

Mixed methods and visual representation of data with CAQDAS: empirical study

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ABSTRACT

Mixed Methods increasingly progress and help research to evolve, combining quantitative and qualitative perspectives and helping the researcher to interpret and represent the studied reality with a holistic approach. In order to exemplify the research process from the methodological complementarity, a contextualized study was carried out in the city of Valladolid (Spain) through a mixed approach with the objective of identifying the socio-labour actions implemented by third sector entities that work with people at risk and socially excluded, including women. For this purpose, semi-structured interviews were conducted with workers from the participating entities, and information was also collected in other formats such as roadmaps and reports from the centres. From the categorization, the codification of the speeches and the results of the quantitative scales we proceeded to the triangulation of the data, with the support of digital supports, CAQDAS. Nvivo 12 and webQDA were used. The node map, project map, coding matrices, dendrogram, word trees and word clouds were made. This made it possible to respond to the objective and the research question, concluding that each entity developed different degrees of socio-labour attention based on its degree of available resources. The study was an example of the representation of reality from the convergence of the quantitative perspective and the qualitative perspective.

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CCS CONCEPTS

• **General and reference** → Cross-computing tools and techniques; Empirical studies • **General and reference** → Cross-computing tools and techniques; Desing

KEYWORDS

Mixed methods, CAQDAS, methodological complementarity, socio-labour orientation

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1 Introduction

Mixed Methods have led to a different methodological approach [23]. Creswell and Plano Clark [12] defined Mixed Methods as a research design with its own philosophical assumptions and research methods. These authors argue that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than any separate approach, and we can find evidence that Mixed Models alone constitute a methodology in publications such as "The Best Practices for Mixed Methods Research in the Health Sciences Report" [11]. What makes Mixed Methods a different methodological approach is to place the research objective and question in the spotlight. This gives the Mixed Methods a special characteristic, the critical or transformative intention of the research.

In focusing attention on the methodological approach of Mixed Methods, it is necessary to consider the need for tools to develop such methodology. Researchers use research technologies to achieve technical efficiencies. Bowleg et al. [4] affirm that

Mixed Methods offer another type of efficiency: theoretical efficiency because it is possible to develop a holistic, multidimensional and robust analysis of social phenomena more effectively than with a single method. The methodological approach of mixed approaches develops both technical and theoretical (analytical of different methods) benefits. The new digital environment in research with Mixed Methods poses serious challenges. Among them is the challenge of new professionals, new practices and new objectives, followed by the challenge of developments in methodologies and technologies of Mixed Methods, and finally, hybrid methodologies and support technologies.

2 Data analysis with mixed methods

In the case of Mixed Methods, we must talk about secondary analysis and archival practice; critical perspectives on data integration; and online data exploitation.

Secondary analysis and archival practice are a valuable but underutilized resource in Mixed Methods. It intrinsically tries to combine and contrast the results of data sets that use different methods. Bowleg et al. [4] comment that research of this type includes the use of data archived on the Internet [6], the combination of textual and visual data [43], and biographical research [46].

Critical perspectives on data integration, such as that of [10] and others, rightly recognize the critical importance of data integration in Mixed Methods. For many, it is intrinsically a matter of combining quantitative and qualitative data [5, 28], while canonical sources such as [14] recognize the logical possibility of 'triangulation of methods'. Many have recognized the value of combining quantitative and qualitative data as a means of gaining both analytical depth and breadth [22], but few have shown how direct integration can be done by converting one form of data to another. Data conversion is quite common. One of the challenges posed by this line of reasoning is the unintended consequence of data simplification, which reduces the potential of a deep level of acquired knowledge, especially when large volumes of qualitative data are converted. [2, 3] is a pioneer in this respect. This does not mean that all integration must be direct; for example, there is much value in qualitative analysis of open-ended questions in surveys, particularly where qualitative software makes it systematic [15]. It is necessary to design an integration strategy considered from the beginning [13]; when this challenge is met, a real analytical discovery is possible [20]. Mixed Methods have the advantage of creatively handling the amount of data and at the same time responding firmly to the information quality issues that often arise.

