Journal for Language Teaching **58(2) 2024, 23 pages**
https://doi.org/10.56285/jltVol58iss2a6466

Collaboration and themes in the *Journal for Language Teaching* (2001–2023): A network analysis

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ABSTRACT

This study provides a quantitative overview of the *Journal for Language Teaching* from 2001 to 2023. More specifically, the current study applies network science to study both the co-authorship network and to identify topics. In addition, the journal's focus on multilingualism is investigated. The results indicate a notable growth in collaborative research in the journal, shown by the increasing average number of authors per paper. The analysis of the co-authorship network reveals a moderately connected network, with a significant group of authors forming the giant component. Important authors are also recognised based on centrality measures, highlighting their crucial roles in fostering connections within the network. Collaboration primarily happens within universities, but when it extends across institutions, inland universities tend to collaborate more frequently than those on the coast or between coastal and inland universities. Furthermore, the analysis of research topics identified eight distinct themes prevalent in the *Journal for Language Teaching*, encompassing various areas in language education. It is also shown that both in the language of papers and in their language focus, the journal foregrounds English throughout this period, and papers tend to be more often in English and focus on English in recent years.

Keywords: academic publishing, authorship patterns, co-authorship networks, language teaching research, publication trends, research trends, scholarly communication

CITATION

Senekal, B. & Du Plessis, T. (2024). Collaboration and themes in the *Journal for Language Teaching* (2001-2023): A network analysis. *Journal for Language Teaching, 58*(2), Article 6466. https://doi.org/10.56285/jltVol58iss2a6466

ISSN: 0259-9570 | eISSN: 2958-9320

1. Introduction

The field of language teaching is dynamic and constantly evolving, with new methodologies, technologies, and research emerging regularly. Journals play a crucial role in disseminating this knowledge and fostering collaborations among researchers, educators, and practitioners. The *Journal for Language Teaching / Ijenali Yekufindzisa Lulwimi / Tydskrif vir Taalonderrig* (hereafter JLT) of the South African Association for Language Teaching (SAALT) (formerly also known under its Afrikaans name, the Suid-Afrikaanse Vereniging vir Taalonderrig – SAVTO) has been a significant contributor to this field since its establishment in 1980 (Kroes 1999, p.7), providing a platform for scholars to share their research, exchange ideas, and explore innovative practices in language teaching.

The current article provides a quantitative overview of the JLT over the past two decades. We focus specifically on three measures: co-authorships, language focus (of the data and of the contribution itself), and topic modelling. More specifically, the study aims to answer the following research questions:

- RQ1: Given the trend towards more collaborative research in academia in general, to what extent did collaboration increase in the JLT over the past two decades?
- RQ2: How densely connected is the co-authorship network around the JLT?
- RQ3: Who are the key authors who facilitate collaborative research published in the JLT?
- RQ4: Which universities collaborate most often in the JLT?
- RQ5: How discernible is the emphasis of the JLT on multilingualism?
- RQ6: What are the main topics of papers in the JLT?

The article is structured as follows. We first provide background to the *Journal for Language Teaching*, including its scope and history. Thereafter, we discuss the network measures applied in the current study in terms of both the co-authorship network and the word co-occurrence network used for topic modelling. This is followed by a discussion of the dataset itself. We then present and discuss the findings and conclude with summary remarks and suggestions for further research.

2. Background

Kroes (1999) deals with the early history of the Association and its Journal. A synopsis of it appears on the Journal's website (https://www.journals.ac.za/jlt/history).

The origin of the Association can be traced back to the establishment of The South African Language Teaching Study Group in 1964 at a one-day congress on language laboratories, at that stage a "new technique" that attracted great attention. At the first Annual General Meeting of the Study Group in 1966, a constitution was adopted. From 1967, the Study Group began to publish the *Newsletter of the South African Association for Language Teaching*, which served as the forerunner of the Journal until 1980. Apart from news about language teaching related matters, the *Nuusbrief / Newsletter* also published academic articles. At a special meeting on 18 March 1978, the Study Group disbanded after which the (current) South African Association for Language Teaching was established. The Study Group's constitution was taken over by this new association. It was also decided to replace the *Newsletter* with the *Journal for Language Teaching* (JLT). The first issue of the JLT appeared in April 1980. From 2022, the JLT is published as an Open Access publication with the University of Stellenbosch as host. All issues since 2001 are now available online.

One of the issues that Kroes (1999) emphasises in his review is the dynamic interplay between the development of the study field of language teaching and the disciplines of linguistics and applied linguistics. For example, he shows that the early interest in language laboratories was partly inspired by the audiological approach to second and foreign language teaching, which in turn is underpinned by a language theory related to structural linguistics and behaviourism. Interestingly, he also links this development as a reaction to the Russians' launch of the first satellite, which raised questions as to whether the Russian education system is so advanced that it gives them a technological edge. In a desperate response to this, the US in particular began supplying technologically advanced aids to educational institutions. This is how language laboratories became a fad and began to attract the attention of scholars in language teaching. With this, Kroes illustrates the importance of accounting for the context within which language teaching takes place, theoretically as well as socio-politically.

3. Methods

Network analysis is one of the best ways to gain an overview of a scientific field, and therefore forms part of so-called science-of-science studies (scientific studies of scientific fields) (Wang & Barabási, 2021). Because of its suitability for analysing scientific fields, specialist network analysis software platforms such as VOSViewer

(Van Eck & Waltman, 2010) have been developed that allow researchers to investigate co-authorship-, citation- and word co-occurrence networks. While we do not use VOSViewer because of data availability issues[1], the current section provides background on the two networks around the JLT that are analysed in the current study, namely the co-authorship network and the word co-occurrence network using article abstracts.

Co-authorship analysis

Network science is an interdisciplinary field that studies the structure and dynamics of complex networks, such as social networks, biological networks, information networks and technological networks, and combines elements from mathematics, physics, computer science, and other fields to understand how the properties of individual nodes and edges in a network can give rise to global patterns and behaviours (Barabási, 2016; Newman, 2018). Some of the key methods used in network science include mathematical modelling, identifying key nodes using centrality measures, and community detection (Barabási 2016; Newman 2018).

