The training process for employees of the Federal Institute of Rio Grande do Sul - IFRS through Analysis of Social Networks – SNA

Márcio Teixeira Oliveira, Ricardo de Moura Araujo, Suellen Moreira de Oliveira, Samuel Carvalho de Aragão, Douglas Francisquini Toledo

Data Science, Multimedia and Development Laboratory, Department of Computer Science, Federal Institute of Education, Science and Technology of Mato Grosso do Sul – IFMS - Três Lagoas - College, Brazil

Corresponding author: marcio.oliveira@ifms.edu.br

Abstract— The qualification possibilities of public employees in Brazil are regulated by Law 8.112/90. The qualification and training of employees is directly related to the Federal Network, with no different at the Federal Institute of Rio Grande do Sul – IFRS. Social Network Analysis - SNA has been widely applied in building training networks. The objective of this work was to characterize the IFRS training indicators through the Analysis of Social Networks. In order to capture the data of qualifying employees and their respective courses, the institution's service bulletin was analyzed. With this, it was possible to build the graph network through the degree and pageRank algorithms. Altogether, sample data from 310 employees were analyzed, distributed in three groups: Total employees (310), administrative technicians (147) and teachers (163), of which were selected: employees capacity unit, qualification course and the total number of employees enrolled in the respective qualification. The degree analysis showed that the Rio Grande unit has the highest number of qualifying employees. The most sought after course is Education. In the teaching group, Porto Alegre has the highest number of all units, with the Education course highlighted. And finally, TAEs - Rectory, obtained the highest indicator, with Education as the greatest demand. It can be concluded that SNA allowed the visualization of employees in training under the IFRS, together with the search for postgraduate courses and the distribution per unit of employees in training.

I INTRODUCTION

The search for qualification or for its expansion is something recurrent both for people who are inserted in the labor market and looking for continuous improvement, as for people who are in contention for new opportunities. This search for the expansion of qualification is no different in public bodies, as in the case of Brazilian Federal Institutes.

Quantify the areas in which the most improvements are made by employees administrative or teachers, as well as knowing the postgraduate programs, in which they have sought to qualify, is of great interest to school management, since, based on these indicators, it is possible to draw the profile of each employee in the institution.

With the defined profile, it is possible to see the strengths that the institution has and in which it needs to improve. Thus, employees will be encouraged to qualify in

certain areas that can promote a greater degree of knowledge that will be considered as a point of improvement for the institution.

However, knowing the courses most sought after by public servants can also become an opportunity for the institution to institute qualification actions through the offer of *lato-sensu* and/or *stricto sensu* courses, in order to spread the knowledge acquired by its employees.

Another important factor, in the case of Federal Institutes, is the verticalization of education, which makes it possible to optimize the physical infrastructure, personnel and management resources, as well as integrate Basic to Higher Education, in addition to offering postgraduate courses -graduation in *lato-sensu* and *stricto sensu*. With this, it is possible to offer courses in the most diverse modalities, as needed and/or local demand. Thus, there is a need for constant improvements and qualifications of the staff, mainly by the teachers, who, after completing the proper qualification, will act in the respective courses whose ownership allows them to.

A. The Federal Network for Professional and Technological Education

The Federal Network of Professional and Technological Education started its activities in 1.909, when Nilo Peçanha, through Decree 7.566 [1], established the 19 Apprentice and Craftsman schools in the country.

The initial mark of public policies for the institution of the Federal Network of Professional Education began with Decree No. 7.566 of September 23, 1.909, instituting the Schools of Apprentices and Craftsmen. With 19 units distributed in the states of Alagoas, Bahia, Rio de Janeiro, Ceará, Espírito Santo, Goiás, Maranhão, Mato Grosso, Paraíba, Paraná, Piauí, Pernambuco, Rio Grande do Norte, São Paulo and Sergipe [2]; offering courses (works) in wood, mechanics and arts.

Initially, the courses offered by the schools were aimed at less favored people (ex: ex-slaves, who with abolition could not find ways to guarantee their livelihood).