2.1. Qualitative software: CAQDAS

In relation to the new technological methods with potential for Mixed Methods, the intersection between qualitative code-based data analysis and content analysis; the convergence of quantitative and qualitative data visualization techniques; and spatial and social analysis is analysed. Mixed Method researchers have enthusiastically embraced qualitative software ("CAQDAS"), which has played an important role in the more systematic analysis of qualitative data, and in their integration with quantitative data [1, 37]. Contemporary CAQDAS increasingly offers powerful tools for the semi-automatization of code-based

analysis [17]. Digital tools for content analysis have enabled new analytical approaches for mixed data sets [21, 35, 36], including full automation [18] and text mining [27], the challenge is to stay close to the underlying data.

2.2 Visualization of the data

Mertens et al. [33] argue that digital tools have transformed data visualization and made statistics more attractive [40-42, 44]. Recently, the visualization revolution has extended to qualitative and geographic data [7]. Techniques for combining types of information in data visualization [29] may be particularly appealing to Mixed Method researchers.

Mixed Methods combine not only social and physical geography, but also quantitative and qualitative geography. The innovative systems that integrate Geographic Information Systems with CAQDAS [8, 24, 25, 39] bring together the spatial and the social. The new geography is also a committed research practice that seeks to put research resources at the service of communities [9] exemplified by feminist analysis of forest resources [34], the use of mixed methods of geographic resources in urban planning [26], and community safety studies [16].

2.3 Ethical aspects

The pragmatic orientation defends mixed or hybrid methods and models: pluralism and compatibility, and maintains that the relationships between the researcher, phenomenon and participants are determined by each particular study and context; it rejects the dichotomy between conventional dualisms and is action-oriented. Pragmatic researchers collect, analyse, and integrate or connect quantitative and qualitative data in a single study or multiphase research program, and offer the same status to quantitative, qualitative, and mixed approaches [19]. The transformative paradigm [30-32] contains philosophical assumptions emanating from an ethical stance that emphasizes the pursuit of social justice and the promotion of human rights. However, the investigation of Mixed Methods is not a panacea. Researchers need to engage with critical philosophical issues and obtain training in quantitative, qualitative research and Mixed Methods to carry out appropriate design and integration. This is an important topic for the teaching of Mixed Methods research, as several textbooks widely used for Mixed Methods research suggest that paradigms are the "basis" of a study of Mixed Methods, and that the researcher should select a particular paradigm for the study [13, 39].

3 Empirical study with mixed methods

During 2017 interviews were carried out with professionals from third sector entities (named with a P and its correspondence figure in the results of the paper) that promoted and developed the line of socio-labour intervention with people at risk and socially excluded, among which the high presence of women victims of gender violence stood out. The purpose of this work for the associations was to foster the empowerment of the users, most of whom were unemployed. The study was carried out in the city of Valladolid (Spain).

In addition, together with the interviews, information was collected on this line of socio-labour work through other materials of the entities, such as memoirs, reports and roadmaps of the work proposed by the associations. The data mentioned above made it

possible to carry out a pair scale from value 1 to value 4 to assess the level and degree of presence of specific socio-labour items in the entity. This last action gave way to a comparison between the lines of work developed by the different associations participating in the study presented below.

The **objective of this study** was to identify the socio-labour actions implemented by third sector entities, in the context indicated above.

The **research question** to which the study responded was: was the socio-labour orientation offered by the study entities the same in all cases?

The focus of the research was on the social intervention offered by the associations due to the importance of developing prevention and intervention on situations of social vulnerability, which especially in this study, affect women, such as the unemployment situation [28, 36].

This objective, and as pointed out in the theory, allowed triangulating qualitative and quantitative data, with the support of technological means, in this case two CAQDAS: NVivo 12 and webQDA. It will be commented later on what results each of them provided to the study, as supports for the analysis.

3.1 Participants

The research began with a detailed survey of the entities that met the defined inclusion criteria: it had to be an entity of the Third Sector of the city of Valladolid, working with people at risk and socially excluded, including women, and that had a socio-labour line or showed interest in its development.

