Socionomy in Indian classrooms: Utilising Networks to Foster More Equitable and Inclusive Classrooms in India under the National Education Policy.

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Abstract

The National Education Policy 2020 posits "inclusion" as a central goal in its vision for holistic and sustainable education. Students' perception of inclusion or embeddedness in the classroom is severely influenced by the classroom environment which is further constructed on the social relations and networks among students. Teachers require an in-depth understanding of such classroom networks to create effective pedagogical practices and classroom management strategies. This paper offers insight from a large-scale intervention called Socionomy conducted by Columbia University, University of California, San Diego, and Aawaaz Foundation which aims to study the effects of classroom networks on students' outcomes, socio-emotional well-being, and non-cognitive abilities. It also proposes the need for democratising access to information about peer networks within classrooms for teachers and schools which can be used to employ improved and inclusive classroom management strategies in alignment with the NEP vision.

Keywords: keywords: peer networks, inclusion, classroom management strategies, National Education Policy

Context: The NEP Vision for Inclusion and Equity

The National Education Policy 2020 has elucidated several goals in its agenda which focuses on holistic and sustainable education and skill development of individuals. Expanding on Goal 4 (SDG4) of the 2030 Agenda for Sustainable Development, "Ensure inclusive & equitable quality education and promote lifelong learning opportunities for all", the NEP has placed a special emphasis on the need for "inclusive" education (Soni, 2022). Taking note of India's diverse socio-economic landscape, the policy has identified "equitable access to the highest-quality education for all learners regardless of social or economic background" as its fundamental goal. The emphasis on "equitable access" extends to the need to make "joyful" and "smart" classrooms (Soni, 2022) conducive to learning for all students. The policy aims to ensure such equitable access through consistent efforts to improve foundational literacy and numeracy, extend early childcare care and education, integrate the curriculum with innovative methods of teaching and assessment, and administer class instructions in native languages (Aithal and Aithal, 2020).

One of the most effective ways to ensure inclusive and equitable education, as highlighted in the NEP, is to reimagine pedagogical practices and fundamentally change curriculum in focal areas. The National Curriculum Framework for School Education (NCF) which expands on the vision elucidated by the NEP has laid down several guidelines to introduce pedagogical practices that promote inclusion and support for students of disparate socio-economic and academic backgrounds as well as learning abilities (Aithal and Aithal, 2020). These practices include methods of learning such as collaborative and project-based learning,

peer assessment modules, and the integration of digital tools into classroom teaching. However, pedagogical tools must be complemented with effective classroom management practices to produce and promote inclusivity within classrooms. Connectivity with students and inclusive teaching practices can enable teachers to achieve classroom goals (Cappella et al., 2013). Classrooms that are efficiently managed can be conducive for teaching and learning (Marzano and Marzano 2003). Classroom management strategies can be instrumental in translating inclusion and equity from abstract goals into tangible practices. Managing a diverse cohort of students, however, is an incredibly challenging feat for teachers (Gremmen et al 2016). Students' perception of inclusion or embeddedness in the classroom is severely influenced by the classroom environment (Li and Singh, 2022). The classroom environment is further constructed on the social relations and networks between students. Teachers can therefore utilise these social networks within the classrooms to produce tangible academic outcomes. Classroom management strategies must extrapolate and exploit the impact of peers and peer networks to leverage desired student outcomes (Berlinski et al.., 2023). This paper supports the use of information about peer networks within classrooms for teachers and schools to employ improved and inclusive classroom management strategies with the help of the *Socionomy* Toolkit.

Literature Review:

Peer Networks and Student Outcomes

A student's educational experience is shaped and influenced by the abilities and attitudes of their peers. Higher-ability peers positively impact student outcomes and motivation levels. McTigue et al. (2019) studied the effects of dormitory assignment in tertiary-level educational institutions in India and reported an improvement in the performance of non-urban and non-English speaking students when they were assigned high-ability peers (McTigue et al., 2019).