Scientific collaboration networks have been studied from the perspective of network science in a variety of papers (Liu et al., 2005; Durbach et al., 2008; Gossart & Özman 2009; Nikzad et al., 2011; Uddin et al., 2012; Badar et al., 2013; Koseoglu, 2016; Bibi et al., 2018; Nadhiroh et al., 2018; Zhou et al., 2018; Cheng et al., 2019; X. Kong et al., 2019; Molontay & Nagy, 2019, 2021; Senekal, 2022). Some studies have focused on specific geographic regions, such as Indonesia (Nadhiroh et al., 2018), Iran (Nikzad, et al., 2011), Pakistan (Badar et al., 2013), Romania (Gaskó et al., 2016), Serbia (Mitrović et al., 2023), South Africa (Durbach et al., 2008) or Turkey (Gossart & Özman, 2009). Other studies have focused on specific academic fields, such as network science (Molontay & Nagy, 2019, 2021), Chemistry (Durbach et al., 2008; Nadhiroh et al., 2018), Computer Science (Gaskó et al., 2016) or Digital Humanities (Gao et al., 2022), while others have focused on specific journals (Koseoglu, 2016; Cheng, et al., 2019; Senekal, 2022). Regardless of the focus, co-authorship network studies usually incorporate network measurements that analyse the network in terms of global properties (such as average path length or transitivity), community formation (such as

[1] VOSViewer allows the researcher to query the APIs of Crossref, OpenAlex and Europe PMC in order to obtain bibliographic data. Data on the Journal for Language Teaching is only available through Crossref, but then only data that includes author, title and issue. VOSViewer is therefore suitable for a co-author network study of this journal, but since abstracts are not included, we could not conduct topic modelling using VOSViewer. Data was therefore scraped manually, as is discussed in the section "Data gathering."

through blockmodelling or modularity), or by identifying key authors (through centrality measures), as is discussed later in this section.

Co-authorship networks consist of two types of nodes, namely papers and authors, and are therefore bipartite networks. It is customary to project bipartite networks to single-node networks (consisting of only one type of node) for the purpose of analysis. In such a projection, the edge between an author and a paper, which means "authored paper", is changed to an edge between authors that co-authored a paper, and hence means "co-authored with." If only one person authored a paper, this author will have no edges after the projection.

We first wanted to determine how connected the co-authorship network in the JLT is, and compare it with other studies of collaboration networks. For this we used the measurement of connected components. A connected component is a set of nodes in a graph such that there is a path between any two nodes in the set, but there is no path between any node in the set and any node not in the set (Newman, 2018; Wang & Barabási, 2021). The largest connected component is known as the giant component, and the size of the giant component is an indication of how connected the network is overall. According to Wang and Barabási (2021), the giant component in collaboration networks indicates the concept of the invisible college, which describes the network of social and professional links that connects academics across universities and continents to form intellectual communities with shared knowledge bases. In order to calculate the number of connected components, we make use of the algorithm by Tarjan (1972).

Our other main focus is on identifying key nodes (authors). In network science, centrality measures are used to identify the most important or central nodes in a network. The key centrality measures used here are degree centrality and betweenness centrality (as developed by Freeman, [1977]), and PageRank centrality (as developed by Brin & Page, [1998]). We do not use Freeman's (1977) closeness centrality because closeness centrality provides inaccurate results if a network is unconnected, and since the JLT is a journal in the Humanities, which is a field dominated by single-authored papers (Wang & Barabási, 2021), we expected the network to be too fragmented to use closeness centrality.

Degree centrality is a measure of the number of connections a node has to other nodes in the network and is usually a measure of activity (Bibi et al., 2018). In the single mode network analysed below, degree centrality will be equal to the number of people an author has co-authored papers with.

Betweenness centrality is a measure of the number of times a node acts as a bridge along the shortest path between two other nodes and is usually interpreted as a measure of importance. It is calculated as the number of shortest paths between any two nodes that pass through the node divided by the total number of shortest paths between any two nodes (Bibi et al., 2018). The algorithm developed by Brandes (2001) was used in the current study to determine betweenness centrality.

PageRank centrality is an algorithm developed by Google for ranking web pages in search results. It is based on the idea that a page is important if it is linked to by many other important pages and is calculated based on the probability of a user visiting a page if they follow a random link from another page. While originally developed for ranking web pages, this centrality measure has demonstrated its utility in a variety of fields, including co-authorship networks (Liu et al., 2005; Bibi et al., 2018; Zhou et al., 2018; Kong et al., 2019).

The aforementioned and additional centrality measures have been employed by several researchers to identify important authors in co-authorship networks. Uddin et al. (2012), Badar et al. (2013), Koseoglu, (2016), Nadhiroh et al. (2018), and Cheng et al. (2019) used degree-, closeness- and betweenness centralities, Zhou et al. (2018) use betweenness centrality, PageRank, and HITS (Kleinberg, 1999), Molontay & Nagy (2019, 2021) and Gao et al. (2022) use betweenness centrality, Kong, et al. (2019) use PageRank, and Senekal (2022) uses degree-, betweenness- and PageRank centrality. Each centrality measure is used to identify different aspects of the importance of a node in a network, they are not mutually exclusive and can be used together to obtain a more complete understanding of nodes' importance in the network. Since Liu et al. (2005) demonstrated the advantages of using PageRank over degree- and betweenness centrality in co-authorship networks, preference is given below to PageRank, although values are provided for other centrality calculations. Rather than raw values, however, results are presented as ranks for the sake of intelligibility.

Topic modelling

One of the ways that one can study networks is by identifying communities through the application of various algorithms. One of the most widely used algorithms for this purpose is the modularity algorithm by Blondel et al. (2008) (commonly known as the Louvain method), which identifies communities when there are more edges within the community than between its members and those outside. To be more exact, this approach contrasts the number of edges that exist between nodes with the number that would be predicted if edge formation occurred at random (Blondel et al., 2008). As a result, node communities that frequently co-occur are clustered together.

Using word co-occurrence networks and Blondel et al.'s (2008) modularity algorithm, Benabdelkrim et al. (2020) provide a method for locating topics in text. First, text preprocessing is conducted as described below. Next, edges are indicated between words that often co-occur in the same text. Then, using the algorithm by Blondel et al. (2008), groups of words that frequently occur together are highlighted. The ultimate result is that several keywords are used to represent various topics.

Because word co-occurrence networks tend to be dense, highly connected networks that are difficult to visualise meaningfully, it was necessary to extract core nodes in a sensible way. The k-core is commonly used to identify the most central nodes in a network and can also be used to extract the backbone of the network, thus simplifying the network and making it easier to read for a network visualisation (Kong et al., 2019). The k-core represents the maximum sub-network in which each node has at least k connections to other nodes in the sub-network (Li et al., 2015; Kong et al., 2019). To identify the k-core, we made use of Seidman's (1983) algorithm.

Data gathering and cleaning

Data were gathered manually from the JLT website: https://www.journals.ac.za/jlt. Only papers published after 2001 are currently available in a digital format and only these papers were included in the current study, which means that the dataset covers the period 2001 to 2023. All papers within this period were included. For each paper, the title, author(s), date of paper, abstract, and author affiliation were collected.

