

REVIEW

What Can Interaction Mediate? An Alternative Model for Analysing Interaction in Multilingual Learning

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ABSTRACT

In this review article, we propose Social Network Analysis (SNA) as an alternative model for analysing interactions within diverse educational contexts. Emphasising the capacity of SNA to reveal unexpected results through the exploration of social ties, we discuss its application in understanding the dynamics of multilingual and multicultural educational settings. Drawing on a range of studies, we showcase how SNA transcends traditional methodologies, shifting the focus from predetermined goals to the holistic examination of relational ties and network structures. Specifically, by delving into the intricacies of social interactions, SNA provides nuanced insights that contribute significantly to our understanding of complex social phenomena. As researchers navigate the ever-evolving landscape of interaction analysis, this paper advocates for the adoption of SNA as an alternative tool that complements traditional approaches, offering a fresh perspective on the multifaceted nature of human interactions.

Keywords: Social network analysis; Interactions; Educational settings; Multilingualism; Social ties

1. Introduction

In the dynamic landscape of multilingual education, the significance of interaction to promote language learning has

been widely acknowledged. Numerous studies have delved into how interaction contributes to multilingual learning in multilingual classrooms and environments. As highlighted by many scholars, multilingual learning is fundamentally

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rooted in the interactive engagement of individuals with various languages and diverse stakeholders in the educational setting (Bucholtz and Hall, 2005; Fang et al., 2023; Gong et al., 2020; etc.). These interactions serve as the cornerstone of the educational experience, shaping linguistic competence, cultural understanding, and overall cognitive development (García, 2018). To better promote multilingual learning in classrooms, current multilingual studies highlight the pivotal role of interaction and consider it as an effective way to learn languages through active language engagement with interlocutors and the adoption of various linguistic resources in language classrooms. For instance, García (2018) introduces the concept of multiplicities of multilingual interaction. This concept underscores that multilingual interaction is a process in which users of languages engage in communicative encounters with others. Those interlocutors with different semiotic resources interact at various societal levels and in diverse social spaces. In the process, the core of multilingual interaction lies in the interaction between message initiators and message interpreters. These messages and interpretations transcend languages and focus on social acts in interaction. Araújo e Sá and Melo-Pfeifer (2018) broaden the exploration of multilingual interaction by including the simultaneous use of different languages by participants. The focus is instances of multilingual language use, along with its utility and the co-construction of meaning between students' diverse linguistic repertoires in classroom contexts. In such contexts, multilingual interaction is conceived as a tool to develop language proficiency in languages other than English. Strikingly, in most of the studies English is one of the languages in contact, either as a majority or a minority language, or as an international language serving institutional purposes of attracting international students (Araújo e Sá and Melo-Pfeifer, 2018). Besides, teachers' instructions also draw on interactions to achieve better language learning. Nap et al. (2022) illustrate the importance of classroom instructions for interactions to be enabled. Because translanguaging can solve communication problems, stimulate different ideas and bring interactions in dialogic interaction, the authors point out that active participation in classroom interaction is essential for multilingual teaching pedagogies, such as translanguaging, to realise their full potential. The authors advocate a comprehensive framework that captures both teachers' and students' discourse practices, emphasising the holistic use of linguistic resources

in classroom interaction from a translanguaging perspective (Nap et al., 2022). The results reveal that when students are stimulated to engage in interaction actively and participate in high-quality interaction with teachers or other students, their performance on language and the understanding of contents can be improved (Howe et al., 2019). Building upon the view that language interaction and individual interaction contribute to better learning outcomes, especially under specific pedagogies provided by teachers, Gajo and Berthoud (2018) consider multilingual interaction as a scaffolding to knowledge construction. They divided two dimensions of language regimes to illustrate multilingual interaction. The first dimension focuses on the process of code-switching, in other words, the alternation of languages (Gajo and Berthoud, 2018). This aspect mainly focuses on the solution of communicative problems. In order to solve communication barriers in class, this perspective constructs knowledge by focusing on the creation of monolingual tasks in the micro-level class and creating curriculum organisations with L1 and L2 in specific areas. Another dimension is the language reference, which focuses on the contrast between linguistic features or different languages in didactic tasks (Gajo and Berthoud, 2018). While these studies provide valuable insights into the importance of interaction in multilingual learning, a common limitation is obvious—they fail to employ a unified framework to comprehensively explain the relationship between interaction and multiple language learning. With a more structured approach, research on interactions may better elucidate the specific contents and benefits that interaction brings to multilingual learning and how this contribution unfolds in educational settings.