Finally, after a study of compliance with the criteria, nine entities participated in the study. The profile attended by them was heterogeneous, but they coincided in being profiles of social vulnerability, with a high presence of women, and high unemployment rates.

The people interviewed for the study were employees of the entities, which provided information through materials that could allow the valuation in scale of the presence of the items studied in the research.

Prior to the participation of the workers of the associations that made up the sample, they were told that their identities would be treated with anonymity, preserving the rights of the entities, workers and people served.

3.2 Collection of data and analysis

First, the flowchart of the semi-structured interviews that were conducted was carried out and a field notebook was written to accurately collect both quantitative and qualitative information that was being collected, such as reports, memoirs and entity roadmaps.

The categories to be studied were established, in order to be able, later, to design the semi-structured interview script. The categories that were analyzed are the following: "Training in socio-labour skills and motivation", "Workshops and pre-employment and occupational training", "Labour intermediation", "Individualized itineraries of labor insertion", "Orientation towards self-employment", "Socio-labour workshops for insertion and reinsertion into the labour market", "Preparation in the use of ICT (*Information and Communication technology*)". These categories, which correspond to the items, were considered the main ones for research, since they covered the whole spectrum of

socio-labour orientation, from the development of socio-labour skills and motivation, to pre-work preparation, individualised work orientation with the design of cover letters and curriculum, the management of new information and communication technologies for effective job search, and direct application in the field, through socio-labour intermediation and guidance for self-employment.

Once the categories for the future codification of the speeches were defined, the process of semi-structured interviews with the participants linked to the staff of the entities began. These interviews were recorded, in voice format, with the prior consent of the workers being interviewed. The same people collaborated by allowing access to other complementary materials already mentioned.

The analysis process was then carried out by means of two fundamental steps: the coding of speeches, i.e. the codification of qualitative contents; and the process of converting the data into an even scale, i.e. the conversion of quantitative data.

The coding of the speeches took place after the creation of the nodes, identified as the items studied. The creation of nodes gave rise to the map of nodes, the fruit of the categories defined, which can be seen in Figure 1. In this field, the CAQDAS allow you to draw the visual representation of the categories with which you work.

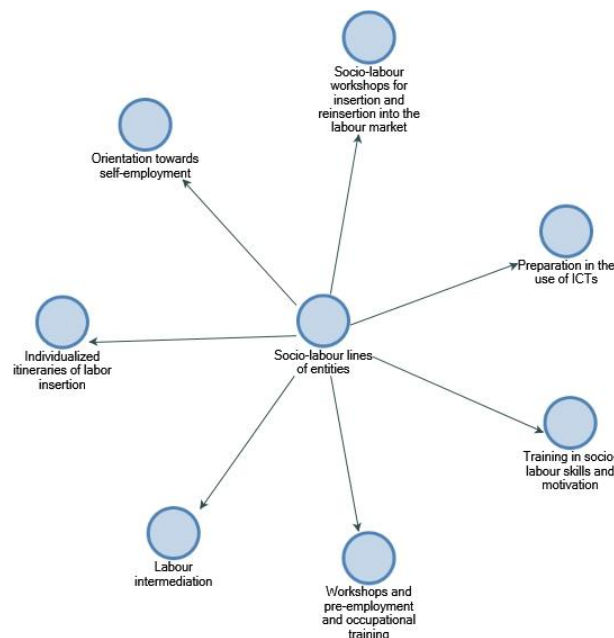


Figure 1: Map of nodes of the project carried out with Nvivo 12.

On the other hand, for the conversion of the data into a scale, the following criterion was followed: if the content of the item studied was not developed by the entity, the rating was equal to 1; if the action was carried out in a punctual or sporadic manner, and it was so stated, the rating was equal to 2; if the frequency of the action was high, however, it was not always applied, the rating was equal to 3; if the implementation of the action was permanent for the development of the work, and was part of the philosophy

of the entity, the rating was equal to 4. As values for the scale, even values were taken so that the score inclined towards one of the two hemispheres, positive or negative.