Social relations within the classroom offer a range of direct and indirect effects on students' academic performance, socio-emotional strength and overall well-being (Sacerdote, 2001; Zimmerman, 2003, De Giorgi et al., 2010; Bhargava et al., 2023). Network centrality indicates how well-connected a student is with their peers. Studies have proven that network centrality or interconnectedness has a direct impact on students' academic outcomes (Williams et al., 2019). Students' sense of belonging and connectedness in the class inspire greater collaboration with peers (Li and Li, 2022) and increased classroom participation (Valiente et al., 2014) which in turn yield improved academic performances. Gradassi et al. (2023) analyzed the link between network centrality and the use of social information which further has an impact on social hierarchies and "perceived smartness". Their study reported a positive relationship between pupils' "closeness" to peers and their social learning. (Gradassi et al., 2023).

Social network equity or equally distributed peer networks also have a positive relationship with behavioural engagement in well-organised classrooms (Cappella et al., 2013). Interaction with peers' personality traits impacts students' outcomes as well. Using measures like "persistence", "self-confidence", "anxiety" and "risk attitude', Golsteyn et al. (2021) examined randomized peer groups to report the effects of students' self-assessed personality traits on their

peers' academic scores. Students assigned with more "persistent" peers reportedly had higher grades while socialization with 'risk-tolerant' peers negatively affected academic performance (Golsteyn et al., 2021). Skewed or hierarchical classroom networks tend to enable a prevalence of aggressive social behaviours (Gest and Rodkin, 2011). Isolation or disconnectedness from peers causes reduced classroom participation and in turn, affects student outcomes. Instances of bullying or social disharmony do not always surface to the teachers' attention. This is because students' levels of isolation are not always evident to the teachers. As a result, students' isolation remains invisible, making it difficult for teachers to intervene or provide direct assistance.

Creating Inclusive Classrooms

Studies have shown that teachers' interaction with students can directly influence the classroom peer ecology and by extension the peer relationships (Farmer et al., 2006; Gest and Rodkin, 2011). This "network-related" teaching can help navigate the overall classroom engagement, influence collaborative learning, and also impact student outcomes. Classroom peer networks could be hierarchical or egalitarian further determining the level of prosocial or aggressive behaviours prevalent within the classroom. Teachers can impact these networks and help regulate children's interpersonal behaviors by managing the peer ecology (Gest and Rodkin, 2011). Prescribing several classroom practices that involve peer collaboration including peer tutoring and peer assessment, the NEP has also acknowledged the positive relationship between peer collaboration and learning. Peer networks become critical for students' academic engagement since students help each other learn and participate in peer-to-peer teaching. (Sacerdote, 2011; Kimbrough et al., 2022). Leveraging critical information about a student's peer network to provide need-based intervention can therefore be instrumental in helping teachers manage such complex classrooms. Students who feel isolated or have little to no peer engagement could be given special attention and aid to help them cope with the rest of the class. In other words, Social Network Analysis of classrooms can lend the necessary tools for improved and inclusive pedagogical and classroom management practices.

One such tool for intervention can be seating arrangements. Seating arrangements have proven to be a vital tool for teachers to manage classroom behaviour as well as regulate academic performance. Seating arrangements influence peer networks since communication among students is facilitated or hindered by proximity (or lack thereof). (Wannarka and Ruhl, 2008). Studies have however noted that teachers mostly rely on academic performance to create peer networks. There is a need for familiarity with existing student relationships to create more effective seating plans (Steggerda et al., 2022). Teachers therefore can greatly benefit from such information about peer networks in order to manage their classrooms and create more inclusive spaces for diverse students. Van Den Berg et al. (2012) affirmed that seating arrangements in the classroom can be used as a method to enhance positive relationships between classmates and decrease behaviors identified as problematic by peers within the classroom. Gremmen et al. (2018) mention the need for teachers to factor student friendships and academic achievements in

designing seating plans. However, acquiring such in-depth information regarding students' social relationships within classrooms is both a daunting and difficult task for teachers who continue to manage large classrooms and administrative responsibilities (King and Nomikou, 2018). In-depth information about the network positions of students cannot be extrapolated from regular interactions. The *Socionomy* project aims to elicit such information regarding students' social relations and make it accessible for teachers who can use it to create better pedagogical and classroom management strategies through the SNA Toolkit. This information can help teachers understand their classrooms and find out which of their students need special intervention. Moreover, the significant impact of peer networks on student outcomes and personality traits can be exploited to generate positive outcomes while inculcating collaborative and peer-based learning.