The above-mentioned data were imported into Google Sheets for further processing and basic analysis. Using Google Sheets, the number of authors per paper was counted, and a list of nodes (authors and papers) and edges (authors and the papers they published) were compiled for network analysis purposes. An edge was indicated between each author and the paper they contributed to, i.e. if a paper has two authors, A and B, an edge was indicated between the paper and author A, and between the paper and author B. The resulting nodes list and edge list were imported into Gephi (Bastian et al., 2009) for network calculations.

Author disambiguation is an important step in the data cleaning process for any co-authorship network study. Authors may be referred to using their initials, full names or a name and initial, and in order to count the number of unique authors or analyse the co-authorship network, it is crucial that every author's name is used consistently. For this reason, we used authors' full names, and the dataset was also checked manually to

ensure consistency. Authors affiliations were also standardised to current names of institutions, e.g. the Rand Afrikaans University was changed to the University of Johannesburg, and Potchefstroom University for Christian Higher Education (CHE) was changed to North-West University. The software does not allow for the accommodation of multiple affiliations, and hence an author's first affiliation – the affiliation the author had when his/her first article was published in JLT – was used. Since very few researchers changed their affiliations, this limitation should not influence broader findings.

Before topic modelling could be conducted, some text preprocessing was necessary. These steps form part of the application by Benabdelkrim et al. (2020) and include eliminating punctuation, changing all capital letters to lowercase, lemmatizing terms, and eliminating stop words. These steps were done on article abstracts, since abstracts provide more information than titles and therefore abstracts were considered better suited to topic modelling than paper titles.

We also wanted to investigate whether there are any language trends in the JLT, given the journal's emphasis on multilingualism. We first determined whether papers are more often in English or linguistically diverse, and how the use of language changes over time. For this reason, the language of papers was identified using Google's Natural Language API, which provides a language classification based on the two-letter ISO-639-1 standard. Results were checked manually for accuracy. Secondly, we classified each paper manually in terms of language focus by thoroughly reading the article's title and abstract. In this classification, we focused on which language the paper is about, e.g. an English-language article could be about teaching Sesotho, and this classification focused on the latter language. If no language was specified, papers were classified as general, i.e. articles that focus on language teaching in general.

4. Results

Overview

There are 403 papers in this dataset, spanning 22 years. Figure 1 provides an overview of the dataset. Figure 1A shows that the number of papers per year fluctuated between 7 (2001) and 24 (2002), with an average of 17.57 papers per year from 2001 to 2023.

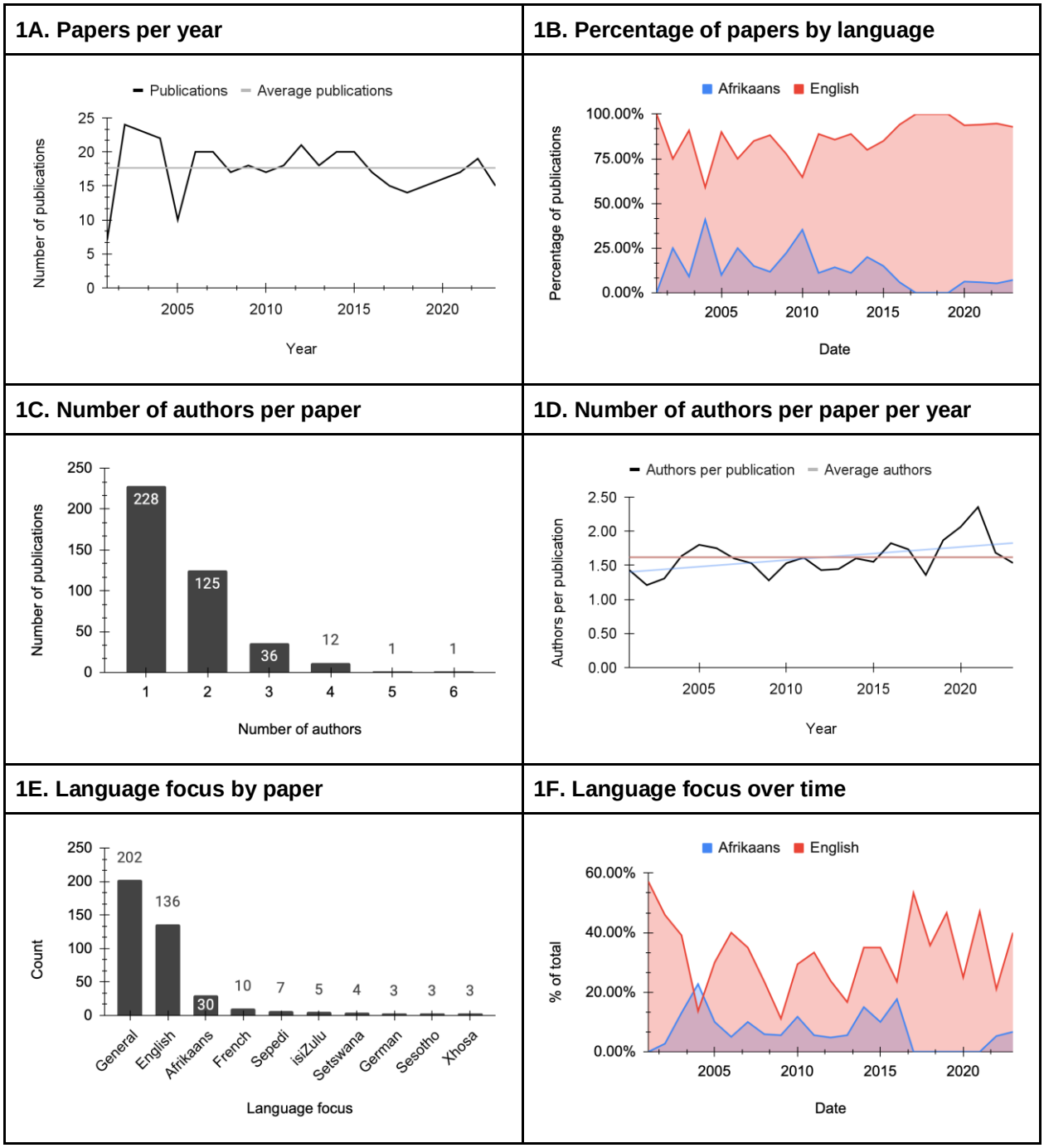

Figure 1. An overview of the dataset.

Figure 1B shows that most papers in the JLT have been in English since 2001, and the percentage of Afrikaans papers has been declining from around 2014. Only two papers were not written in either English or Afrikaans: one in French, and one in Zulu. Despite the multilingual name and focus of the JLT, English medium papers therefore clearly dominate this journal. Note however that our data only include issues up to 2023; in 2024, 17 articles were published in African languages other than Afrikaans. This shows

that while our dataset indicates a focus on English, the journal has recently taken important steps to include other languages.

