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IMPROVING PERFORMANCE AND RESOURCE EFFICIENCY IN PUBLIC ADMINISTRATION THROUGH TRAINING DATA ANALYSIS: A LEARNING ANALYTICS APPROACH

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ABSTRACT

Learning Analytics (LA) is a field that uses statistical analysis of educational data to improve learning processes' effectiveness, efficiency, and satisfaction. With the improvement of technologies and the increase in distance learning courses, Learning Analytics has grown considerably. This article discusses successful applications in public administration. It had to reorganize itself to continue serving its employees based on a financial need to reduce the number of licenses contracted for an e-learning platform for technological courses. Based on a statistical survey, various problems were identified, such as idleness, excessive workload, courses that needed to be more suited to the position of the job, and the distance between the manager and the needs. With the use of LA, it was possible to plan, distribute, and control the use of contracted rotating licenses more efficiently based on various actions that changed the culture, rules, and way of using them implemented in the company, resulting in more efficient use, improving all the indicators, even with the reduction in licenses.

Keywords: Learning Analytics. Distance Learning. Corporate Education.

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INTRODUCTION

In a V.U.C.A (volatile, uncertain, complex, ambiguous) and F.A.N.I (fragile, anxious, non-linear, and incomprehensible) world, professionals are constantly compelled to improve their qualifications at more incredible speed (SILVA, 2021), which is no different in public organizations. In this context, corporate education becomes strategic as it focuses on constant improvement, especially in distance learning, which has proved capable of keeping up with changes (MESQUITA, 2022).

At the same time, public organizations routinely face the challenge of improving their processes to achieve greater efficiency and effectiveness in providing services. This issue affects different processes, mainly when the financial resources to carry them out are limited, as is the case with corporate education. In this way, improving learning processes to make more efficient use of financial resources is indispensable, as is optimizing their results (FISCHER, 2020).

Learning Analytics is a comprehensive approach offering various tools for enhancing learning processes. It encompasses techniques, tools, and methods for collecting, analyzing, and visualizing learning data. Doing so aims to improve the quality and effectiveness of learning, enhance student satisfaction, and boost organizational efficiency.

Furthermore, there is evidence that applying learning analytics to identify and relate learning data to support corporate education in a public organization promotes greater transparency, dialogue, and collaboration between managers and employees. These actions culminate in greater efficiency in allocating and distributing resources by matching available resources with the development needs of civil servants. This fosters an environment of open communication and shared understanding (FERREIRA; ANDRADE, 2013; FISCHER, 2020; MONTEIRO et al., 2021; SILVEIRA et al., 2021).

Given this context, we proposed the following objective for the study: To identify and analyze how Learning Analytics can help state-owned companies optimize the courses and training offered to their employees. We used a case study as our research method.

For our study, we selected a Brazilian public information technology company established in the 1970s as our subject. This company, with its mission to provide technological solutions for the execution of public policies, currently employs around three thousand individuals across various regions. We chose this organization to demonstrate how Learning Analytics can be effectively applied to optimize the courses and training offered to employees.

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THEORETICAL FOUNDATIONS

CORPORATE DISTANCE EDUCATION IN THE PUBLIC SECTOR

Organizations are increasingly aligning their educational practices with strategies, building digital learning ecosystems so that corporate education becomes one of the main foundations of technological, social, and cultural changes (SILVA, 2021; MONTEIRO et al., 2021). From this perspective, according to Mesquita (2022), there is evidence that distance corporate education has proved to be a tool capable of keeping up with the changes related to digitalization, teleworking, and deterritorialization in public service. This allows flexibility in terms of time, place, and access as many times as necessary, making it possible to improve learning (GIOVANNI et al., 2023).

Virtual access makes it possible to participate in classes both synchronously and asynchronously, which not only allows more servers to follow classes in real time but also allows the content to be accessed by other servers at different times, according to their needs (MESQUITA, 2022).

Distance learning, facilitated by Learning Analytics, also makes it possible to reduce costs. The courses can be accessed timelessly, with no expiration date, which allows the same course to be used at various times when civil servants need it. In addition, there is no limit on the number of participants, enabling large-scale qualification. This cost-saving potential is a significant advantage (MESQUITA, 2022; ORIOL et al., 2021).