According to Fonseca [3] , Professional Education was seen by society at the time as philanthropy or charity, acting as a mechanism for social regulation. With the national industrial development process, there was a constant need for qualified labor, which caused the Federal Education Network to be restructured.

Between 1.937 and 1.942 there was the first restructuring of the units with the creation of 21 Industrial Schools in the municipalities of Aracaju, Belém, Campos, Belo Horizonte, Cuiabá, Curitiba, Florianópolis, Fortaleza, Goiânia, João Pessoa, Maceió, Manaus, Natal, Niterói, Pelotas, Salvador, São Luiz, São Paulo, Recife, Teresina and Vitória [2]. The curriculum offered already had an industrial profile with courses in mechanics, electrical, crafts and civil construction, and lasting four years. During this same period, the S system of professional qualification was founded, as a result of the public-private partnership.

In 1.942, SENAI – National Industry Service was created by Decree-Law 4.048 of January 22 [4], being a private institution of public interest, whose objective was to support the industry in the training of human resources, through the Professional education and the provision of services aimed at industrial workers, which is the objective even today [5].

According to Souza [5], on January 10, 1.946, SENAC - National Service for Commercial Learning was created, through Decree Law 8.621, a private institution of public interest, offering Professional Education aimed at training commercial workers [6].

In 1.964, with the beginning of the military dictatorship, the articulation between the interests of international capital and the national political elite was accentuated, and the increase in the education of workers became a determining factor for the country's industrial development.

Furthermore, with more people seeking access to secondary education, there was pressure for higher education places. With a more educated population, it could represent a risk to the political regime, so Vocational Education acted as an escape valve, alleviating the pressure for places in universities [7].

Over the years, the Federal Agricultural Schools were created - farm schools linked to the Ministry of Agriculture, and from Decree n. 60.731 of May 19, 1.967 are now supervised by the Ministry of Education and Culture [8].

Over time, a network of agricultural schools was created – Federal Agrotechnical Schools, based on the farm school model and linked to the Ministry of Agriculture. In 1.967, these farm schools were transferred to the then Ministry of Education and Culture, becoming agricultural schools. In 1.978, three federal schools, in Rio de Janeiro, Minas Gerais and Paraná were transformed into Federal Technological Education Centers (CEFET), being equal, in the scope of higher education, to university centers [9].

In the 1990s, several technical and agro-technical schools were transformed into CEFET – Federal Technological Education Centers, originating in 1994 the basis of the national system of technological education.

In 1.996, the Law of Guidelines and Bases of Education (Law 9.394/96) [10] and the Federal Decree

2.208/1997 [11] established the bases for the reform of vocational education in Brazil. According to Manfredi [12], formally, after the institution of the Law, every educational institution, whether private or public, adjusts to the new educational norms that the legislation in force determined. As a result, since the 1990s, Professional Education in Brazil has been acquiring a new institutionality.

On December 29, 2.008, Law 11.892 was enacted, which created the Federal Network for Professional, Scientific and Technological Education, at the same time as the Federal Institutes of Education, Science and Technology (IFs) were created. Despite maintaining, by virtue of this law, the provision of Vocational Technical Education, these new institutions now compete with federal universities in offering free public Higher Education [13].

Also in Law 11.892/2008, articles 7 and 8 defined the objectives of the Federal Institutes, divided as follows: a minimum of 50% (fifty percent) of their vacancies to provide high school technical professional education, primarily in the form of integrated courses, for those graduating from elementary school and for the public of youth and adult education; a minimum of 20% (twenty percent) of its vacancies to teach undergraduate courses at higher education level, as well as special pedagogical training programs, with a view to training teachers for basic education, especially in the areas of science and mathematics , and for professional education; and the remainder, 30% (thirty percent), is intended to provide higher education courses: a) higher technology courses aimed at training professionals for different sectors of the economy; b) bachelor's and engineering courses, aimed at training professionals for different sectors of the economy and areas of knowledge; c) *lato-sensu* postgraduate courses for improvement and specialization, aimed at training specialists in different areas of knowledge; and d) *strictu sensu* master's and doctoral postgraduate courses, which contribute to promoting the establishment of solid foundations in education, science and technology, with a view to the process of generation and technological innovation [13].

