Software for Teaching:
Case PROMETHEE

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INTRODUCTION

There is defined a line of research, very open, in the sense of its breadth. With it is pursued to relate different fields of knowledge and human knowledge, to generate new knowledge and disseminate this generated knowledge to the public. Within this line of research, there is a field of work that relates support systems, specifically Teaching support systems (TSS [SAE]) (Abbott et al., 2020; Enslow, Fricke & Vela, 2017; Lin, Xie & Luo, 2021), with different areas of mathematics, among others, multicriteria models (Carnero, 2020; Da Silva et al., 2021; Solodukhin, 2019). This space for research has been translated into tools for teaching. It has been possible to create a series of software to facilitate the teaching of mathematics, particularly in the university environment. Interactive tools, in English and Spanish, have been produced to facilitate the teaching of some fields of linear programming, specifically integer programming (Gamboa et al., 2016) and the transportation problem focused as a flow problem (Castaños, 2015). Software for teaching sequencing was also created (Da Corte, 2015). Additionally, a couple of software were produced to facilitate the teaching of multicriteria problems, specifically, the first of them about Data Envelopment Analysis (DEA) problems (Mata & Sanánez, 2015) and the second to provide some light on the Preference Ranking Organization METHod for Enrichment Evaluations (PROMETHEE) (Da Silva & Raidi, 2016).

In this work it wants to present some comments on the process of creating these software and to illustrate it will use the case of PROMETHEE. Immediately the objectives and the methodology used to achieve them are presented.

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Objectives

From the aforementioned, the general objective of this work is: to present the process of creating a teaching tool, specifically that of the PROMETHEE case. From this general objective, the following specific objectives are generated:

- Present what it is and some relevant aspects of PROMETHEE.
- Show, through the methodology used, how was the process to create a Teaching support system (SAE) to facilitate the learning of PROMETHEE.

Methodology

The methodology to be used to complete this work will coincide with that used in the development of the tools to be presented. It is the Integrated-Adaptable Methodology for the development of Decision Support System ((IAMDSS, in Spanish, Metodología Integradora-Adaptable para desarrollar Sistemas de Apoyo a las Decisiones [MIASAD]). MIASAD has proven to be very useful, to carry out research in different fields of knowledge (Dahdah et al., 2021; De Burgos et al., 2016; García, Hernández & Hernández, 2018; 2020; 2022; Hernández, García & Hernández, 2018; 2022; Schwarz et al., 2016). This methodology, among other advantages, has the characteristic that it is not dedicated to testing hypotheses, but follows a series of steps, which lead the research and facilitate the achievement of the objectives. However, MIASAD does not oblige the researcher to detail each step of it, but the results are obtained, directly and independently (Dahdah et al., 2021). Thanks, above all, to its flexibility, MIASAD, allows to take from its twenty basic steps only those that are necessary for the respective research that is being conducted. In particular, for this work, following an approach similar to that made in Da Silva & Raidi, 2016; García et al., 2017 and Hernández, Hernández & García, 2018, followed the following steps:

1. Define the problem. Which, as has already been said when stating the objectives is: to present the process of creating a teaching tool, specifically that of the PROMETHEE case;
2. Elaborate a first prototype. Among its first functions is to offer a clear vision of what will be the result of the research. In this case, that the final product, is a scientific article, rather than a physical prototype, what is expected is to clearly define who the work is aimed at. Which it translates in identify, before starting the peak of the investigation, the audience, or, potential readers of it. Of them it can highlight all those concerned with the improvement of teaching-learning processes, in particular those who have concerns about improving the teaching of mathematics, to these would be added those interested in multicriteria models and especially those who have particular interest in PROMETHEE. Additionally, it is expected that the article will be of great benefit to all those who start learning this multicriteria technique.

With the intention of defining clearly the final product, with this first prototype, in these cases of scientific articles, the structure of the same is usually presented. In particular, in addition to this introduction, a background will be presented where some brief comments will be made on the teaching-learning processes and on PROMETHEE. Then the central chapter will be presented, which will give some details of the creative process of the tool SAE-PROMETHEE (PROMETHEE Teaching support system). To close the article will present the conclusions and some possible lines of future research and will culminate with the references relating to the works cited;