Therefore, this paper aims to address the identified gap in the literature by proposing a new analytical lens—the application of Social Network Analysis (SNA) as an alternative framework for examining the intricate relations of interaction and multilingual learning. The overarching purpose is to critically examine existing studies on interaction in multilingual learning, focusing on the need for a systematic exploration of the contents and benefits of these interactions. SNA is an analytical tool focusing on the function of relationships in interaction among units. All theories, models, and applications utilising this tool are expressed in relational concepts, which consider unit networks as entities consisting of collections of individuals and linkages (Wasserman and

Milton, 1994). The SNA perspective believes that features of social units are affected by or arise from the relational systems they are in, aiming to investigate characteristics of the environment and their influences on observed features and connections among social units. While previous studies provide qualitative insights into the nature of interaction, the adoption of SNA introduces a quantitative dimension, allowing for a nuanced understanding of the network structures that govern interaction within multilingual classrooms. This shift towards a more structured approach holds the potential to unveil patterns, connections, and dynamics that might have been overlooked in traditional qualitative analyses towards multilingual interaction. With qualitative and quantitative perspectives together, a holistic lens to analyse the discourse practices among teachers and pupils in classroom interaction can encompass both pedagogical and interactional aspects. This paper seeks to postulate a paradigm shift in the study of interaction in multilingual learning by advocating for the integration of SNA as a methodological tool to analyse interaction in multilingual learning. Through this novel lens, the relational dynamics of interaction, which shed light on the intricate web of connections that underlie multilingual learning, can be explored. As the educational landscape continues to diversify linguistically and culturally, it is imperative to equip educators with comprehensive frameworks that not only recognise the importance of interaction but also provide actionable insights for optimising multilingual pedagogies by utilising interaction effectively. This paper proposes SNA as an approach to further analyse interaction and point out the complex relation between interaction and multilingual learning to solve the current gap.

2. Problematising research on classroom interaction for multilingual learning

Current research on classroom interaction has predominantly centred on the evaluation of dynamics within educational settings, particularly focusing on classroom goals achieved through specific pedagogies or activities (Cekaite and Björk-Willén, 2012; Howe et al., 2019). These studies commonly seek to determine whether interaction contributes to the realisation of predetermined educational objectives (Davila, 2019; Martinez et al., 2017). A substantial portion

of the literature emphasises the assessment of interaction in terms of their impact on achieving predefined goals within the classroom context. These goals encompass a range of areas, including impacts of classroom interaction on language learning, social development, and the construction of identities within peer groups.

One goal that classroom interaction tries to fulfil lies in the results of language learning through certain type of interaction. For instance, Nap et al. (2022) offer a nuanced perspective on multilingual classroom interaction, specifically emphasising the role of dialogic interaction in the context of translanguaging pedagogies. The study advocates for active pupil participation and stimulating discussions as integral components of effective multilingual teaching. By examining both teachers' and pupils' discourse practices from a translanguaging perspective, the authors propose a framework to describe linguistic resource usage in classroom interaction, contributing to meaningful multilingualism in dialogic engagement. Notably, the study highlights that when pupils are encouraged to actively participate in high-quality dialogue, their performance improves both in terms of content and language. Considering the realisation of the preset goal, dialogic interaction is seen as an effective tool to improve language learning (Alexander, 2006). Another perspective in classroom interaction studies emphasises the social and cultural knowledge gained through language learning classroom interaction. Cekaite and Björk-Willén (2012) explore peer group interaction in early multilingual educational settings. They reveal the intricate dynamics of language-related episodes among children. In the language learning classrooms, students interact with each other and adopt corrective actions, including targeting, assessing, and criticising each other's language use. The study showcases that these specific interaction actions are instrumental in building peer group identities and establishing norms for conduct and language use, which contribute to students' learning of a new language. Language expertise emerges as a significant factor influencing negotiations and redefinitions in multilingual peer group interactions. The study interprets these interactions as crucial processes in the cultural production and reproduction of children's language learning, and emphasises the active and agentive use of languages to forge social relations. Therefore, peer group interaction has been recognised in the study because they provide approaches for students

to achieve their goals, which is the development of social relations.