Pacheco [14] comments that the Institutes have characteristics of innovation and daring, characteristics that are necessary, and aim to meet:

"[...] a policy and a concept that seek to anticipate here and now the foundations of a contemporary school of the future and committed to a radically democratic and socially just society".

According to the Nilo Peçanha Platform (PNP 2.020), the Federal Network of Professional Education in 2.017

had 653 units, 41 Institutions, 22 Technical Schools linked to the Federal Institutes and the Federal Technological University of Paraná (UTFPR). With about 1.023.303 enrollments in courses, 46.688 professors throughout the network, 32.02% are doctors and 53.88% are masters, that is, 85.90% of the professors are masters or doctors.

B. The Federal Institute of Rio Grande Do Sul - IFRS

The Federal Institute of Education, Science and Technology of Rio Grande do Sul - IFRS is part of the Federal Education Network. The institution offers courses free of charge in approximately 16 municipalities in Rio Grande do Sul. The courses offered are initial and continuing education, high school courses in an integrated or concomitant form, and higher education courses (Bachelors and technologists), in addition to postgraduate courses . IFRS has about seventeen campuses and a rectory (in the municipality of Bento Gonçalves).

According to the Nilo Peçanha platform, in 2.017, IFRS had approximately 14 thousand students, with the population offering 311 course options, ranging from initial continuing education courses to postgraduate courses. To meet this demand, the IFRS had approximately 2.173 civil servants, with approximately 1.221 professors and 952 administrative technicians.

It is worth noting that in the state of Rio Grande do Sul there are 3 (three) Federal Institutes, namely: Federal Institute of Rio Grande do Sul (IFRS), Federal Institute of Rio Grande do Sul (IFSul) and Federal Farroupilha Institute (IFFarroupilha). Each institute is independent and has distinct rectory and campuses.

C. Training of federal civil servants

There is an understanding in basic and higher education institutions that teacher training has contributed to improving learning. Duarte [15] explains that teacher qualification has impacted on student learning, but also improved the quality indicators of public and private educational institutions, as it is understood that the more capable the employees, the better the work will be.

Law 8.112/1990, which establishes the Legal Regime of Civil Servants of the Union, of autarchies, including those under special regime, and of federal public foundations, in particular Articles 81 and 87, assures the employees of the removal of their activities to carry out of training according to the level of qualification [16]:

"Art. 87. After each five-year period of effective exercise, the civil servant may, in the interest of the Administration, withdraw from the exercise of the effective position, with the respective remuneration,

for up to three months, to participate in a professional training course";

"Art. 96-A. The civil servant may, in the interest of the Administration, and provided that the participation cannot occur simultaneously with the exercise of the position or by compensation of time, withdraw from the exercise of the effective position, with the respective remuneration, to participate in a *stricto sensu* graduation at a higher education institution in the country."

In Decree nº. 9.991, of August 28, 2.019, published in the Official Diary of the Union – Brazil [17], he restructured the policy for the development of employees. Now, for the civil servant to request a license for training, he will have to meet criteria such as preparing a work plan, containing the description of the action's objectives in the perspective of development for the civil servant, the results to be presented to the agency, duration and load weekly hours.

This and other measures are part of the implementation of the National Policy for the Development of People – PNDP. In addition to providing for the PNDP, this decree also regulates provisions of Law nº 8.112/90, regarding licenses and removals for development actions.

All this effort to encourage the training of professionals confirms the importance of this study, which helps institutions to better understand the profile of their professionals, as well as their own needs for improvement.

The development of employees, through training, is of such relevance that on the IFRS website there is a space reserved for training, where information such as Recommended Institutions for Training, People Development Plan, Needs Assessment is made available Training, among others.

D. Analysis of Social Networks - SNA

For Serrat [19], Social Network Analysis is a method with increasing application in Social Sciences and has been applied in areas as diverse as: Psychology, Health, Business Organization and Electronic Communications. Aragon et. al. [20], used the method of analysis of social networks through graphs to represent the movement of animals through the Animal Transit Guide – GTA, in the state of Pará.