In this context, Fischer (2020) points out that when it comes to corporate education and people development, especially in organizations with limited resources, it is essential to establish procedures to identify, map, and manage knowledge and learning assets to ensure that these assets are maintained and optimized for the benefit of the organization. In a study on the application of learning analytics to identify and relate learning data to support corporate education in a public organization, the author found that making the information explicit to managers and civil servants enabled the creation of a transparent environment in which dialogue and collaboration are facilitated for cooperative development, resulting in greater efficiency in the allocation and distribution of resources, based on the cross-referencing of available resources with the development needs of civil servants.

LEARNING ANALYTICS APPLIED TO CORPORATE EDUCATION

Learning Analytics is a tool that focuses on using and analyzing data to improve efficiency and satisfaction in learning processes. It is based on collecting, analyzing, and

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interpreting educational data to understand and support the learning process. With the popularization of technology and the growing amount of data generated by students, teachers, and education systems, the importance of Learning Analytics has increased significantly in recent years.

For Khalil (2018), Learning Analytics can be defined as a set of techniques, tools, and processes used to collect, analyze, and visualize learning data to improve the teaching and learning process. A concept similar to that cited by Uhomoibhi et al. (2019) says it is a data-based approach that uses analysis techniques to collect, process, and interpret learning data to improve educational decision-making.

In addition, according to the International Society for Technology in Education (ISTE, 2011), Learning Analytics can be defined as measuring, collecting, analyzing, and representing data on learning and using technologies to help individuals and institutions understand and improve education. In addition, by using artificial intelligence and machine learning techniques, Learning Analytics enables the personalization of learning and the early identification of problems, helping to guide educational decisions and improve results.

In this same understanding of the Learning Analytics tool as a guide for decision-making, Ferreira and Andrade (2013) state that it is possible to extract a large volume of data, creating Big Data, from the interaction between students, teachers and their courses in virtual learning environments which, through the use of Learning Analytics (LA), promote more informed decision-making. This process is potentially transformative as it creates a management model in pedagogical fields and contributes to process improvement and greater organizational efficiency (FERREIRA; ANDRADE, 2013). Regarding this aspect of efficiency, a better understanding of data related to learning can contribute to reducing procedures, unnecessary bureaucracy, and personnel involved in the process, as well as culminating in cost savings (ROGGE et al., 2017).

Extending the concept, Papamitsiou et al. (2020) states that Learning Analytics can be applied in different contexts, including formal education, distance learning, and corporate learning. In all cases, the aim is to improve the quality and effectiveness of learning, increasing student satisfaction and knowledge retention. Zapparolli et al. (2017) add that solving learning problems in virtual environments requires a proactive attitude, using tools such as Learning Analytics that provide accurate information and aid early decision-making.

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METHODOLOGY

We used a qualitative research approach.According to Godoy (1995), it aims to describe and understand a phenomenon's complexity. We also applied the case study technique, which is used in situations that aim to contribute to knowledge of individual, social, and organizational phenomena (YIN, 2015), as occurred in this research.

The data collection techniques chosen were documentary and field research. The documentary research analyzed company documents containing statistical data from the application of Learning Analytics and its effects on changing learning processes. In field research, a questionnaire with closed questions was used to check employee satisfaction with the changes that had taken place (HAIR et al., 2009; ALBUQUERQUE et al., 2023).

DEVELOPMENT OF LEARNING ANALYTICS

ANALYSIS AND DIAGNOSIS

The company had a contract with a platform for distance learning technology courses that allowed 200 rotating licenses to be used by employees. However, the number of licenses was halved by a higher-level decision, and it was necessary to improve the efficiency of use since the number of employees to be served would remain the same.

In the old leave distribution process, it was up to managers to inform HR at the beginning of the year of the list of people and courses they wanted, often without consulting their employees, which distanced the manager from the need and availability.

HR would fill in a spreadsheet that at the end had thousands of lines, containing each course chosen for each of the thousands of employees, with the date to take the course, the type of course, the teacher, the workload, etc. The employee would then be told a week in advance that they needed to take the course. However, often the employee was busy, the manager was no longer the same, the scope of the area changed, and even the employee was no longer part of that team, so the planned courses no longer made sense for the employee and the job position. Everything had to be revised at short notice, or the employee wouldn't be properly engaged in the course.