While existing literature provides valuable insights into the achievement of preset goals through interaction, an important gap emerges when considering the broader landscape of language learning and social development. Some studies tend to take a general perspective and overlook critical aspects such as cultural content in language learning goals and individuals' understandings towards certain events or knowledge. These elements are essential for language learning and necessary for individuals to receive dynamic and comprehensive language learning experiences. For instance, Davila (2019) contributes to this discourse by exploring how peer and teacher-student interaction in linguistically diverse high school ESL classrooms produce changes in learners' uptake of different languages and cultures. It sheds light on individual issues of power and identity, confirming that peer interaction affords learning opportunities and the development of multilingual identities. The main goal of the study is to evaluate the function of classroom peer interaction for the identity construction, such as students' changed views towards Spanish and their different use of learned Spanish. However, little attention has been paid to how and why these changes take place from an inner view. In other words, there is a lack of analysis in students' mentality and perceptions towards messages and contents brought from their engaged classroom interaction. Students' changed mentality contributes to changes in their language use. This inner view may provide a comprehensive understanding towards classroom peer interaction. Similarly, linguistic competence in social-relational goals is also a dimension that tends to be marginalised in current interaction research. Martinez et al. (2017) provide further insights into the interactional co-construction of identities among first-grade students who learn Spanish as a third language in a Spanish-English dual language classroom. The study delves into the interactional mechanisms by which students' identities are asserted, contested, and negotiated in everyday classroom talk. It underscores the intersubjective and interactionally emergent nature of identity construction, challenging static or established views of identity. Importantly, the study proposes an analytic approach that privileges the interactional level, as language use actively and agentively contributes to the forging, achieving, and renewing of social relations. The main

purpose of this study is to evaluate the role of classroom interaction for students' identity formation and the development of relations with their classmates. Linguistic resources are mentioned in this study and are considered as a tool to achieve their relational development. But the contents of linguistic resources and results of using linguistic resources are not mentioned in the study, especially with reference to the context of a language classroom. This separated view towards interaction undermines its impacts on the promotion of language learning, which leads to an insufficient understanding of classroom interaction.

Another commonly overlooked goal in classroom interaction studies is the incorporation of cultural contents, as linguistic competence takes the dominant position in these studies. Nap et al. (2022) point out that different types of classroom interaction posit different roles of teachers, which brings various levels of students' participation and teachers' and students' interaction. As a result, classroom interaction contributes to different levels of language learning results. For instance, authoritative or monologic interaction pays attention to teachers' dominant roles and responsive roles of students who are directed to a specific point by teachers through a non-interactive monologue and a series of question-answer-evaluation sequences. Dialogic or accountable talk encourages students to express different ideas to form different arguments. In interactive perspectives, teachers' pedagogical approaches, translanguaging has been explored with an aim to examine the effect of these approaches on multilingual classroom interaction and these effects are displayed from a discourse perspective. However, the findings revealed that teachers are still in the dominant position, offering less chances for students to communicate with each other. Therefore, the goal of using multiple languages has not been achieved, considering teachers utilised their home languages for translation and/or comparison of certain words, which restricted the impacts of multiple languages on students' cognitive development. In this perspective, the study deems the adoption of dialogic interaction as a failure due to teachers' inability to provide more opportunities for students to use languages, which may result in a failure in students' language learning. However, a more significant goal, the cultural contents, is overlooked in the study. When teachers translate and/or compare different languages, students' processes of understanding and gaining such knowledge will in-

evitably introduce certain culture-relative contents into their minds. With insufficient exploration into students' learning processes, the study marginalises cultural contents embedded in teachers' instructions and overlooks the importance of dialogic interaction on students' understanding of a new culture. Cultural contents are of great significance to language learning because students' understanding of embedded culture may contribute to their better learning of a new language.