II OBJECTIVE

The object this paper was the build a Social Network Analysis of employee of Federal Institute of Rio Grande do Sul – IFRS.

III MATERIAL AND METHODS

Employees (administrative technicians and teachers of Basic Technical and Technological Education) participated in this study in the training process of the seventeen units of the Federal Institute of Education, Science and Technology of Rio Grande do Sul, and a rectory

It is important to mention that the data were obtained directly from the IFRS website and that they were analyzed in order to verify the numbers of both teaching staff and administrative technicians.

Through actions that allowed the transparency of public information, it was possible to obtain the qualification data to carry out this research, dispensing with any interactions or interventions related to public servants of the Federal Institute of Education, Science and Technology of Rio Grande do Sul, the aforementioned opinion on research ethics for human beings is unnecessary.

Subsequently, sample data from 310 civil servants were extracted from the website of the Federal Institute of Rio Grande do Sul, distributed into three groups: Total civil servants (310), administrative technicians (163) and professors (147), from which the following were selected: the employee capacity unit, the qualification course and the total number of employees enrolled in the respective qualification.

With this, the records were pre-formatted for the Comma-separated values model (.csv extension), which allowed us to build the graph network, with the help of the Gephi software [21]. Successively, the document containing the information of the sample groups was processed using the Social Network Analysis – ARS, through the Degree and PageRank algorithms. The vertices (nodes) are represented by employee, stocking unit and qualification courses, whereas the edges (Edges) represent the interactions between the stocking unit and the respective qualification course.

The Gephi software was adjusted for graph network analysis using as a layout option, the circular layout, with a diameter size of 500.00; ordering nodes (Node) ID and transaction steps of 1.000.000.

The training data were submitted to algorithmic analysis, with the aid of the Degree and PageRank techniques.

IV RESULTS

In the analysis carried out through the Nilo Peçanha Platform (PNP 2.018 - Base Year 2.017), the Federal Institute of Rio Grande do Sul (IFRS) had 952 administrative technicians, 16 with elementary education, 61 with high school, 79 with technical education, 217 with

graduation, 394 with specialization, 162 with master's and 23 with doctorate.

Also in PNP 2.017, it was possible to analyze that the IFRS has 1,221 professors, of which 31 are graduates, 74 have specialization, 656 are masters and 460 are doctors. The indicators for the distribution of employees by stocking units in the process of improvement are presented in Figure 1.
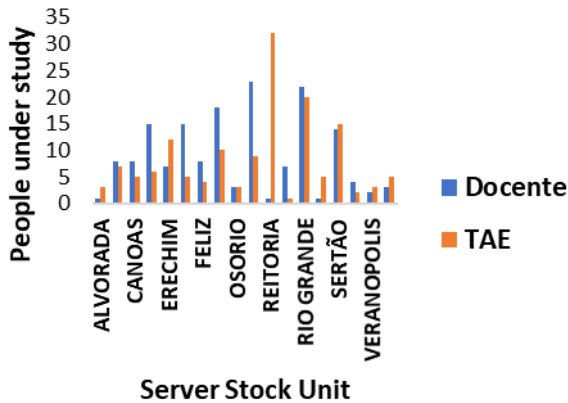

Fig.1: Employees of the Federal Institute of Rio Grande do Sul in the process of qualification by college.