Understanding the *Socionomy* Toolkit

Social Network Analysis is used to study patterns in interactions, relationships and organization of individuals in a social setting. Several studies have employed SNA to understand the social patterns governing educational institutions, teacher communities, school leadership, peer effects and so on. (Penual et al., 2009; Coburn and Russell, 2008; Pitts and Spillane, 2009). Longitudinal SNA has also been applied to study peer effects and the incidence of bullying within classrooms (Sentse et al., 2014). SNA can be useful for observing the classroom environment and identifying useful patterns of interaction between multiple actors (Li, Shouhui, and Xinying 2011; Bohkove, 2016).

The Social Network Analysis (SNA) Toolkit or *Socionomy* is a user-friendly web-based program that allows leaders and teachers to use the social network perspective to advance more quality learning environments. SNA democratises access to such crucial information about student relations by mapping peer networks for teachers. Teachers and schools can access this information and apply multiple metrics to understand how peer networks influence academic achievements, socio-emotional well-being and other personality traits of their students. The program produces in-depth information which can be easily interpreted with the help of charts and graphs and can be manipulated to conceive multiple classroom management strategies.

The Socionomy Project

Facilitating access to this toolkit is part of a larger research project by Columbia University, University of California and Aaawaaz Education Services which is currently being implemented in over 20 schools across India. The research aims to analyse social dynamics within classrooms and understand how seating arrangements can be manipulated to improve academic and other student outcomes for isolated students. The research aims to answer three main questions:

- What do friendship networks in Indian classrooms look like? Are they segmented on demographic characteristics, personality traits and academic scores?

- How can we use the existing classroom social networks to improve the socio-emotional and academic outcomes of all the students within the classroom? Can seating arrangements play a key role in achieving that outcome?
- How can educators use this tool in the long run and implement findings from the study to design better classroom environments?

The Pilot

The Pilot was conducted using a mixed-method approach. Students' peer networks were surveyed and analyzed quantitatively using the method of social network analysis . Semi-structured interviews of teachers were also conducted to navigate their engagement with these visualized networks. The qualitative data were analyzed using a constant comparative method (Glasser, 1965) to surface the different themes in the ways that teachers engage with their classroom data and connect it to daily practices.

Methods and Data Collection

The surveys were administered in 24 classrooms across 3 schools in Rajasthan, Uttar Pradesh and Delhi. A total of 584 students were asked to mark their classmates as "very good friend", "good friend" or "sort of a friend" to understand immediate peer networks. We constructed popularity indices through in-degrees over dimensions such as friendship connections, recess connections and help connections and placed students into L (low popularity), M (medium popularity) and H (high popularity) categories. We also elicited information about classroom experiences and socio-emotional skills through a mix of standardized scale questions and hypothetical games which measured comfort in asking doubts to teachers, perception of bullying in class, optimism, neuroticism, enthusiasm to participate, willingness to work hard, trust, competitiveness, comfort in academic activities, patience, risk, altruism, morality, rationality, and grit (Bhargava et al. 2023).

Findings

Popularity versus Isolation

Popularity refers to the general visibility of individuals in a collective setting which is directly linked to having more social capital, power, prestige and overall acceptance by peers (Cillessen and Marks, 2011). Classrooms are known to be organised with a "popularity hierarchy" wherein varying degrees of popularity are widely known and accepted by all students (Laninga Wijnen et al. 2019). Relatively "popular" students are known to present prosocial behaviours, competence, academic competence, confidence and even strong leadership skills (Laninga-Wijnen et al., 2019).