Thus, these two research links opened the way to the triangulation of quantitative and qualitative data, making use of CAQDAS, Nvivo 12 and webQDA [38]. From CAQDAS Nvivo 12 were extracted, besides the node map, the project map, coding matrices, analysis of the conglomerates by similarity of coded words, the word tree and the dendrogram. This was complemented with the word cloud, extracted after the analysis of the term frequencies, with the CAQDAS webQDA.

After the process of codification of the speeches of the participants, and the integration in the CAQDAS of the values of the scale, corresponding in both cases to the defined categories, the triangulation was proceeded that can be read in the results of the study.

4 Results

In order to know how the categories behaved in the speeches, Figure 2 shows the associative distribution between the nodes and the main source, through the project map generated by the analysis of CAQDAS Nvivo 12.

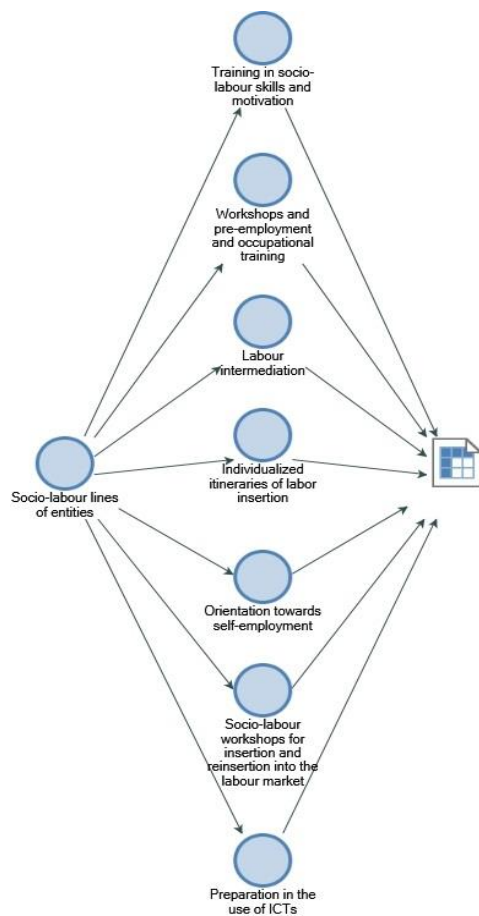


Figure 2: Project map between nodes and main source.

From the analysis of the data and contents, with the support of the CAQDAS, it was concluded that item 1, "Training in socio-labour skills and motivation" was intensely developed by the entity P2, with a score of 4 out of 4, followed by entities P4 and P6, with a score of 3. However, entities P1, P5, P7, P8 and P9 did not develop the work of socio-labour competencies and motivation.

In relation to item 2, "Workshops and pre-employment and occupational training", the entity P2 stood out remarkably, with a score of 4 on the scale of 4. The entities P4 and P6 followed it in the task of pre-work orientation, with a score of 2.

Entity P4 and P6 were experts in item 3 "Labour intermediation", and punctually, entities P2 and P9, with a score of 2 out of 4, carried out some intermediation task, but it was not the usual practice for these associations. On the other hand, the rest of the entities did not have this service, due to a lack of professional and temporary resources.

Entities such as P4, P6, P3, P8, P9 and P2, in order of execution, emphasized the great importance that item 4 "Individualized itineraries of labour insertion" had in their programs for labour orientation.

Interestingly, only entities P4 and P2, in the order mentioned, performed tasks of item 5 "Orientation towards self-employment".

In addition, for item 6 "Socio-labour workshops for insertion and reinsertion into the labour market" the perspective was more diverse, as no entity stood out with a score of 4 out of 4. However, entities P2 and P4 carried out workshops for insertion and reinsertion into the labour market, followed by P3, P6 and P8.

Finally, although all entities at some point in their speeches stressed the importance of preparation for the handling of new technologies, and the active search for employment through the Internet, only entities P3, P2 and P6, in order of development, implemented item 7 "Preparation in the use of ICT (*Information and Communication technology*)".