In summary, existing research, while providing valuable insights into the achievement of goals through classroom interaction, tends to overlook the rich cultural content inherent in language learning goals and the nuanced process of linguistic competence development involved in achieving social-relational objectives. To address these gaps and gain a more comprehensive understanding of classroom dynamics, we advocate for the adoption of SNA. SNA offers a holistic approach that goes beyond a separated and general view, providing insightful and detailed understandings of the minds and learning processes of stakeholders in educational settings.

3. Postulating SNA as a novel model

This section endeavours to introduce and advocate for the application of SNA as a novel and promising framework for analysing interactions. To illuminate the efficacy of the SNA approach, this section will draw upon a selection of studies that exemplify its application. Through these case studies, we aim to showcase how SNA can be employed to analyse interactions comprehensively, emphasising the unexpected outcomes and insights that emerge from the exploration of social ties.

Recent multilingual studies from an SNA perspective believe that the central analysis of actors' behaviours should focus on the construction of relational ties in interactions between individuals and communities (Li and Ren, 2021). According to Wasserman and Milton (1994), a network emphasises the fact that each individual has ties to others, who may in turn be tied to some or many others. These connections are relational ties that establish linkages between pairs of actors. With these linkages, messages and resources can be transferred among different actors. These contents are seen as the transfer of social capital which is facilitated by structures and positions of social ties. The concept of social

capital has been understood by Bourdieu (2011) as unevenly distributed among several forms of 'capital' permeating in a community. Social capital is shaped and transferred with the development of ties with others. Based on this understanding, three tools are utilised to elicit and analyse network data. The first type known as indirect access to resources. It takes a view that social capital can be gained through the access to other types of resources and conveyed by the construction of ties (Lin and Dumin, 1986). They focus on the development of and individual perspectives towards ties. This type of tool looks like a common questionnaire, which collects alters around the ego, their attributes and their relations with egos. For instance, the position generator tool asks egos about whether ties exist rather than directly asking resources egos get from ties. However, this perspective highlights the existence of networks, such as the diversity and range instead of the structure within networks, namely features of ties. As for outlining structure of networks, name generator has been conducted to ask respondents to list names of alters with whom they developed relations with, like asking whom egos usually discuss important topics with or who lives near egos. This view of social networks goes beyond the concept of social capitals, and explores egos' feelings towards ties and contents that they can get. After the collection of basic information, methods of visualisation can be adopted. Concentric circles designed by Kahn and Antonucci (1980) asks egos to place names of alters in different parts of the circle, such as putting alters who form tense ties with them closer. But this method neglects ties built among alters. Currently, a more mixed-method approach has been proposed and more widely used. Bellotti (2008) took advantage of UCINET to import their interview data and visualised network structures. **Figure 1** shows an example of NetDraw's algorithm generated graph. This framework not only facilitates further interviews in ego-alter ties, but also pays attention to alter-alter ties to provide a more comprehensive understanding of ego's network structure. Consequently, researchers tend to choose a mixed-method approach to conduct their studies. At first, name generator and visually aided data collection have been adopted to turn egos' interactions into specific ties. Then elements, such as diversity of ties, centrality of networks, and even ego-alter similarities in certain networks, are calculated and presented in a mathematical way with the help of computers to provide empirical evidence (Borgatti and

Johnson, 2018). This analysis provides a detailed description in structures of networks. After that, a mixed-method approach to facilitate relational analysis is adopted (Crossley et al., 2015), indicating that narratives collected from participants can be turned into numerical indicators, showing whether ties are present or absent with a number from 0 to 1 which also indicates the strength of the tie. Name roster approach can be adopted to check the existence of different ties (Borgatti, 2014). Through this approach participants are asked to recall their interactions by listing names and use arrows to indicate the existence of social ties. Interviews with open-ended questions are conducted to explore meanings and contents which are transferred and formed within ties. With the combination of interviews, an insider view of social networks has been achieved to illustrate the dynamic process of the network development (Edward, 2010).