Figure 1C shows that papers were written by 414 unique authors at an average of 1.61 authors per paper. Most papers (228 or 56.58%) were written by 1 author, followed by 2 authors (125 or 31.02% of papers) and 3 authors (36 or 8.93% of papers). The maximum number of authors per paper is 6. Single author papers therefore constitute 56.58% of papers, which is to be expected in a Humanities journal, which is a field known for its single-authored papers (Wuchty et al., 2007, p. 1037).

Figure 1D shows the distribution of authors over this period, where the average number of authors per paper per year fluctuated between 1.21 (2001) and 2.35 (2021). The trend line indicates a slight trend towards more collaboration. There has been a 38.47% increase in the average number of authors per paper from the 2010s to the current decade, and a 6.02% increase from the 2000s to the 2010s. In the 2000s, there were an average of 1.5 authors per paper, in the 2010s an average of 1.59 authors per paper, and in the 2020s an average of 2.21 authors per paper. Put in perspective, in a field such as Science and Engineering, the average number of authors per research article has increased from 1.9 to 3.5 between 1955 and 2000 (Wuchty et al., 2007), while in the South African Journal of Science and Technology, the average number of authors per paper increased from 1.62 in the 1990s to 2.93 in the 2020s (Senekal 2022). While the increase in collaboration between researchers is not as distinct as in the Natural Sciences, Figure 1D answers RQ1: Collaboration has increased significantly in papers in the JLT.

Figures 1E and F show the language focus of articles in JLT, with 1E showing languages with more than one article dedicated to them, and 1F showing the dominant two languages (English and Afrikaans) over time. Most articles have a general language teaching focus, but of articles that have a specific focus, teaching English dominates this corpus. The second most common language focus is Afrikaans, followed by French. All other languages have less than ten articles dedicated to them. Figure 1F shows that articles dedicated to the second most common language, Afrikaans, have declined since around 2017. While nominally multilingual, English therefore dominates JLT, both in the language of papers and in their focus, and even the second strongest language in this paper, Afrikaans, has seen a decline in recent years, both in terms of articles dedicated to Afrikaans and in the language of papers.

Beyond our dataset, which only extends to 2023, the first issue of 2024 is dedicated to the teaching of African languages featuring 17 papers in Xitsonga, isiZulu, Siswati, Setswana, Sepedi, Luganda, and Kiswahili. This marks a significant advancement towards the JLT ideal of multilingualism.

The co-authorship network

Figure 2 shows the co-authorship network, which consists of 414 nodes (n) (authors) and 306 edges (m) (collaborations), but when nodes with less than one edge are removed (authors who did not collaborate), the network consists of n = 308 and m = 306. Connected components are indicated with different colours, and PageRank values with larger node sizes. It can be seen here that the network is rather fragmented as it consists of many components with no links to other components, but one component (green, bottom left) is larger as it consists of more nodes than the rest. We refer to this component as a giant component below.

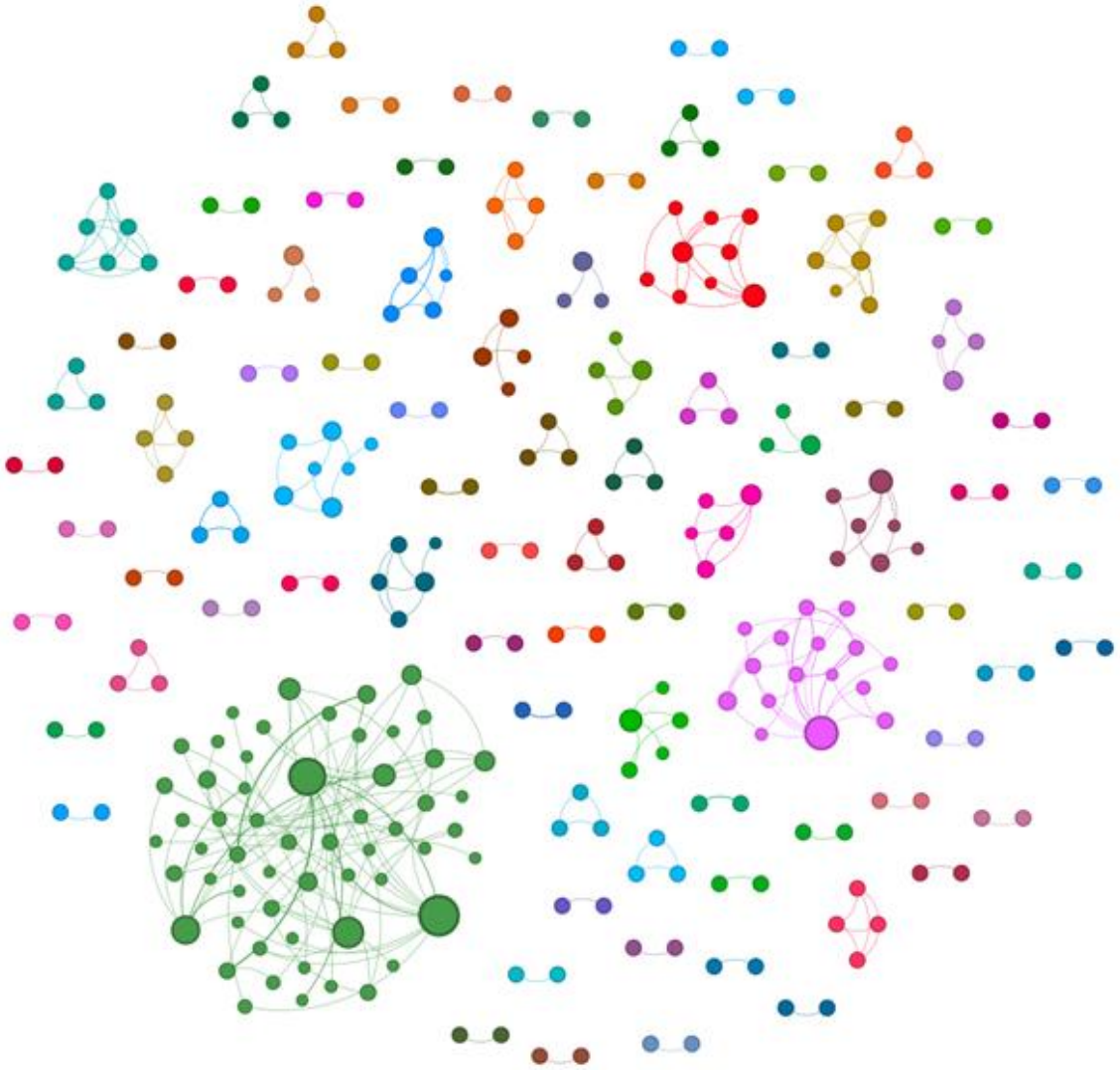

Figure 2: The co-authorship network in the *Journal for Language Teaching*, n = 308, m = 306. Connected components are indicated with different colours, and nodes without connections have been removed.