In the pilot, classrooms showed significant incidences of isolation among students as well as skewed distribution of "popularity". At least 20% of students in each classroom were nominated

by only 1 other individual as a very good friend while 20% of the students within each classroom got nominated by more than 6 individuals as very good friends. Such information becomes critical for teachers to identify isolated students and facilitate improved classroom embeddedness for them. Further, if left on their own, well-connected students barely want to sit with isolated students, thereby increasing the shortcomings emanating from isolation. Classroom interactions or "dialogue" greatly influence teacher-student relationships, evaluations as well as feedback exchange, (Bokhove, 2016). Our findings indicate that High popularity students are more likely to be comfortable asking doubts in the classroom, less likely to be worried, more likely to work hard, and more likely to be comfortable in academics than low-popularity students. On the other hand, low-popularity students are less likely to be optimistic than high-popularity students. A unit increase in the popularity measure amongst students leads to a 0.59 SD increase in extraversion, 0.3 SD decrease in perception of bullying, 0.54 SD increase in willingness to participate in the classroom, 0.26 SD increase in willingness to work hard in studies, 0.4 SD increase in competitiveness and 0.47 SD increase in academic comfort within the classroom. An increase in the number of "very good friends" results in a reduction in competitiveness but an increase in the students' optimism.

Information Asymmetry for Teachers

Our qualitative interviews with teachers reported a significant gap between teachers' understanding of their classrooms and the students' information. Teachers expressed surprise upon discovering the students who were isolated in their classrooms. While they were aware of the popular students, they did not know much about the students who were on the margins. Therefore, teacher's perceptions of isolation among students varied considerably from actual social relations within the classroom. Such insights proved to be useful for teachers who could make tangible connections between the data and their future practices.

" That is umm…surprising… I knew about X being there but I am surprised to see Y there, are you sure that this is that child?"

- Teacher, Grade 6, School B, Delhi

"Is this X?? That is very weird, I thought he had at least a few good friends"

- Teacher Grade 7, School C, Jaipur

Teachers reported an inclination to study this information in-depth and understand their classrooms using multiple metrics provided in the toolkit. They wished to know more about the friendship networks in the classroom as well as students' perceived levels of optimism, altruism, competitiveness and overall aptitude. They proposed practices that included rearranging seating plans according to the data and nominating isolated students to take a more active part in school events.

In light of this evident gap between teachers' perception of classroom networks and actual student relations, the need for easily accessible information about a student's network centrality becomes imminent. While teachers could reportedly notice the more popular students, isolated students were not so evident. The *Socionomy* Toolkit will be able to produce such information for teachers and help them visualise peer networks through graphs and charts. Teachers will also be able to use this information and understand who is isolated in these networks and how they can be integrated into the network.

The Way Forward

Classrooms continue to function as an important site for facilitating learning. Against the backdrop of a New Education Policy which has placed a significant emphasis on creating "joyful" and "smart" classrooms, designing effective classroom management strategies will be an important requirement for teachers. These strategies can be designed by understanding the unique peer networks created in each classroom which have a significant impact on student outcomes, socio-emotional well-being and non-cognitive abilities. Burdened with multiple administrative, assessment and teaching responsibilities, teachers will require easy access to information about such networks. The *Socionomy* Toolkit can democratise this access for teachers and make it easier for them to acquire in-depth information about their classrooms which can otherwise be impossible to elicit through regular interactions. Such information can also be used to design better pedagogical practices while incorporating the NEP guidelines. Additionally, teachers would be able to identify effective seating plans for students using this data and create learner-friendly and inclusive classrooms. The intervention is currently testing whether matching isolated students with other isolated students would create positive or negative results in comparison to matching an isolated student with a popular student. The results of the project will open new avenues for creating standardised seating plans which can be effectively used for creating equitably and inclusive yet manageable classrooms. We believe that by empowering teachers and schools with the network information of their students along with tangible seating plans, we can take a significant step towards making all classrooms in India equitable and inclusive for *all* students.

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