In Figure 2, the qualification levels that civil servants have been looking for can be observed. Of the 147 administrative technicians in qualification, 45 were enrolled in Specialization; 74 in the Master's course and 28 in the Doctoral program. Regarding professors, about 163 are enrolled, of which 3 are in Specialization courses (3), 15 in Master's, 138 in Doctorate and 7 in post-doctoral internships.
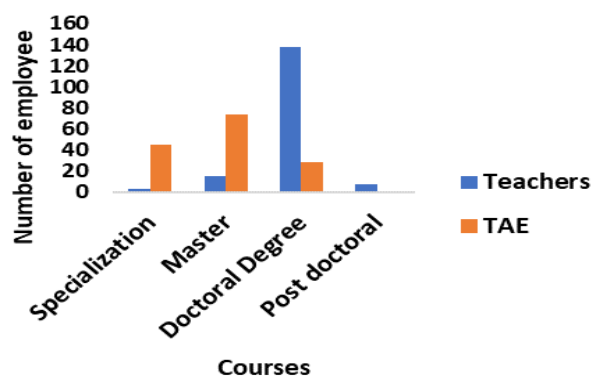

Fig.2: Distribution of employees in training by level of study.

In Table 1, it was possible to assess the number of professors, administrative technicians and their training courses through the Nodes (nodes) and the interactions between them through the edges (Edge).

Table 1. Quantitative of relationships between employees and qualification courses.

Description	Nodes	Edge
All employees	109	208
Teachers	69	112
Administrative Employees	83	119

Table 2 shows the number of employees by qualification level. Of the total number of employees in qualification analyzed, 48 are attending Specialization, 89 Master's, 166 Doctorate and 7 Postdoctoral. Data analysis also showed the level of qualification that the employees are looking for. Of the 147 administrative technicians in qualification, they are enrolled in Specialization (45), Masters (74) and Doctorate (28) courses. Of the 163 professors, they are enrolled in Specialization courses (3), Master (15), Doctorate (138) and Post-doctorate (7).

Table 1. Quantitative of relationships between employees and qualification courses.

Descritpion	Specialization	Master	Doctorate	Post doctorate
Teacher	3	15	138	7
Administrative employees	45	74	28	0

Present in this study, the Social Network Analysis - Degree characterized in Figure 3, presented the total amount of civil servants in qualification. In this network, it is inferred that the Rio Grande campus (42) is the unit with the largest number of employees in qualification, followed by the Rectory (33), Porto Alegre (32), Sertão (29) and Ibirubá (28) units.
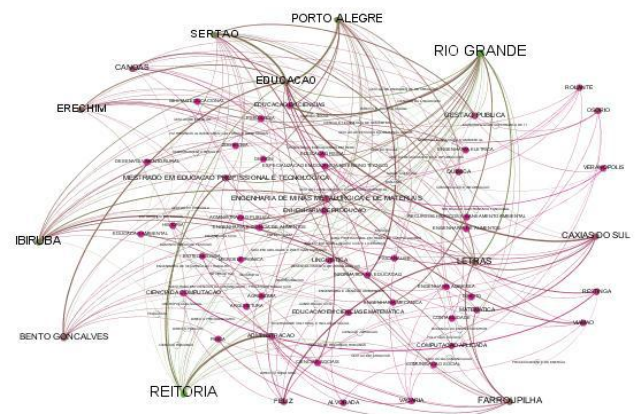

Fig.3: Degree characterization of all employees of the Federal Institute of Rio Grande do Sul in the qualification process.

To identify the most sought after courses, a PageRank analysis was performed (Figure 4) of all civil servants in qualification, with emphasis on the civil servants who

attended the following postgraduate courses: Education (42), Languages (26), Masters in Education Professional and Technological (12), Public Management (10) and Applied Computing (7).
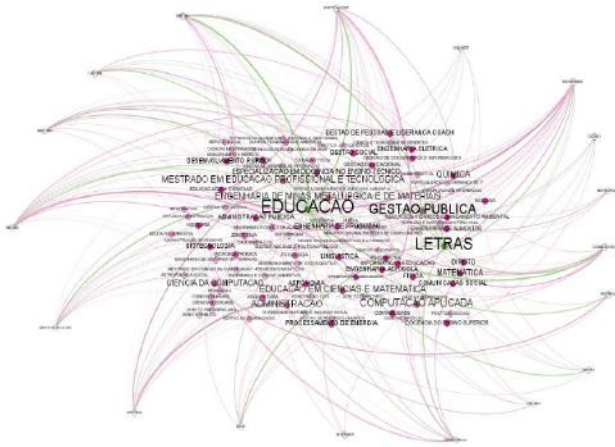

Fig.4: Analysis of Social Networks of all person by PageRank algorithm.