Figure 3 shows the component size distribution. There are 193 components in this network and the giant component consists of 57 nodes (13.77% of nodes). The largest number of components (64 or 46.38% of components) contain 1 node (in other words, single-authored papers), followed by 2 nodes (43 or 31.16% of components) and 3 nodes (15 or 10.87% of components). Only 1 component (0.72% of components) contain more than 30 nodes. With almost 14% of nodes found in the giant component, the co-authorship network is less connected than what was found in many other scientific fields. In the co-authorship network surrounding network science, the giant component comprises 62.8% of all authors, according to Molontay and Nagy (2019, 2021). Newman (2004) reported that 80-92% of scientists in the natural sciences are connected in the giant component. Koseoglu (2016) also found that 69% of authors in the Strategic Management Journal belong to the giant component. This figure does however depend on the journal and the field: In Afrikaans scientific research articles, Senekal (2022) found that research articles in the South African Journal of Science and Technology, which publishes articles from a variety of fields in the natural sciences, has a much smaller giant component consisting of only 10% of authors. A giant component of 14% of nodes therefore indicates a fragmented field, but not entirely dispersed, which answers RQ2.

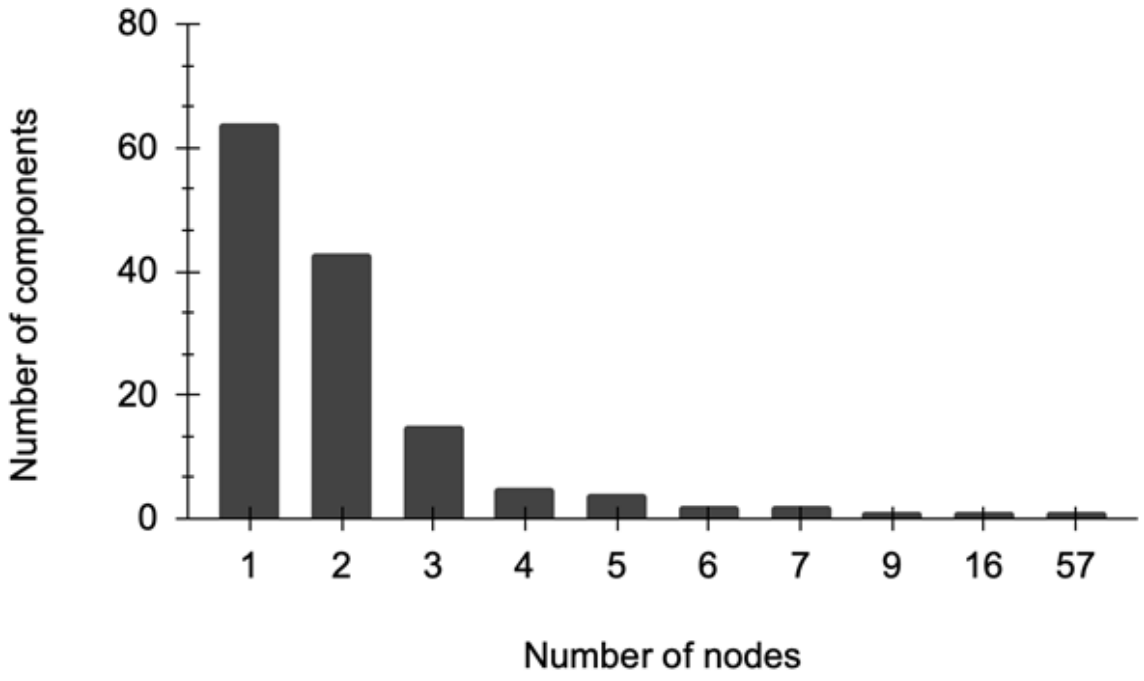

Figure 3. Component size distribution.

Figure 4 shows the authors that belong to the giant component. Note that while many of these names are also found in Table 1 below, which shows the key authors overall, not all these authors are to be considered key authors. The authors in the giant component are merely authors who form part of the most cohesive segment in the co-authorship network.