This combination of numerical indicators and qualitative resources enables researchers to learn more about the mentality and subjective feelings of participants towards their developed social ties and thereby some unexpected results are easily exposed. For instance, by adopting a mixed-method approach, Tao et al. (2020) firstly utilised SNA questionnaires to outline teachers' social networks, and then conducted interviews to reveal each actor's interpretations of their constructed relations to analyse the collective agency of a multilingual team of eight language teachers in their research practices. In data analysis, researchers calculated the density and centralization to provide an outsider view regarding the structure of social network built in this research group. Qualitative data was used to reveal information transferred through each tie and personal perspectives towards these ties. These perspectives cover different periods of the development of social relations inside the community, from the beginning of establishment to recent stages of social ties constructed through interactions within this community. As a result, this study not only fulfils preset goals to indicate factors including artifacts, relational knowledge and physical distance that mediate the construction of collective agency, but also illustrates an unexpected result that language is not a barrier to social interactions. International students' cultural adaptation is the main topic for multilingual studies using the SNA approach. According to Kim (2001), cultural adaptation refers to 'the dynamic process by which individuals, upon relocating to new, unfamiliar, or changed cultural environ-

ments, (re)establish and maintain relatively stable, reciprocal, and functional relationships with those environments. It articulates how settlers who arrive at a new environment, such as immigrants and exchange students, change from cultural outsiders to gradually active and effective cultural insiders (Kim, 2001). During this adaptation process, settlers develop social relations with the local community and exchange resources with each other. And in the development of social ties, communications in all types of cultural encounters are developed (Hammer, 1989), which are defined as the ability to understand linguistic and non-linguistic codes and practices in a specific cultural community. SNA posits that an actor will encounter the provided opportunities and constraints from their positioned social ties and this will affect their actions, such as performance, behaviour, and beliefs (Borgatti et al., 2018). By adopting the SNA perspective, cultural adaptation is considered in a comprehensive way by integrating all aspects of students' cultural adaptation. In other words, by developing social ties with the host community, actors' behaviours will be shaped by their gained local linguistic and cultural knowledge and eventually facilitate their cultural adaptation. Therefore, SNA transforms the abstract concept of cultural adaptation into visible ties shaped from individual interactions with individuals or subgroups. In this way, the process of interaction is represented in a detailed way with individuals' observable experiences when they engage in interactions with others, which presents specific relations to explore individuals' interactions from an overall view.

Although there are different views regarding the analysis of cultural adaptation from the SNA perspective, all of them emphasise the role of social ties. According to Borgatti and Johnson (2018), the analysis of social ties has been divided into outcome and explanatory perspectives, which highlight the formation and effects of social ties. In the outcome perspective, the formation of social networks is affected by various factors such as gender, language proficiency, and students' experience when they study abroad. The impact of these factors on students is manifested in their behaviours of formulating social relations with others. In this way, along with the formation of social networks, other effects are also visible from their actual actions. For instance, Bown et al. (2015) documented 82 students' interactions in their Arabic learning experiences, in order to identify factors that influenced the quality of their social relations. The re-

searchers focused on the relations developed from individual interactions to identify impacts of different factors. It turned out that these factors, including genders, attitudes towards communication as well as talking strategies more or less affected both students' use of languages, their ultimate language gains as well as their development of social relations (Bown et al., 2015). It is clear that effects on language use is not a predetermined goal but it is brought out by focusing on students' interactional behaviours during the construction of social networks.

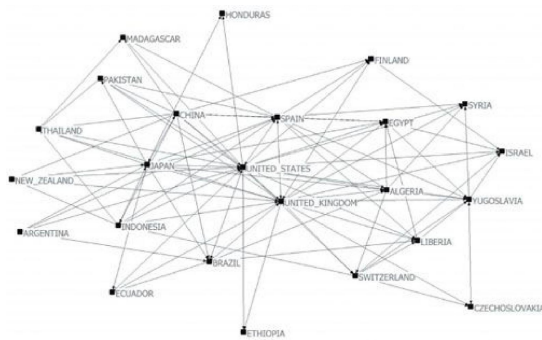


Figure 1. A network generated by NetDraw algorithm (Borgatti et al., 2018).