In the group of professors, when running the Degree algorithm (Figure 5), a large number of people on the Porto Alegre campus (23) were in qualification, followed by Rio Grande (22), Ibirubá (18), Caxias do Sul (15)) and Ragamuffin (15).

Fig.5. Analysis of Social Networks of all Faculty using the Degree algorithm

In the results for the courses most sought after by teachers, the algorithmic analysis of PageRank (Figure 6), there was a great demand for the Education course (27), followed by Literature (16), Applied Computing (6) and Specialization in Teaching in Technical Education (3).
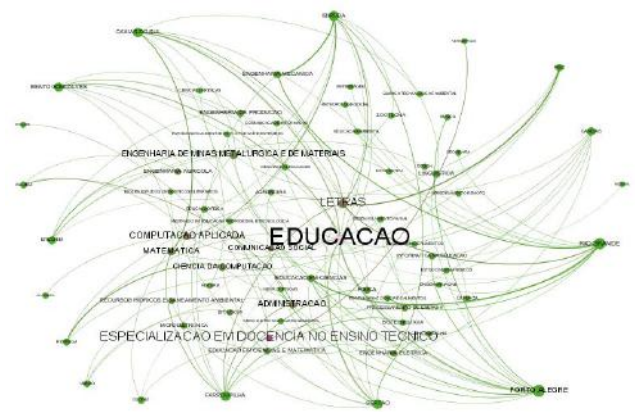

Fig.6: Analysis of Social Networks of all Faculty by PageRank algorithm.

In the results of the Degree analysis (Figure 7) of administrative technical servants, it can be seen that the Rectory (32) is the unit with the highest quantity of civil servants in qualification, followed by Rio Grande (20), Sertão (15), Erechim (12) and Ibirubá (10).

Fig.7: Analysis of Social Networks of all technical administrative employees by the Degree algorithm.

In the results of the PageRank algorithm (Figure 8) for the specialization, master's and doctoral programs, applied to technical administrative staff, it is noted that the Education course (13) is the most sought after, followed by Literature (14), Masters in Professional Technological Education (11) and Public Management (10).
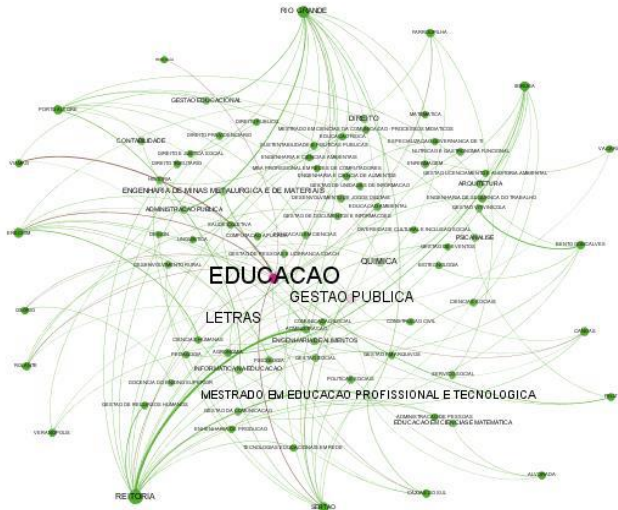
Fig.8: Analysis of Social Networks of all technical administrative employees by PageRank algorithm.

V DISCUSSION

Through this study, it was possible to observe that the faculty showed greater demand for *stricto sensu* courses at the doctoral level. The justification for this demand can be seen when analyzing the titles of professors in the Nilo Peçanha Platform 2.018, which records, in the base year 2.017, 31 professors with an undergraduate degree, 74 with specialization, 656 with a master's degree and 460 with a doctorate. Thus, it is evident that the greatest demand, for the teaching class, would be for the doctoral level, since the majority (53.73%) have a master's degree.