In addition, there were abuses by managers, who, believing it to be positive for the company and employees, enrolled their employees in a large number of courses, generating an excessive total workload, and also requiring them to fulfill their work obligations.

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There was also the operational cost in HR, which had specific resources to carry out only this leave management, which was a very passive, operational, cumbersome process, and prone to errors due to the manual filling in of various spreadsheets by managers and HR. These aspects are in line with what was reported by Mesquita (2022), who mentions a transparent and collaborative environment for better corporate development.

Despite this scenario, the improvement project needed quantitative information to be approved by the board. So, the data collection began with the construction of a database to collect and store the historical use of the licenses and information on the company's employees who used them. The main aspects surveyed were courses completed and not completed, time with the license, workload, professionals served, positions held, areas served and not served, individual performance, and performance by area.

The data was extracted from the online training platform and the company's employee database. They were then processed and modeled using the SQL Server tool in a database. Descriptive statistics such as mean, outlier, and standard deviation, as well as multivariate analyses such as linear regression and correlation, according to Hair et al. (2009), are important measures and analyses when it comes to investigating phenomena. In this case, they were applied as an example to discover the relationship between time on leave versus completion and the number of courses versus completion.

From the statistical analysis of the use of the licenses of the contracted distance learning platform, it was found that 63% of planned courses were not completed; 60% kept the license for more than 50 days; 25% were completed in the last 3 days; Certain areas and people remained with the license for a long time, while others had none and exaggerated study plans, with up to 360 hours of courses, almost a postgraduate degree.

RESTRUCTURING THE PROCESS

In view of the problems identified from the data analysis, authorization was obtained to start a total restructuring of the process with the aim of improving efficiency in the use of licenses, corroborating what was cited by Uhomoibhi et al. (2019) on a data-based approach. The work was then approved at superintendence level, below only the board of directors and the president. This was necessary because, as the impact would be company-wide and on different departments, and as it is a public company, it was necessary to publish an internal normative communication to publicize the changes and the rules of use.

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In the same week, an announcement was also sent by e-mail, informing managers that the new format would be launched and that a presentation would be made to managers on the rules and recommendations.

At first, the HR process was decentralized to the departments. In practical terms, the departments were sent a simple departments a simple interest survey form every semester, which had to be filled in by the department managers. The answers were then spreadsheeted and the license lot was distributed as a priority based on certain assumptions, such as, and especially, the area's percentage of completion in the past, i.e. poor use began to deprioritize the area's receipt of licenses.

The batches of licenses were then communicated and made available to managers, who were informed of the number of licenses received by their team, as well as the availability deadline and, above all, the new rules. In order to distribute the licenses to their employees, managers had to follow some previously stipulated rules, namely: draw up short study plans, talk to the employee, distribute the license to several employees, register the plans on the platform, respect the maximum period of 30 days with an employee, keep an eye on idleness and completion of the courses.

To control this entire process, rules and licenses, a dashboard was created in Microsoft Power BI that became the heart of the process by allowing dynamic analysis of the process in real time. For Donohue J. et al., (2019) the creation of a dashboard is an important tool for comprehensive evaluation and process control. This is fed directly by data from the distance learning platform, which shows the exact performance of each area and employee, as well as compliance with the rules. This dashboard was checked periodically and if non-compliance with any rule was noticed, actions were taken, such as: removing the license and assigning it to another area; lowering the priority of the penalized area in receiving licenses, and in the last case, financial punishment for those involved.

All the licenses were automatically removed at the end of the allotment period. A new allotment was assigned to the following areas in the queue, and so on, always prioritizing the end areas, with good historical use and the ratio of use between staff and courses.

RESULTS

In order to analyze the increase in efficiency with the project, the following parameters were established at the beginning of the project:

- reduction in the dropout rate;

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- increase in the course completion rate;
- suppression of idleness;
- increase in the number of employees on leave;
- increasing the workload of completed courses;
- increase in the number of courses completed.