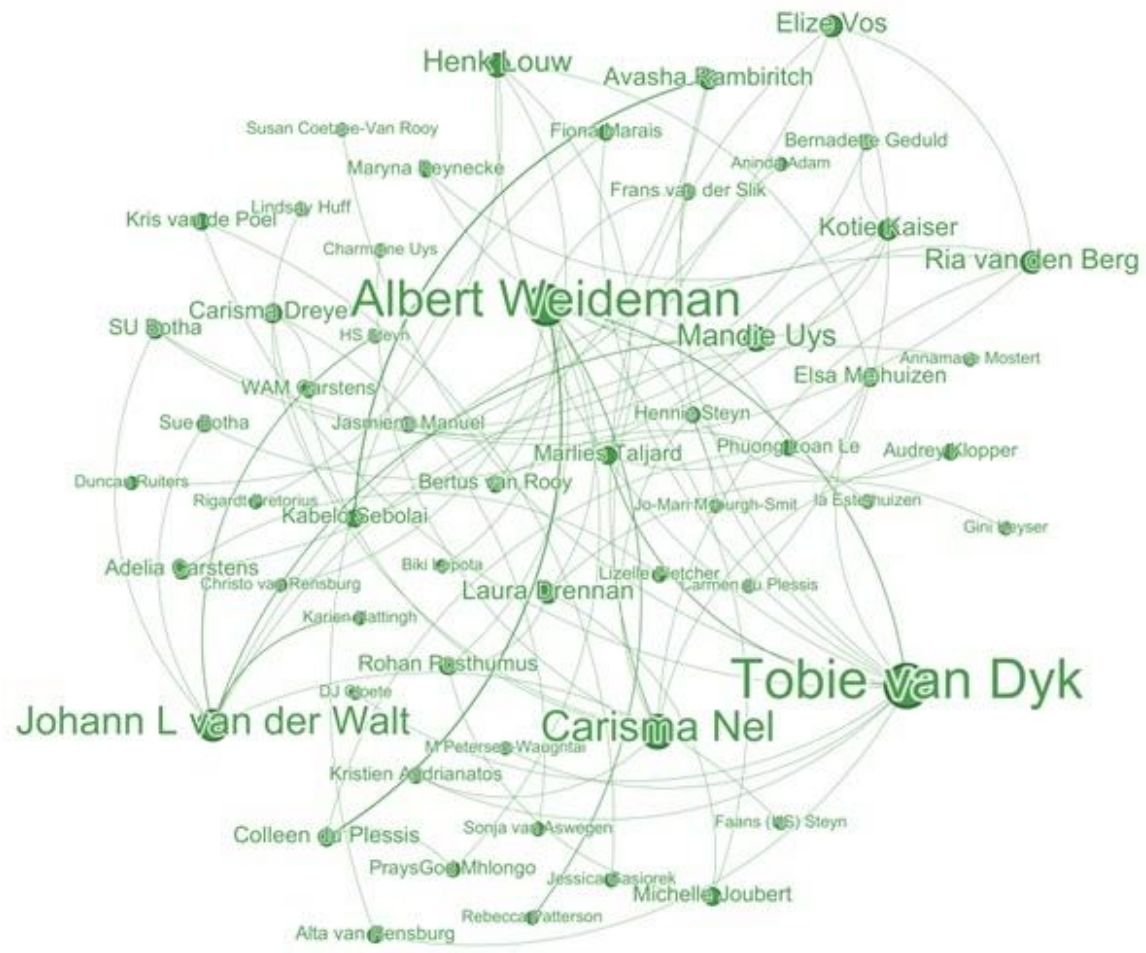

Figure 4. The giant component, n = 57, m = 75.

Figure 5 shows the collaboration network with nodes coloured by affiliation. Most authors are affiliated with the University of the Free State (UFS) (13,14%), followed by the North-West University (NWU) (12,41%), the University of South Africa (UNISA) (12,17%) and the University of Pretoria (UP) (10,95%). Other universities are represented by less than 10% of authors, with a total of 74 institutions represented. As Figure 5 shows, most components consist of authors affiliated with the same university, with the exception of the giant component, which is composed mostly of authors from

the University of Pretoria (green), North-West University (blue), and the University of the Free State (brown).

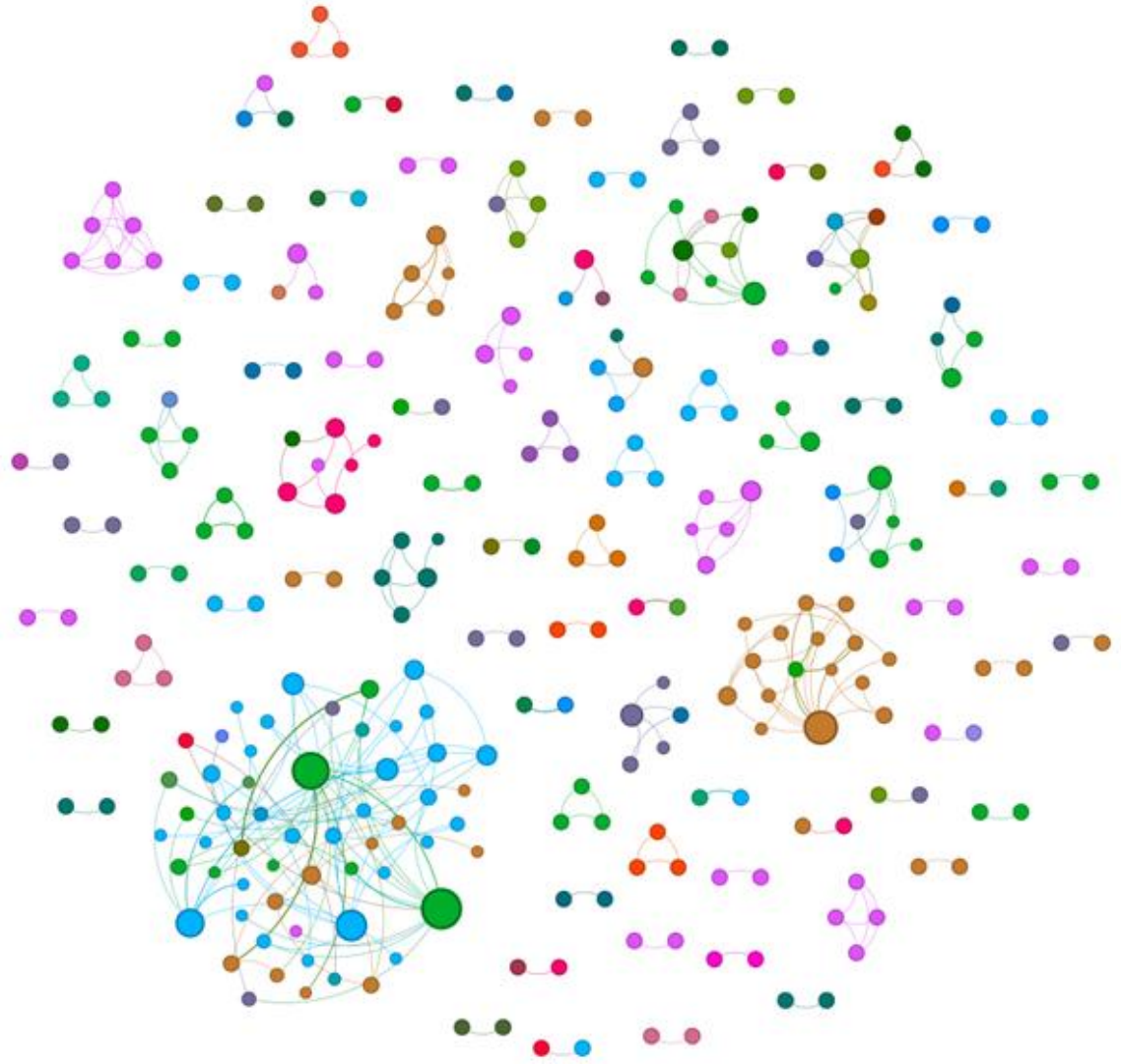

Figure 5. The co-authorship network in the Journal for Language Teaching, n = 308, m = 306. Author affiliations are indicated with different colours, and nodes without connections have been removed.

Figure 6 shows the universities that worked together most often, with only universities included that contributed at least 5 authors to the co-authorship network.

