGINEERING (IJITE), 7, 34-40.

Velaora, C., & Kakarountas, A. (2019). Logic Design as an Enabler to Python Programming Language Teaching. 1-6. https://doi.org/10.1109/PACET48583.2019.8956286

Wang, Z. (2021). Program Synthesis with Algorithm Pseudocode Guidance. 2021 36th IEEE/ACM International Conference on Automated Software Engineering (ASE), 1391-1393. https://doi.org/10.1109/ASE51524.2021.9678657