In this work, it was also possible to observe that administrative employees had a greater demand for *stricto sensu* courses at the master's level. As for the faculty, the justification can also be observed when analyzing the title of Administrative Technicians in the Nilo Peçanha Platform 2.018, which records, in the base year 2.017, 217 Administrative Technicians with graduation, 394 with specialization, 162 with master's and 23 with doctorate. Therefore, it is evident that most of these person have specialization and, therefore, it is evident that the greatest demand would be, in fact, courses at the master's level. It should be noted that, for administrative employees, there are still 156 civil servants who do not have a degree.

In Figure 01, there was a high rate of administrative technical servants, attending a master's and doctoral degree in the rectory, as observed in the Nilo Peçanha Platform 2.018, in the rectory the vast majority of employees working are administrative technicians, which justifies this finding.

Another important factor to note is that in 2.017, according to data obtained from the Ministry of Education, via Nilo Peçanha Platform, it was a year with appointments, mainly

of administrative technical employees for the Federal Institute of Rio Grande do Sul.

Several other analyzes can be carried out from this work together with a more detailed survey of Nilo Peçanha Platform and IFRS. One of these analyzes is linked to Figure 01, where it is possible to observe that on the campuses of Rio Grande and Porto Alegre there is an expressive number of teachers and administrative technicians in qualification, in addition to being in an equivalent proportion. The number of administrative employees in qualification, higher than the number of professors in qualification that some campuses have, also proves to be an interesting analysis that can be explored. These and other analyzes can be the objectives of other works that may be based on the work presented here. In addition, we emphasize that according to data from the Nilo Peçanha Platform in IFRS 91.40% of teachers are masters or doctors, which given the number of administrative technicians, there should always be a greater number of administrative technicians attending a master's course, it is also important to emphasize that there are unit with about 85% of professors with master's and doctoral degrees, which will be very evident to have a campus with a greater number of employees studying master's and doctoral degrees than another given campus.

VI CONCLUSION

The present study showed that the use of Social Network Analysis - ARS applied to civil servants in the qualification process at the Federal Institute of Rio Grande do Sul - IFRS allowed a complete and accurate visualization of the civil servants in qualification in relation to graduate programs. In this way, the use of the ARS can help managers in offering postgraduate courses with a higher rate of demand. Still, such networks can be improved according to the availability of complementary and more accurate data by the Federal Education Institutions – IFE. The results also showed the level of qualification of the servants and that they always seek to be growing, which, as portrayed in this work, helps in valuing educational institutions and the knowledge they have of their servants.

REFERENCES

[1] BRAZIL. (1909). Dispõe sobre a criação de Escolas de Aprendizes e Artífices, para o ensino profissional primário e gratuito. Official Diary of the Union - Brazil. https://www2.camara.leg.br/legin/fed/decret/1900-1909/decreto-7566-23-setembro-1909-525411-publicacaooriginal-1-pe.html

[2] Soares, M. (1981). As Escolas de Aprendizes Artífices e suas fontes inspiradoras. Fórum Educacional, 5(4), 69-77. http://bibliotecadigital.fgv.br/ojs/index.php/fe/article/download/60571/58817

[3] Fonseca, C. S. (1961). História do Ensino Industrial no Brasil. Rio de Janeiro: Escola Técnica.

[4] BRAZIL. (1942). Decreto-Lei nº 4.048, de 22 de Janeiro de 1942. Cria o Serviço Nacional de Aprendizagem dos Industriários (SENAI). Official Diary of the Union – Brazil. https://www2.camara.leg.br/legin/fed/declei/1940-1949/decreto-lei-4048-22-janeiro-1942-414390-publicacaooriginal-1-pe.html

[5] Souza, A. A., Nunes, C. R.G. de L., & Oliveira, E. (2011). Políticas públicas para a educação profissional e tecnológica no Brasil. Fortaleza: Edições UFC.

[6] BRAZIL, Decreto – Lei nº 8.621, de 10 de janeiro de 1946. Dispõe sobre a criação do Serviço Nacional de Aprendizagem Comercial e dá outras providencias. Official Diary of the Union – Brazil. https://www2.camara.leg.br/legin/fed/declei/1940-1949/decreto-lei-8621-10-janeiro-1946-416555-norma-pe.html

[7] Tavares, M. G. (2012). Evolução da Rede Federal de Educação Profissional e Tecnológica: as etapas históricas da educação profissional no Brasil.UEPG.