The explanatory view of social networks posits that social ties built by actors serve as conduits for the flow of materials, ideas, and instructions, contributing achievement, better performance or benefit to the actors (Borgatti et al., 2018). As international students inevitably interact with surrounding people, ideas, beliefs as well as information can be exchanged via social ties. During this process, students will gain information such as the knowledge of local norms and linguistic knowledge from interlocutors, contributing to their development of communication competence. For instance, when investigating the role of social networks in international students' academic socialisation in China, Li and Gong (2023) identified five patterns of social networks in international students' interactions with the host community. These social networks were categorised by the measured diversity of students' social ties with alters. These measurements focus on the frequency of students' contacts with others and the number of connections they have developed with alters. Based on the analysis of developed social networks, the results revealed that in students' constructed social ties with surrounding alters such as supervisors and classmates, their developed social ties entailing various factors, including academic norms, professional values, and

local practices, affect both their socialisation trajectories and their learning of linguistic and local knowledge. In another study, Li et al. (2022) explored the academic socialisation of two international doctoral students in China by drawing upon data collected from social network questionnaires, concentric circles, reflective journals, and observational field notes to visualise students' ego networks. The visualisation not only turns students' interactions into concrete social ties, but also reveals personal views towards these ties and their hidden meanings. The results demonstrate that students' interactions with diverse alters are crucial to cope with challenges in their studies. By developing social relations with these alters, students can receive diverse resources, such as advice from supervisors transferred through these ties and agentively utilise these resources to achieve their academic integration as well as their integration into local communities. Based on the above-mentioned analysis, linguistic competence and socialisation are not preset goals but with the SNA perspective that emphasises the role of social ties these unexpected goals can also be realised.

In summary, by adopting the SNA perspective, researchers examine interactions at micro and macro levels. At the micro level, ties and nodes are utilised to present every interpersonal interaction among individuals with narratives to interpret each tie. At the macro level, individuals' interactions with social groups are visualised with structures. By calculating significant structural features of these social networks, such as the density, different social network typologies are presented to indicate various forms of interactions. This visualisation specifies our understanding of people's interactions under different circumstances and social contexts with specific social network formats and images. Personal thoughts towards social networks provide a detailed view towards interactions because it maps every interaction through explanations for calculations of the constructed social ties among actors. This perspective provides accurate data for further investigation and unexpected results can be fulfilled by analysing actual contents in each tie. Therefore, studies conducted in a SNA perspective can investigate individual interactions with communities in an internal and overall way by specifying interactions into actual social ties and utilising individual explanations towards these relations.

4. Conclusion

In conclusion, the exploration of interactions through the lens of SNA emerges as an alternative lens to analyse interactions. The preceding discussion has laid the groundwork for understanding the unique contributions of SNA, emphasising its potential to unearth unexpected results and provide a nuanced perspective on the dynamics of social ties within diverse contexts. The adoption of SNA as a novel model for analysing interactions signifies a departure from traditional approaches that often focus solely on a specific aspect of interactions and predetermined goals. By centring its analysis on the intricate web of relational ties and network structures, SNA offers a comprehensive view that extends beyond the confines of preset objectives. This shift is particularly significant as it enables researchers to unravel hidden patterns, complexities, and outcomes that are also important to understand interactions. As we reflect on the intricacies of SNA, it becomes apparent that this approach has the potential to reshape our understanding of interactions at both micro and macro levels. The nuanced insights gained from the studies presented in this discourse underscore the importance of considering social ties, structures, and relational dynamics in the broader context of interaction analysis.

In essence, this exploration into the realm of SNA stands as an invitation—an invitation to delve deeper into the complexities of interactions, to discover the unexpected, and to embrace a paradigm that transcends conventional boundaries. As we navigate the ever-evolving landscape of research methodologies, SNA offers a lens that not only captures the intricate tapestry of social ties but also opens new avenues for understanding the multifaceted nature of human interactions, particularly in multilingual learning.

Author Contributions

Wenjun Yu—literature review, first draft; Hao Xu—conceptualisation, proofreading, funding.

Conflict of Interest

The Authors declare that there is no conflict of interest.

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Not applicable.

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