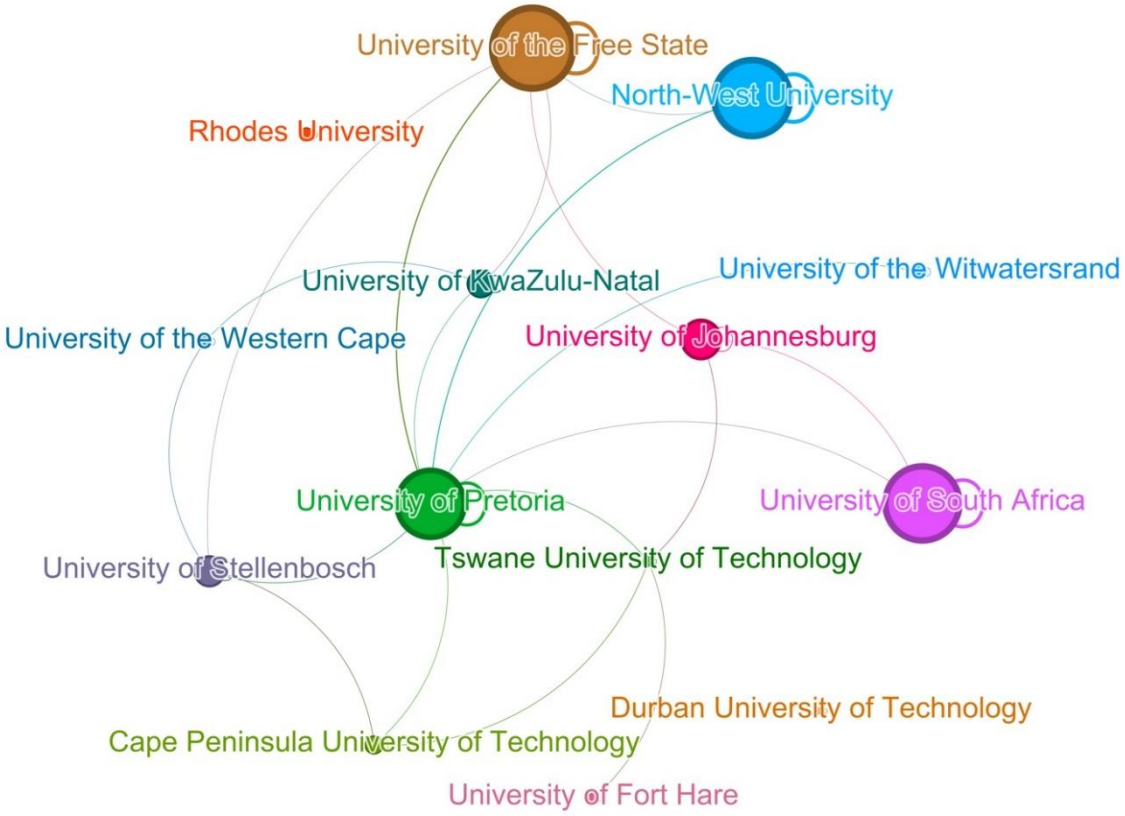

Figure 6. The universities that worked together most often, > 5 authors, n = 14, m = 33.

Nodes are sized based on the number of authors per university, self-loops are included to indicate when authors of the same university worked together, and the thickness of edges indicates the number of collaborations (thicker lines indicate more collaborations). The strongest connections are between the UFS and the UP, between the UP and NWU, and between the UP and the University of Stellenbosch (US). The University of Rhodes (RU) and the Durban University of Technology (DUT) did not collaborate with authors from other universities. Figure 6 provides the answer to RQ4: While most authors are affiliated with the UFS, NWU and UNISA, the UFS and UP work together most often, followed by UP and NWU.

Table 1 shows the nodes with the highest PageRank scores, expressed as a rank, along with their ranks in terms of degree- and betweenness centrality. Nodes are organised from highest to lowest using PageRank scores.

Table 1. Key nodes in the co-authorship network.

Node	Rank degree	Rank betweenness	Rank PageRank
Tobie van Dyk	1	1	1
Albert Weideman	2	4	2
Karel GF Esterhuyse	2	12	3
Carisma Nel	4	2	4
Johann L van der Walt	5	6	5
Ilse Fouché	8	24	6
Naomi Boakye	6	20	7
Christa van der Walt	19	27	8
Mandie Uys	6	7	9
Henk Louw	8	9	10

These are the authors that occupy key positions in the co-authorship network in the JLT, which answers RQ3.

Topic modelling: analysis

Using the method by Benabdelkrim et al. (2020) described above, eight topics were identified. While the total word co-occurrence network constructed using all these articles' abstracts consists of 753 nodes and 9196 edges, the k-core consists of 67 nodes and 1951 edges (k = 46). Figure 7 shows the k-core of the word co-occurrence network, with topics indicated with different colours, and the terms with the highest frequency shown with larger labels.

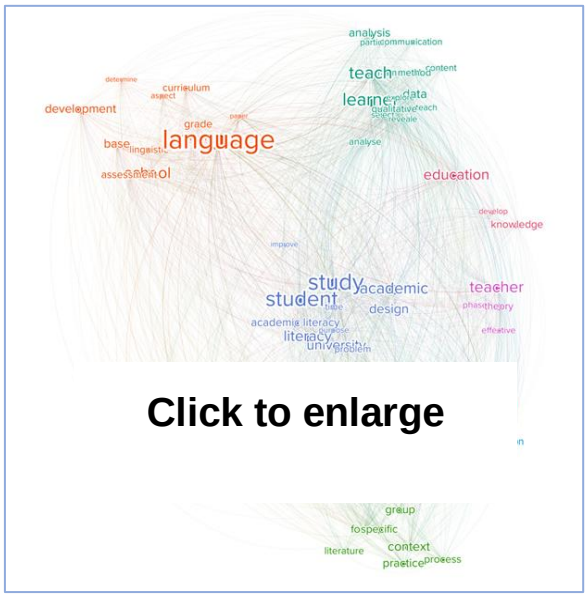

Figure 7 The k-core of the word co-occurrence network, with topics indicated with colours, n = 67 and m = 1951. [Click here to go to Appendix A: Figure 7]

The topic in orange (top left) centres around school education, in particular around the curriculum, development and assessment (the label underneath *assessment is school*). The topic indicated in dark green (top) indicates qualitative research around teacher and student interactions, as suggested by terms such as *teach* and *learner*, specifically around communications and methods. The topic in red (top right) shows papers on knowledge development through education. The topic in blue (centre) revolves around academic literacy at tertiary institutions, specifically related to design, performance and improvements, as suggested by terms such as *student* and *study*. The topic in pink (right) relates to research on teachers, theory and phases. The topic in turquoise (bottom right) relates to English proficiency, specifically as a language of instruction (note the term *classroom*). The topic in green (bottom) relates to contexts and environments, as emphasised by terms such as *group* and *context*, as well as the use of literature-related research. The topic in brown (bottom left) relates to research specifically focussed on South Africa.

