

CONFERENCE PROCEEDINGS

CIVINEDU 2025

9th International Virtual Conference on
Educational Research and Innovation

May 28 - 29, 2025



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An analysis of the free software PSPP from a researcher's perspective

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Abstract

Statistical software is present in the daily lives of companies/organizations and higher education institutions in contemporary times, making it necessary to train higher education students in its use. One of the biggest constraints on using statistical software in the teaching context is the high cost of proprietary software licenses, so it is necessary to look for alternatives that allow statistical analysis to be worked on in the classroom. This case study aims to present the free software PSPP as an alternative to be explored in teaching. Through the use experience of a student in the master's program in ICT in Education and Training at the Bragança School of Education in 2024, the study presents the main features of PSPP and the student's considerations about its use compared to SPSS. The study addresses the user's vision, demonstrating that PSPP is a good alternative, mainly for use within the classroom context.

Keywords: statistical software, open-source software, PSPP, SPSS, data analysis.

Análisis del software libre PSPP desde la perspectiva del investigador

Resumen

El software estadístico está presente en el día a día de las empresas/organizaciones y de las instituciones de enseñanza superior en la época contemporánea, lo que hace necesario formar a los estudiantes de enseñanza superior en su uso. Una de las mayores limitaciones para el uso de software estadístico en el contexto docente es el elevado coste de las licencias de software propietario, por lo que es necesario buscar alternativas que permitan trabajar el análisis estadístico en el aula. Este estudio de caso pretende presentar el software libre PSPP como una alternativa a explorar en la docencia. A través de la experiencia de uso de un estudiante del Máster en TIC en Educación y Formación de la Facultad de Educación de Bragança en 2024, el estudio presenta las principales características de PSPP y las consideraciones del estudiante sobre su uso en comparación con SPSS. El estudio aborda la visión del usuario, demostrando que PSPP es una buena alternativa, principalmente para su uso en el contexto del aula.

Palabras clave: software estadístico, software de código abierto, PSPP, SPSS, análisis de datos.

Introduction

Nowadays, the use of software for statistical analyses has become part of companies, public/private organizations, and educational institutions, making it an asset to approach the content in the classroom context to develop students' skills in statistical data analyses (Yagnik, 2014). One of the constraints faced in the teaching context is the high cost of proprietary licenses for statistical software, which makes it difficult to practice using it in the classroom (Shepherd & Richardson, 2024; Silva & Barros, 2019).

In the quantitative method, statistical analyses are an important point for the development of scientific research since it is through them that the data collected will obtain the results that refute or prove the hypotheses formulated (Pocinho & Matos, 2022). In this sense, statistical software has become a fundamental resource for researchers, reducing analysis time and increasing the results' reliability (Pocinho & Matos, 2022; Yagnik, 2014). There are countless examples of proprietary software on the market, the best known being IBM SPSS (Statistical Package for the Social Sciences), which is widely used in the Social Sciences but at a high cost to institutions and students, making it unfeasible to use it as a tool for learning practice in classroom contexts (Shepherd & Richardson, 2024; Yagnik, 2014).

Given the importance for higher education students to learn how to use statistical software to carry out statistical analysis within curricular units and/or for their academic work, namely master's thesis, an alternative to be presented is the free software PSPP, thus constituting the use of free software an added value to carry out the treatment and analyses of statistical data (Silva & Barros, 2019; Yagnik, 2014).

This qualitative case study aims to present the experience of a researcher's student looking for a solution to reduce the costs of a research project, namely in the quantitative part of a descriptive case study with a mixed approach. Through the experience of using PSPP in the initial phase of processing statistical data in a master's thesis in

ICT in Education and Training in 2024. The aim of this case study, through an account of the student's experience from the user's point of view, is to present an option for processing statistical data in a way that is accessible to all students who do not have the financial resources to buy a license for proprietary software.

To carry out this case study, primary data was collected, considering the experience of using the software and secondary data, through a narrative bibliographical review of the literature, which was carried out in the bibliometric databases, institutional websites, and the World Wide Web.

What is PSPP?

PSPP is a free software developed by the GNU Operating System (PSPP - GNU Project - Free Software Foundation, n.d.) as an alternative to SPSS. It has a working interface very similar to SPSS, making it possible to produce descriptive and inferential statistical analyses with a wide range of resources for analysing and processing statistical data (Niu *et al.*, 2021; Shepherd & Richardson, 2024; Silva & Barros, 2019).

According to the GNU Operating System, "free software means that users have the four essential freedoms: (0) to run the program; (1) to study and change the program's source code; (2) to redistribute exact copies; and (3) to distribute modified versions" (PSPP - GNU Project - Free Software Foundation, n.d.), thus contributing both to making technological resources accessible to users and to stimulating collaborative work, the development and improvement of processes and products in the programming area (Niu *et al.*, 2021).

How does it work?