However, at the time of the study, the lack of spatial-temporal and professional availability meant that their interventions focused on other axes such as basic needs, psychological care, legal care and management related to social care (referrals to the public services of local bodies and the autonomous community).

The recently commented distribution of the items worked from the entities can be read graphically in Figure 3, which corresponds to the coding matrix created through CAQDAS Nvivo12, to favour the visualization of the data.

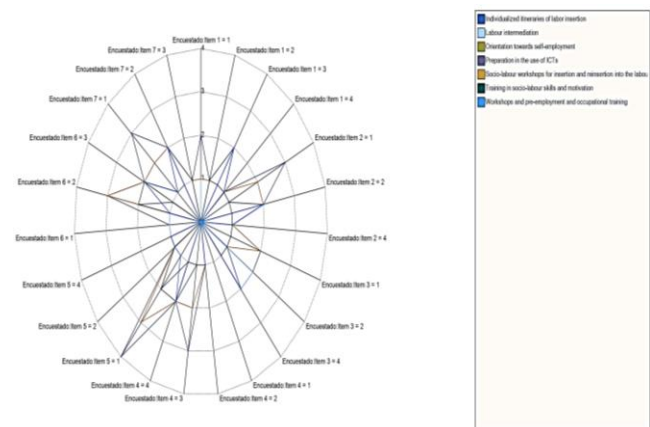


Figure 3: Coding matrix broken down by entity and items developed.

In the same way, in Figure 4, it is possible to visualize the final computation of the socio-labour work carried out by the entities. The graph shows perfectly how entities P2, P4 and P6 stood out in the work.

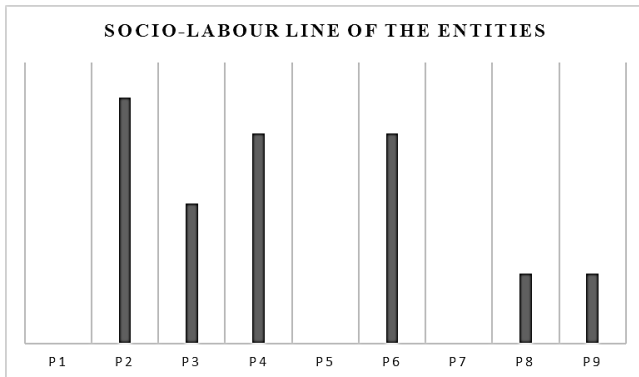


Figure 4: Coding matrix broken down by entity and items developed.

Developing a discursive analysis, the P2 entity stood out in the socio-labour labour ones as an entity, and some of its main comments in relation to the categories in which the contents were coded are indicated below. In relation to the training of socio-labour skills and motivation, the person interviewed was qualified: *"On tuesday mornings we have dedicated them to specific occupational workshops: in these workshops we have given topics such as interviews, curriculum, social skills, relationships within the company. | We have carried out workshops such as: the professional, professional motivation, satisfaction, socio-professional skills. | Empower their communication and social interaction patterns. | Workshops to promote verbal/non-verbal communication and body language through theatrical techniques".* As for pre-employment training, the person interviewed commented: *"The only ludic workshop we have is drawing, that's ludic. | Then we have spanish for foreigners and culture; initial culture is what we call for literacy for women who speak spanish and who can't read or write. Then there is a more general culture, aimed at those women who already know how to read and write, but in a precarious way, that is, they commit spelling mistakes, they don't know how to write well. | Then next to the culture workshop there is some mathematical operations, because division and multiplication are already more complex, and then notions of geography and history. So, in that culture workshop, a little more is dealt with".*