5. Discussion

Collaborative research in the JLT has shown a significant increase over the two decades under study. The average number of authors per paper has risen steadily, indicating a shift towards more collaborative efforts within the field of language teaching research. This trend aligns with broader patterns observed in academia, where collaboration is becoming increasingly common across various disciplines. The co-authorship network analysis revealed a moderately connected network, with a notable giant component linking a substantial number of authors. Collaboration mainly occurs within universities, but when co-authorships span across universities, it is notable that universities in the centre of the country collaborate most often, e.g. UFS and UP, or UP and NWU, rather than universities at the coast or between universities at the coast and universities situated inland. This may reflect a language division: The inland universities are historically Afrikaans universities, while the coastal universities are historically English universities (except for Stellenbosch). Key authors were also identified through centrality measures that play pivotal roles in facilitating connections within the network, highlighting their importance in driving collaborative research endeavours.

The topic modelling analysis unveiled eight distinct research themes prevalent in the JLT. These topics encompass a wide range of areas within language teaching and education, including school education, teacher-student interactions, academic literacy,

English proficiency, and research specific to South Africa. The topics found are in some ways less interesting than the topics not found. Given South Africa's 12 national languages, one would expect first language education to be among the keywords identified in Figure 5, as well as postcolonial education. In addition, topics such as e-learning were not discovered.

While the study offers insights into collaboration patterns and research themes within the JLT, a major limitation is that the analysis focused on co-authorship networks and topic modelling, neglecting other potential aspects of research dynamics such as citation networks. Future research could explore these additional dimensions to provide a more comprehensive understanding of research interactions within the journal.

6. Conclusion

This study provided a particular overview of the JLT over the period 2001-2023, focusing on collaborative research patterns and research themes. The findings revealed a significant increase in collaborative research within the journal, as evidenced by the rising average number of authors per paper. The co-authorship network analysis demonstrated a moderately connected network, with a notable giant component linking a substantial number of authors. Key authors were identified through centrality measures, indicating their pivotal roles in facilitating connections within the network. Additionally, topic modelling analysis unveiled eight distinct research themes prevalent in the JLT, covering a wide range of areas within language teaching and education.

Further avenues of research could include exploring the dynamics of citation networks within the *Journal for Language Teaching* to understand the influence and impact of published research.

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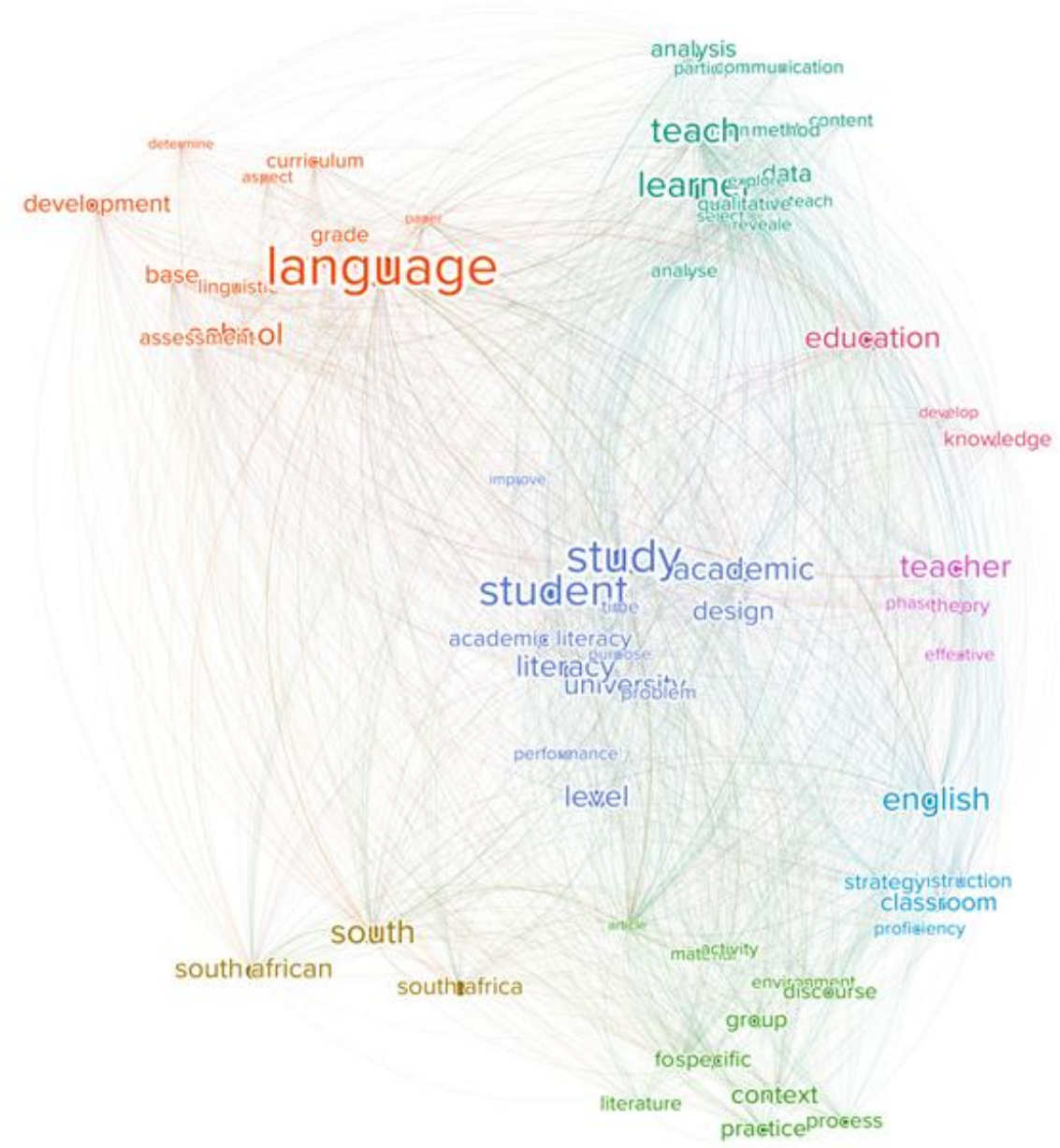
Appendix A: Figure 7 (Topic modelling: analysis)



- **Orange**: school education, in particular around the curriculum, development and assessment (the label underneath assessment is school).
- **Dark green**: qualitative research around teacher and student interactions, as suggested by terms such as *teach* and *learner*, specifically around communications and methods.
- **Red**: knowledge development through education.
- **Blue**: academic literacy at tertiary institutions, specifically related to design, performance and improvements, as suggested by terms such as *student* and *study*.
- **Pink**: research on teachers, theory and phases.
- **Turquoise**: English proficiency, specifically as a language of instruction (note the term *classroom*).
- **Green**: contexts and environments, as emphasised by terms such as *group* and *context*, as well as the use of literature-related research.
- **Brown**: research specifically focussed on South Africa. ↑ Back to Topic modelling analysis ↑

ISSN: 0259-9570 | eISSN: 2958-9320
https://www.journals.ac.za/jlt