PSPP has a similar interface to SPSS, divided into two working environments, namely Data View and Variable View (see Figure 1). The Data View refers to the environment where the data values corresponding to each variable are placed. The

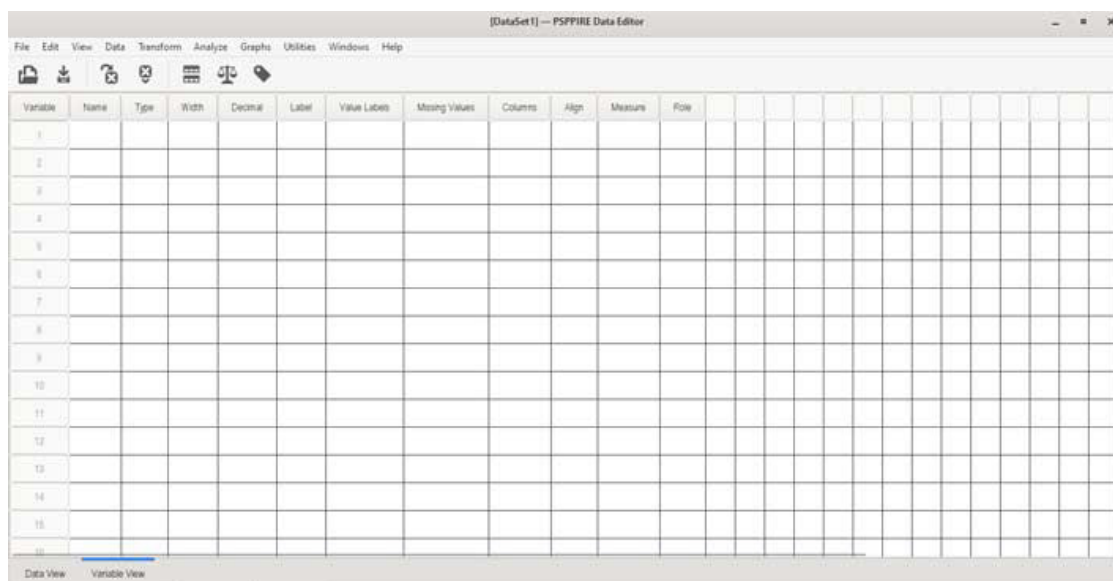


Figure 1. View of the work environment of PSPP
Author, 2024

Variable View is the environment where you enter the data corresponding to each variable, define the name of the variables, the type of variable, labels, value labels, number of decimal places, missing values and classify scalar, ordinal or nominal measures (Yagnik, 2014).

PSPP has a menu bar that allows the user to access various functions such as: i) File, Edit, View, Data, Transform, Analyse, Graphs, Utilities, Windows and Help, allowing the user to import, export, modify data, create graphs and search for help, with information on the system and the reference manual available in the Help option (Niu *et al.*, 2021; Yagnik, 2014). An added value is that PSPP is compatible with opening files worked on in SPSS and vice versa.

With PSPP it is possible to use basic descriptive and inferential statistical tools such as: i) frequencies; ii) cross tables; iii) Chi-square analysis; iv) Comparison of means; v) Standard deviation; vi) Normality tests; vii) T-tests; viii) One-way ANOVA; ix) correlations; x) regressions; xi) Reliability estimation; xii) Non-parametric tests. It also features advanced statistical tools such as: i) Cluster

analyses; ii) Factor analyses; iii) Logistic regressions (Niu *et al.*, 2021; Shepherd & Richardson, 2024; Yagnik, 2014).

Some advantages presented by PSPP, according to the GNU Operating System: i) the software will not expire or deliberately stop working in the future; ii) an unlimited amount of cases and variables can be created; iii) it is not necessary to install additional packages to make use of the available tools; iv) it is considered stable and reliable software to install (PSPP - GNU Project - Free Software Foundation, n.d.; Silva & Barros, 2019).

In this sense, in the field of education, the PSPP is an accessible resource for students who are developing academic work, allowing them to explore quantitative data through descriptive or inferential analyses, contributing to the development of skills needed for new work contexts at no cost to institutions or students, and also contributing to the fight against piracy (Yagnik, 2014). PSPP is available to download from the GNU operating systems website at the following link: <https://www.gnu.org/software/pspp/get.html> for the different operating systems.

Methodology

This work aims is a case study of the experience of a researcher's student on the use of free software as an alternative to the high cost of proprietary software, using PSPP in the month of June 2024, within the dissertation work of the Master's Degree in ICT in Education and Training, from the Bragança School of Education, developed within the scope of the Orientation Seminar Curricular Unit. In this sense, it will focus on the use of primary data, through the experience of using the PSPP software in the phases: i) installation; ii) database creation; iii) basic statistical analyses; iv) presentation of outputs; v) file export formats. The work will also present an evaluation of the user's perception of the positive and negative points of the PSPP software.

The secondary data refers to a narrative bibliographical review of the literature to support the study, carried out in the bibliometric databases Scopus, B-on, Google Scholar, institutional websites and the World Wide Web.

Results and discussion

Experience report on PSPP

During the first year of the master's program, the student had the opportunity to work with the SPSS software for a 15-day trial period. In this sense, based on the experience of using the SPSS software, it was possible for the student to verify the ease of use of PSPP from the perspective of a user of both software programs.