For its part, the P4 entity that stood out in its labour intermediation with companies indicated that: *"The labour mediation is carried out, this is carried out depending on the profile of the people. | And then in intermediation we do have a job exchange, but our reality is not different from the rest of society and well, currently we do not have many offers as in good times. | And the intermediation service is a common service for those programs. In addition to that job exchange, we also have a list of companies where they can do self-application. | To facilitate labour market insertion through intermediation between people and the effective*

labour market and support for business initiatives, promoting networking through socio-labour mediation". From the entity was also transmitted in so much to the individualized itineraries, that: *"The programmes are insertion itineraries and various programmes are carried out. | The methodology of work is the same for all, however, work is based on personal itineraries of insertion. | Here we have to participate in the projects from the individualized orientation with the counselor, and other sessions of group orientation. | The program is a program of itineraries and they are intensified itineraries, that are for people of low employability, I insist they are intensified, because they are with groups of greater difficulty in front of the rest of the population, that already have difficulties. | The three blocks are orientation, training, intermediation. | Within orientation we have individualized orientation. We provide group orientation with all those activities that we believe are of interest to all the groups we work with".*

The analysis by similarity of the speeches leads to a conglomerate, in which again, the digital support of the CAQDAS favours the visualization.

This is the case shown in Figure 5, where you can see the dendrogram derived from the discursive relationship between the items that have been analysed. In this example, two main clusters were generated (upper cluster made up of items 3 and 7; lower cluster with double branching, item 2 and new cluster), and the second of them produced two divisions, the second of it in turn drifting into two clusters (in the upper cluster are framed item 4 and item 5, and in the lower cluster items 6 and 1).



Figure 5: Dendrogram of the similarity of the speeches in relation to the study items.

Also, the analysis of the contents through the use of CAQDAS makes it possible to analyse the existing discourse around a term, thus creating a tree of words. This is the example with the word "orientation". The display can be read in Figure 6.

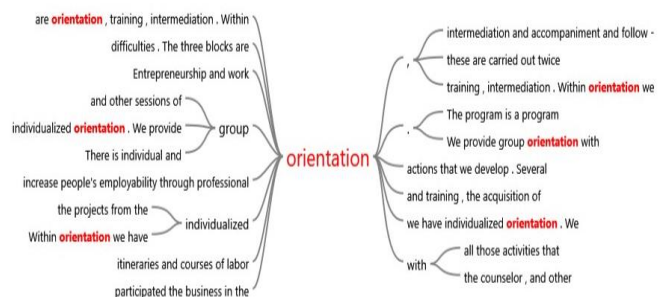


Figure 6: Word tree with the term "orientation".

Finally, the CAQDAS give the researcher the option of drawing a cloud of words, with those terms that most frequently present. Figure 7 shows the word cloud generated with the CAQDAS webQDA after selecting the number of terms to be extracted and the minimum length of characters per term.



Figure 7: Cloud of most frequent words in the study.

As can be seen in this case, the most frequently repeated words are "programme", "training", "attention", "employment", "insertion", "service", in relation to work orientation and the terms "violence", "immigrants" and "prostitution" in relation to the main causes of social exclusion in the context in which the research has been carried out.

5 Discussion and conclusions

The research, in its broad concept, carried out from mixed approaches has led to an advance within the field of science, as has been demonstrated in the paper from the literature, and share authors such as [23]. Mixed Methods allow the researcher and the researcher to go deeper into reality and results, performing an analysis of data and contents in a holistic way. This progress for research and methodology, in addition, is accompanied by the technological revolution and the support of digital media, through the CAQDAS, support the visualization of results in a simpler and more communicative way.

In order to achieve the studied methodological complementarity, it is necessary to understand the necessary combination between the quantitative data and the qualitative contents, in order to arrive at the triangulation of the data, and to achieve the complete interpretation of the same reality from the two converging perspectives.

As has been expressed in the study carried out and presented in this paper, first of all, it is necessary to define the objectives and research questions to be answered, in order to arrive at the organization of the flowchart. The definition of inclusion criteria is necessary to properly select participants. From that moment on, research must be directed towards the same objective, gathering qualitative and quantitative information through different techniques and instruments, and then developing an analysis where both methodologies are combined and allow the researcher and the reader to visualize reality as a whole.