[8] BRAZIL. (1967). Decreto nº 60.731, de 19 de maio de 1967. Transfere para o Ministério da Educação e Cultura os órgãos de ensino do Ministério da Agricultura e dá outras providências. Official Diary of the Union – Brazil. https://www2.camara.leg.br/legin/fed/decret/1960-1969/decreto-60731-19-maio-1967-401466-norma-pe.html

[9] Silva, C. J. R. (2009). Institutos Federais lei 11.892, de 29/11/2.008: comentários e reflexões. IFRN. https://www.ifb.edu.br/attachments/4713_Lei%20n%C2%BA%2011.892%20-%20Comentada.pdf

[10] BRAZIL, (1996). Lei nº 9.394, de 20 de dezembro de 1.996. Estabelece as diretrizes e bases da educação nacional. Official Diary of the Union – Brazil.

[11] BRAZIL, (1997). Decreto nº 2.208, de 17 de abril de 1.997. Regulamenta o § 2º do art.36 e os artigos 39 a 42 da Lei nº 9.394, de 20 de dezembro de 1.996, que estabelece as diretrizes e bases da educação nacional sobre a educação professional. Official Diary of the Union – Brazil. http://portal.mec.gov.br/seesp/arquivos/pdf/dec2208.pdf

[12] MANFREDI, S. M.(2002). Educação profissional no Brasil. São Paulo: Cortez.

[13] BRAZIL, (2008). Lei nº 11.892, de 29 de Dezembro de 2.008 que Institui a Rede Federal de Educação Profissional, Científica e Tecnológica, cria os Institutos Federais de Educação, Ciência e Tecnologia, e dá outras providências.

[14] Pacheco, E., (2011). Institutos federais: uma revolução na educação tecnológica. São Paulo: Moderna.

[15] Duarte, V.C., (2004). Capacitação Docente em Minas Gerais e São Paulo: Uma Análise Comparativa. Cadernos de pesquisa, v. 34, n. 124, p. 139-168.

[16] BRAZIL, (1990). Lei nº8.112, de 11 de dezembro de 1.990. Estabelece o Regime Jurídico dos Servidores Públicos Civis da União. Official Diary of the Union – Brazil.

[17] BRAZIL, (2019). Dispõe sobre a Política Nacional de Desenvolvimento de Pessoas da administração pública federal direta, autárquica e fundacional, e regulamenta dispositivos da Lei nº 8.112, de 11 de dezembro de 1.990, quanto a licenças e afastamentos para ações de desenvolvimento. Official Diary of the Union – Brazil. https://www2.camara.leg.br/legin/fed/decret/2019/decreto-9991-28-agosto-2019-789036-norma-pe.html

[18] BRAZIL, (2019). Dispõe sobre a Política Nacional de Desenvolvimento de Pessoas da administração pública federal direta, autárquica e fundacional, e regulamenta dispositivos da Lei nº 8.112, de 11 de dezembro de 1.990, quanto a licenças e afastamentos para ações de desenvolvimento. Official Diary of the Union – Brazil.

[19] Serrat, O. (2017). Knowledge Solutions: Tools, Methods and Approaches to Drive Organizational Performance. Singapura: Springer Singapore.

[20] Aragão S. C., Pontes A. R., Gouveia L. B., Lopes S. F., Katsuda P. K. R., Tavares P., Oliveira M. T., Oliveira J. P., Coroa R. S. B., Araújo G. F., Siqueira M. M. P. The Visualization of Cattle Movement Data in The State of Pará in 2.016 Through Networks of Animal Transit Graphs and Guides. Advances in Science, Technology and Engineering Systems Journal, v. 3, n. 5, p. 92–96, 2.018.

[21] Bastian, M., Heymann, S., Jacomy, M. (2008). GEPHI, An open source graph visualization and manipulation software.