

## PERSONALITY-SENSITIVE PEDAGOGIES: A MIXED METHODS ANALYSIS OF SMALL GROUP INTERACTIONS AMONG 9-10 YEAR OLDS

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### Abstract

There is considerable evidence that working collaboratively in small groups has learning benefits (Laal and Ghodsi, 2012) and that children's participation in such activities mediates learning (Webb et al., 2014). Despite a growing interest in inclusion in education, personality has been overlooked as a possible source of exclusion. In this study we identified children who self-reported low levels of extraversion and/or high levels of neuroticism (tendency to worry) as personality traits and then observed them working in small group collaborative learning situations. Using social network analysis (SNA) as a way of understanding the group interactions, we employed a novel measure of degree centrality (influence) and coupled this with a qualitative analysis of the nature of the group interactions, establishing a genuinely mixed methods social network analysis (Froehlich et al., 2020). Findings suggest that low levels of extraversion and/or high levels of neuroticism can be, but are not always associated with lower levels of participation and that a range of other factors, notably the personality traits of the other children, affect participation. These findings could be used to suggest ways that teachers could employ more personality-sensitive pedagogies.

**Keywords:** *Personality, social-network-analysis, collaboration, participation, talk.*

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### 1. Introduction

In classrooms in UK primary schools, pupils spend considerable time working collaboratively in small groups. There is good evidence that collaborative group work can have learning benefits (e.g. Laal and Ghodsi, 2012). Mercer (2008) outlined the importance of collaborative talk in developing children's reasoning and Littleton and Mercer (2013) further explored the importance of 'interthinking' (children collaborating and talking together in a productive way) to enhance learning. This is supported by Wells (2007) who argues for the encouragement of learners of all ages in all educational settings to engage in dialogue in order to construct knowledge together. There is evidence, therefore not only that collaborative group work can be beneficial, but also that student participation in such activity mediates learning (Webb et al., 2014).

In educational discussions at present, there is a great deal of focus on diversity and inclusion with efforts being made (quite properly) to ensure that children are not disadvantaged in their learning because of their cultural, ethnic, religious or socio-economic background. However, little attention has been given to individual personality traits as forms of diversity among school-aged learners, despite evidence that personality is often quite stable by middle childhood (Muris, Meesteres and Diederer, 2005) and that it exerts considerable influence on learning behaviours and outcomes (Gardiner and Jackson, 2015; Neuenschwander et al., 2013).

The most influential theoretical framework of personality is the 'Big Five' traits model (McCrae and Costa, 1987); personality is characterized by a position on a continuum in each of five distinct traits:

**Openness** – individuals high in openness are characterized by curiosity, willingness to try new things, imagination, and being more creative and unconventional.

**Extraversion** – individuals high in extraversion are characterized by sociability, being energized by social interaction, excitement seeking and being outgoing.

**Conscientiousness** – characterized by being competent, organized, dutiful, striving for achievement, self-disciplined and deliberate.

**Agreeableness** – individuals high in agreeableness are characterized by being trusting, straight-forward, altruistic, compliant, modest, empathetic and conflict averse.

**Neuroticism** – individuals high in neuroticism are characterized by anxiety, stress, irritability, self-consciousness, vulnerable and experiencing swings in mood.

Introversion and neuroticism are individual traits which may signal vulnerability to poor learning outcomes (Chamorro-Premuzic, & Furnham, 2003). Shyness, which may be an indication of low extraversion and high neuroticism has been shown to be correlated with poorer academic outcomes (Mjelve and Nyborg, 2019). Komarraju and Schmeck (2011) suggested that high levels of neuroticism were associated with lower academic performance. We hypothesised that pupils high in one, or both traits may be particularly at risk due to increased inhibition or marginalisation during classroom interactions, particularly during collaborative group tasks, combined with increased susceptibility to emotional instability/anxiety.

## 2. The study

The study measured the ‘Big Five’ personality traits of a group of children in a single class in Year 5 (9 and 10 year olds) in a primary school in the centre of a large city in the south west of the UK. From this data we identified children who were either low in extraversion and/or high in neuroticism; (now referred to as the ‘target children’). We then recorded the target children working with their peers on a deliberately non-cognitive collaborative task. We aimed to explore the following research questions:

- Are the ‘target children’ less influential/participatory than the other children?
- What personality factors influence the participation of the target children?
- What pedagogical lessons might be drawn that could support teachers to introduce more personality-sensitive pedagogies into their practice?