In response to the objective set for the research, the socio-labour tasks that were most developed in different entities were: training in socio-labour skills and motivation, pre-labour training, individualised itineraries, insertion and socio-labour reintegration workshops; followed by socio-labour intermediation, orientation towards self-employment and training in digital skills. In addition, the three entities that stood out in the work were P2, P4 and P6.

Finally, and in response to the research question posed, not all the entities participating in the study had sufficient resources at a spatial-temporal and professional level to deeply develop the work of socio-labour orientation, so that the attention of each entity was different.

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REFERENCES

- [1] Bazeley, P. 2010. Computer assisted integration of mixed methods data sources and analyses. *Handbook of mixed methods in social and behavioral research*. SAGE.
- [2] Bazeley, P. 2009. Editorial: Integrating data analyses in mixed method research. *Journal of Mixed Methods Research*. 3, 3 (2009), 203–207.
- [3] Bazeley, P. 2006. The contribution of computer software to integrating qualitative and quantitative data and analysis. *Research in the Schools*. 13, 1 (2006), 63–73.
- [4] Bowleg, L. et al. 2016. *The Future of Mixed Methods: A Five Year Projection to 2020*.
- [5] Bryman, A. 2006. Integrating quantitative and qualitative research: How is it done? *Qualitative Research*. 6, (2006), 97–113.
- [6] Carmichael, P. 2008. Secondary qualitative analysis using internet resources. *The SAGE Handbook of Online Research Methods*. Sage.
- [7] Chen, C. et al. 2007. *Handbook of data visualization*. Springer.
- [8] Cisneros-Puebla, C. and Fielding, N.G. 2009. CAQDAS-GIS convergence: Towards a new integrated mixed method research practice? *Journal of Mixed Methods Research*. 3, 4 (2009), 349–370.
- [9] Craig, W.J. et al. 2002. *Community participation and geographic information systems*. Taylor and Francis.
- [10] Creswell, J.M. 2009. *Research design: Qualitative, quantitative and mixed approaches*. SAGE.
- [11] Creswell, J.W. et al. 2011. *Best practices for mixed methods research in the health sciences*. National Institutes of Health.
- [12] Creswell, J.W. and Plano Clark, V.L. 2007. *Designing and conducting mixed methods research*. Sage.
- [13] Creswell, J.W. and Plano Clark, V.L. 2011. *Designing and conducting mixed methods research*. SAGE.
- [14] Denzin, N. 1970. Strategies of multiple triangulation. *The research act in sociology: A theoretical introduction to sociological method*. 297, (1970), 313.
- [15] Fielding, J. et al. 2013. Opening up open-ended survey data using qualitative software. *Quality & Quantity*. 47, 6 (2013), 3261–3276. DOI:<https://doi.org/10.1007/s11135-012-9716-1>.
- [16] Fielding, J.L. and Fielding, N.F. 2013. Integrating information from multiple methods into the analysis of perceived risk of crime: The role of georeferenced field data and mobile methods. *Journal of Criminology*. (2013).
- [17] Franzosi, R. et al. 2013. Quantitative narrative analysis software options compared: PC-ACE and CAQDAS (ATLAS.ti, MAXqda, and NVivo). *Quality & Quantity*. 47, 6 (2013), 3219–3247.
- [18] Grimmer, J. and Stewart, B.M. 2013. Text as data: The promise and pitfalls of automatic content analysis methods for political texts. *Political Analysis*. 21, 3 (2013), 267–297.
- [19] Hernández-Sampieri, R. et al. 2014. *Metodología de la investigación*. McGraw-Hill.
- [20] Hesse-Biber, S.N. 2010. Feminist approaches to mixed methods research: Linking theory and practices. *SAGE handbook of mixed methods in social & behavioral research*. SAGE. 169–192.
- [21] Hogenraad, R. et al. 2003. Force and influence in content analysis: The production of new social knowledge. *Quality and Quantity*. 37, 3 (2003), 221–238.