Installing PSPP

To download the PSPP, the student went to the GNU Operating System page, where you can find the necessary information about the PSPP and the download links for the different operating systems corresponding to this analysis to the Windows version 2.0.0-g5b54d1. Installation is easy, and it only takes a few minutes to complete the

download. The PSPP icon will appear on the desktop to open the software and the user manual for consultation.

PSPP was originally developed for the Linux system, but its source code was later developed for the Windows system, which can cause problems when using it. However, the problems can be solved in the compatibility tab, located in the software's properties. To access the PSPP properties, simply right-click on the icon on the desktop, then find the compatibility tab and run troubleshooting.

Creating a database

When you open PSPP, the user view is very similar to SPSS, with it divided into the Data View and Variable View work environments. To start using it, the user can choose to import a ready-made database (from the file option) or start building a database manually. To build a database, in the Variable View Environment, you must click on the name cell to name the variables, and the names must start with a letter. After naming the variable, the other cells are automatically available to be configured. Regarding the variable type, PSPP offers various options, the most common being numeric and string.

The labels option refers to the summarised description of the variable and, if necessary, it is possible to create value labels for the variables. Despite its similarity to SPSS in terms of interface, PSPP is less user-friendly than its counterpart. One example is the value label's function, where in SPSS it is possible to create the first label and drag it to the other variables with the same value. PSPP does not offer this facility.

In the PSPP it is also possible to define missing values for blank answers in the survey, using the Missing Values option. One last function to mention is the measure of value to be assigned to each variable, with the ordinal, nominal or scalar options.

The transform function allows you to create a new variable from an existing one, such as age, which can be transformed into age groups.

After configuring the variables, the user must insert the corresponding data into the Data View work environment. You can copy and paste the data from a file, but make sure that the active lines of the data are only those corresponding to the data entered. If a row that is not part of the data is active, it should be deleted by right-clicking on the cell and choosing the 'clear variables' option before proceeding to analyse the data.

Performing statistical analyses

In the initial data processing phase for the master's thesis, the student used only basic statistical analysis tools. Using the analyse function, a descriptive analysis was carried out using frequencies. There is a wide range of statistical resources available, such as: mean, median, mode, variance, among others.

In addition, the descriptive analysis used cross-tabulations to statistically cross-reference between two variables, with various statistical resources available.

For the context of finalizing the Orientation Seminar Curricular Unit, these two analyses were sufficient to present the partial results of the data, with further analysis to be carried out later to conclude the master's thesis.

Presentation of outputs and export methods

Regarding the outputs produced by the PSPP, the model is presented through unattractive and non-editable tables, which is a disadvantage compared to SPSS.

In addition to tables, requesting graphs when carrying out frequency analyses is possible. Still, depending on the amount of information in the variable, these are of poor quality in most analyses and cannot be edited.

In terms of export formats for the results, PSPP offers the following extensions: SPSS Viewer, PDF, HTML, Open Document, Text, Text

(Plain), PostScript, Comma-Separated Values, Portable Network Graphics, and Scalable Vector Graphics.

As far as exporting the results is concerned, in the student's opinion, HTML is the format that gives the best results. In HTML export, the user can save parts of the screen or the whole image using the Edge browser. In the other export formats, the file was disfigured. It should be noted that this view cannot be generalized, as this may be a problem of the software's compatibility with the operating system installed on the user's desktop, which corresponds to the Windows 7 version.

Evaluation of the positive and negative points of the PSPP

In the researcher's view, the positive points include the fact that PSPP is free and easy to use software. PSPP allows students to have unlimited access to basic tools for statistical analyses, contributing to the development of academic work. It can be used as a teaching tool at no cost to the institution or the student. The database created is compatible with SPSS and can easily be used in proprietary software. As it is free software, it allows contributions to be made to improving its source code, making it favorable for the development of learning communities and projects in the areas of programming, thus adding value to education.

Negative points include that some functions are less user-friendly than those of the similar SPSS. In the researcher's view, the main constraint is the presentation of the results, which are presented in tables and graphs that cannot be edited. The export format can be considered another negative point of PSPP.

Conclusion

Within higher education institutions, quantitative data analysis is present in curricular units such as the Orientation Seminar, which seeks to prepare students for the development of their final course work, namely the master's thesis.

Consequently, using proprietary software is a constraint for teaching contexts, as it requires the purchase of licenses at a high cost for institutions and/or students, sometimes making access to this important resource unfeasible.

Therefore, PSPP is a viable alternative to be explored in the classroom. Due to its similarity to SPSS, it allows unlimited learning to be developed in the creation and manipulation of databases, thus providing added value for use in the development of academic work.

However, as it is a free resource, it has some limitations compared to its similar counterparts, especially when presenting and exporting results. However, these limitations do not outweigh the benefits of using PSPP, as it can be considered an environment that prepares students to work with proprietary software agilely. The compatibility of opening databases between PSPP and SPSS allows the student to develop the entire structure of the database in the free software, learn how to carry out the statistical analyses, and then use the proprietary software in the experimental time to produce the results, thus benefiting from the short time available for testing to produce results in editable formats that are compatible with the regulations.

In conclusion, the PSPP can be considered an asset to be explored as a classroom resource within curricular units that teach research methodologies.

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