The personality data was gathered using a child-appropriate version of the well-established ‘Big Five’ self-report personality framework (Muris, Meesters and Diederens, 2005). The children answered 15 questions by selecting how they would respond in different scenarios illustrated with pictures and a small amount of written commentary. Each of the Big Five personality characteristics was assessed in three scenarios (giving a maximum score of 15 and a minimum of 5 for each trait). The questionnaires were administered by the class teacher (someone the children knew well and trusted) during a 15-minute period as part of a normal school day. A teaching assistant was also on hand to read for any of the children who had trouble with the wording of the questions. In addition, and to provide some triangulation, we asked the class teacher (who knew the children well) to identify those she deemed to be either introverted and/or prone to anxiety.

Following the administering of the personality questionnaires (and the identification of the ‘target children’) groups of children were filmed completing a short, non-cognitive collaborative task. This was done in a separate room, away from the main classroom. The groups were of 3 to 5 children and consisted of one, or two ‘target’ children working with their peers. The task was to use a set of building blocks to construct a castle with specific characteristics (a given height, containing a staircase etc.). The non-cognitive nature of the task was chosen specifically so that confidence in a particular academic domain did not confound the role of personality in the children’s participation. The children were given up to 15 minutes to complete the task. No adult was present in the room as the children collaborated but the children were aware that they were being filmed. In total eight groups were recorded. Each recorded completion of the task will now be referred to as an ‘episode’.

### 2.1. Social Network Analysis

Social Network Analysis (SNA) is an approach to investigating relations and social structures through the use of networks (Froehlich et al., 2020). Reviewing and coding the eight video-recorded episodes, we used detailed dynamic social network analysis (SNA) protocols and a novel degree-centrality measure (indicating level of influence of the individuals in the group) to analyse the frequency and type of pupil interactions. From these we were able to rank order pupils according to influence.

SNA has been criticised for its static nature (Bokhova, 2018). Our approach has sought to address this. Analysing data at regular time intervals (every minute) during each episode enabled the creation of dynamic representations from which we were able to analyse how pupils’ influence and the interactions between pupils changed over the duration of the episodes.

A second critique of SNA is its lack of attention to the qualitative nature of the interactions it seeks to model (Fuhse and Mützel, 2011; Hollstein, 2011). Froehlich et al. (2020) have proposed the idea of Mixed Methods Social Network Analysis (MMSNA) as a way of exploring both the relationship between content and group dynamics and the meaning related structural dynamics (Bruun et al., 2019). We adopted this approach; after the construction of the social networks and the quantitative ranking of

influence, we conducted further analysis of the video data. This ensured that salient features of the group interactions not coded in the SNA were described and analysed. Given our interest in the personality traits of the participants, we aimed to explore not only who was influential, or not, but how the personality traits of the participants may have affected the gaining or diminishing of influence. The study innovated on established SNA approaches to derive original contributions to the field of agent-based modelling.

## 2.2. Coding protocols

The video data was analysed both quantitatively and qualitatively. We argue that our approach is genuinely a mixed methods approach, as the quantitative analysis led directly to the qualitative and vice versa. The nature and intended target of each utterance was coded. Utterances were defined as follows:

- If one utterance is spoken without interruption – coded as a single utterance.
- If one utterance is bisected by another including a pause (as in turn taking) – coded as two utterances.
- When two different ideas are expressed back-to-back – coded as 2 utterances.
- Utterances do not include screeches, howls, speaking to oneself (externalising internal monologue – *because not intended for public consumption*), singing to oneself etc. (unless accompanied by a clear action)
- Exact repetitions are coded as two utterances.

Each video episode was watched once through in its entirety by each researcher independently. The researchers then came together to watch each episode several times. During each viewing, attention was focused on a single child and utterances coded in the following way:

- To a specific member of the group (the intended target of the utterance was recorded)
- Utterances to nobody in particular (into the ‘ether’) which did elicit a response
- Utterances to nobody in particular (into the ‘ether’) which did NOT elicit a response
- Utterances that were no intended to elicit a response (e.g. self-talk)

Any disagreements between the researchers about an utterance (e.g. whether the intended target was one of the other children, or whether it was to nobody in particular) were resolved by re-watching the utterance, looking at the body language of the other children, the context in which the utterance was made, the nature of the utterances preceding it etc. and a judgement was made.