- [22] Ivankova, N. and Kawamura, Y. 2010. Emerging trends in the utilization of integration designs in the social, behavioural and health sciences. *Handbook of mixed methods in social and behavioural research*. Sage. 581–611.
- [23] Johnson, R.B. et al. 2007. Toward a definition of mixed methods research. *Journal of Mixed Methods Research*. 1, 2 (2007), 112–133.
- [24] Jung, J.K. 2009. Computer-aided qualitative GIS: A software-level integration of qualitative research and GIS. *Qualitative GIS: a new approach*. Sage. 115–135.
- [25] Jung, J.K. and Elwood, S. 2010. Extending the qualitative capabilities of GIS. *Transactions in GIS*. 14, 1 (2010), 63–87.
- [26] Knigge, L. and Cope, M. 2006. Grounded visualization: Integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environmental Planning A*. 38, (2006), 2021–2037.
- [27] Lee, S. et al. 2010. An empirical comparison of four text mining methods. *Journal of Computer Information Systems*. 51, 1 (2010), 1–10.
- [28] Llinares-Insa, L.I. et al. 2018. Women's job search competence: A question of motivation, behavior, or gender. *Frontiers in Psychology*. 9, FEB (2018). DOI:<https://doi.org/10.3389/fpsyg.2018.00137>.
- [29] Maxwell, J. 2010. Using numbers in qualitative research. *Qualitative Inquiry*. 16, 6 (2010), 475–482.
- [30] McCandless, D. 2012. *Information is beautiful*. Collins.
- [31] Mertens, D. 2015. Mixed methods and wicked problems. *Journal of Mixed Methods Research*. 9, 1 (2015), 3–6.
- [32] Mertens, D. 2009. *Transformative research and evaluation*. Guilford Press.
- [33] Mertens, D. and Wilson, A.T. 2012. *Program evaluation theory and practice*. Guilford Press.
- [34] Mertens, D.M. et al. 2016. The future of mixed methods: A five year projection to 2020. Mixed methods international research association. *Journal of Mixed Methods Research*. 11, 1 (2016), 11–18.
- [35] Nightingale, A. 2003. A feminist in the forest: Situated knowledges and mixing methods in natural resource management. *ACME: An International E-Journal for Critical Geographers*. 2, 1 (2003), 77–90.
- [36] OECD Employment Outlook 2018 | READ online: 2018. https://read.oecd-ilibrary.org/employment/oecd-employment-outlook-2018_empl_outlook-2018-en. Accessed: 2019-01-10.
- [37] Popping, R. 2015. Analyzing open-ended questions by means of text analysis procedures. *Bulletin de Methodologie Sociologique*. 115, (2015), 79–88.
- [38] Popping, R. and Roberts, C.W. 2009. Coding issues in semantic text analysis. *Field Methods*. 21, 3 (2009), 244–264.
- [39] Sánchez-Gómez, M.C. et al. 2019. Evaluation of Computer Assisted Qualitative Data Analysis Software (CAQDAS) Applied to Research. *Learning Technology for Education Challenges* (2019), 474–485.
- [40] Silver, C. and Lewins, A. 2014. *Using Software in Qualitative Research: A Step-by-Step Guide*. Sage.
- [41] Souza, F.N. et al. 2011. Análise de Dados Qualitativos Suportada pelo Software WebQDA. *Atas da VII Conferência Internacional de TIC na Educação: Perspetivas de Inovação (CHALLENGES2011)*. (2011), 49–56.
- [42] Teddlie, C. and Tashakkori, A. 2009. *Foundations of mixed methods research. Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks.
- [43] Tufte, E. 2006. *Beautiful evidence*. Graphics Press.
- [44] Tufte, E. 2001. *Visual Display of Quantitative Information*. Graphics Press.
- [45] Unwin, A. et al. 2006. *Graphics of Large Datasets: Visualizing a Million*. Springer-Verlag.
- [46] Valles, M.S. et al. 2011. Qualitative Archives and Biographical Research Methods. An Introduction to the FQS Special Issue. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*. 12, 3 (2011). DOI:<https://doi.org/10.17169/fqs-12.3.1755>.
- [47] Wilkinson, L. 1999. *The Grammar of Graphics*. Springer-Verlag.