In other words, around 45% of departments were covered, with a focus on the areas involved in the production and technological support of products. The middle areas, although they occasionally receive licenses, were not the focus as the courses dealt with technical topics related to programming and development. In this way, 1,200 employees were served directly, and 3,200 indirectly, obtaining the following results:

- Doubling the number of courses and hours completed;
- Tripling the total number of employees served;
- A 50% increase in the number of employees on leave;
- A 12pp increase in the completion of courses planned by the manager;
- Improved performance in 85% of areas;
- The elimination of idleness by 100%;
- Reducing the average number of courses and workload per syllabus to acceptable numbers (25h / 5 courses);
- Reaching new areas and people who had never been there before.

  The exciting thing about these results is that they were obtained in a context using only half of the licenses historically used since there was a reduction in the contract mentioned in the introduction to this article, which was the primary trigger for starting the Learning Analytics project.

When the project was finished and the training process was readjusted, a survey was sent out to employees to understand their satisfaction with the new method. The overall satisfaction rating of the survey was high; employees were happier with the training, the use of the platform, and the new process, and one of the more qualitative issues that was commented on was the rapprochement between manager and employee in the choice of courses of interest as well as availability.

These results are consistent with the concepts initially presented by Papamitsiou et al. (2020) in which he mentions that Learning Analytics can be applied in different contexts, such as corporate learning. It is also consistent, and especially so, with Khalil, M (2018) who mentions LA as a set of techniques aimed at improving the learning process.

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FINAL CONSIDERATIONS

This study presented a case of application of Learning Analytics, in order to increase the efficiency of the learning process in a public company. The organization was facing problems related to the inefficient use of licenses for corporate distance learning courses, resulting in low course completion, idleness, lack of employee involvement and high operating costs. To solve these problems, a survey was carried out of historical and current data on the use of licenses and the employees involved.involved. Descriptive and multivariate statistical analyses were then used to identify and detail the main problems and their patterns.

The application of Learning Analytics made it possible to increase efficiency by completely restructuring the process. There was an increase in the completion of courses, the number of employees served by leave, and the total workload completed. The performance of the areas improved, idleness was eliminated, and employees showed greater satisfaction with the training and the process in general. These results corroborate the literature on the benefits of using Learning Analytics for corporate learning.

The main contributions of this work are twofold. Firstly, there is a proactive search for new tools and innovation in the face of budget restrictions, which are recurrent in public administration. In this sense, learning analytics was a very innovative means by which this active attitude was instrumentalized, so the application of the techniques helped clarify a phenomenon that professionals had identified subjectively: the low efficiency of using the platform. The tool made it possible to investigate the facts, validate them, and legitimize solutions and opportunities for improvement to overcome the restrictions imposed.

In the second sense, the study contributed to a demonstration, in a specific case, of the potential of using the Learning Analytics tool to redefine learning processes. Based on the parameters obtained through the use of Learning Analytics, the management of leave, which had previously only been carried out by HR, was decentralized to managers, which had repercussions in terms of greater efficiency in the use of leave as employees became active players in the decision-making process, being able to express their availability and interest in taking the courses. Management has thus become more transparent, shared, and engaged. At the same time, creating the data dashboard made it possible to monitor and communicate to users the characteristics and results of their training. From this perspective, training decisions have become more objective and well-founded, legitimizing

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the granting or suspension of training for employees and organizational units based on criteria, indicators, and the respective data.

As a recommendation for officials who deal with training in public administration, because of the principle of efficiency, it is strongly recommended that Learning Analytics be studied and implemented. Today, several modern, inexpensive, and even free tools make it easier to improve training performance. In addition, it is worth mentioning that obtaining sponsorship from the board of directors is interesting because, even more so in public management, where long and bureaucratic processes have been in place for years, a change to a more modern and dynamic process may need support. In this case, the sponsorship meant that the new rules became official regulations for the company, making implementation much more accessible.

As a limitation, because it is a case study, this research does not allow generalizations or recommendations to be made, since it was dedicated to understanding the phenomenon of a single organization.

Finally, it is understood that the mastery and implementation of analytics techniques can be a key to innovation attitudes such as the one reported in the article becoming more common in public institutions, culminating in the creation of value, improved efficiency and the strengthening of a collaborative, learning-oriented organizational culture.

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