From this coding, a ‘net in-degree’ calculation was made for each child. This was done by subtracting the number of incoming utterances from the number of outgoing utterances. The supposition is that children who are recipients of a lot of utterances are more influential and therefore more engaged in the learning than those who do not. Children who speak a lot, but whose utterances do not then generate a lot of incoming utterances are less influential. This measure was adjusted to account for children who said almost nothing but who received one or two incoming utterances (injunctions to become involved etc.) and who therefore appeared highly influential when they clearly were not. The adjustment was therefore made to include the each child’s total utterances (as speaking a lot was seen as indicative of involvement). The ‘Adjusted Degree Centrality (ADC) measure was then by adding each child’s total utterances to the ‘net in-degree’ measure.

We also explored the extent to which each participant was ignored by calculating an ‘Ignored Factor’ (IF); dividing the number of utterances to ‘the ether’ that did not garner a response by the total number of utterances. This was then expressed as a percentage.

The nature of each utterance was also coded, giving us data on the interaction/utterance types. Each utterance was assigned to one of the following categories; procedural (concerning the completion of the task, use of resources etc.); pro-social (giving compliments, resolving or averting arguments, praising an idea); anti-social (arguing, sowing dissension in the group); task knowledge (indicating an understanding of the nature and requirements of the task); subject knowledge (bringing prior knowledge to bear on the task), dominance (gaining authority, asserting an opinion, taking control of resources); subordination (acquiescing in an argument, relinquishing resources) and miscellaneous.

## 2.3. Qualitative analysis

Froehlich et al. (2020) note that both quantitative and qualitative SNA have their limitations. The detailed quantitative analysis revealed an overview of the structural properties of the network, but less of the content being exchanged or the fluctuations of the relationships. The video episodes were then analysed from a qualitative perspective. Each episode was watched again (this time independently) with attention being paid to the following features: the nature of the language used (i.e. the person of the verb (I, you, we etc.), suggestions or imperative etc.); body language; position in the room and relative to other children; on-task and off-task behaviours; dynamics between children that suggest prior relationships, or interactions. We were not limited to these but had them as prompting ideas as we watched the episodes.

Also as prompts, we had the quantitative analysis of the episodes and the personality data of each participant. In this way, the qualitative analysis was prompted by the quantitative analysis. Additionally, the observations from the qualitative analysis prompted a return to the quantitative data, for example to consider the personality data, or the influence ranking, to help us understand the episode fully. This process will now be exemplified through a consideration of one episode.

### 3. Illustrative example

Two of the four children were identified as ‘target children’\*

Table 1. Personality scores and influence calculations.

Name	E	N	O	C	A	ADC	IF
Kate*	6	10	11	13	10	62	27%
Nigel	14	8	7	11	5	54	21%
Darren	11	9	10	9	9	40	36%
Sophie*	7	6	10	12	8	15	42%

Sophie (consistent with her low E score) said little, was largely ignored and exerted little influence on the group. Kate, on the other hand, with similar personality traits, participated much more and exerted greater influence on the group. Their personality traits are similar for all five factors except for N, with Kate rating herself as considerably more prone to worry. In the episode, Sophie, while very much on the periphery seemed unperturbed by this. Kate seemed more concerned to be involved.

An analysis of the language used by the two revealed distinct patterns in their utterances. Sophie’s utterances were almost all commentary, or a repetition of something that someone else had said, e.g. *‘That’s a good archway’*; *‘Yes, we should.’*

Kate, on the other hand, made a number of suggestions. She did not use imperative language but couched her utterances in the third person plural (we) and often with a modifier such as ‘maybe’ e.g. *‘Shall we do a height test and a fit test?’*; *‘Maybe we could make it like a Jenga puzzle?’*

Kate is also highly agreeable (one of the Big Five personality traits) and acts as peacemaker when Darren knocks part of the tower over, Nigel admonishes him and it appears that an argument might ensue. Kate steps in to make sure that the group remains cohesive, using verbs in the third person plural and reassuring the whole group that the setback is not serious. Her acting as peacemaker seems to increase her influence and particularly Nigel’s receptiveness towards her suggestions.

The personality traits of the other (non-target) children in the group could also be important. Nigel, who came out as the second most influential child and who was quite dominant, was notably low in both openness and in agreeableness. His lack of openness was clear in the language that he used. He often began his utterances refuting a suggestion from one of the others;

‘No! We’re not measuring yet!’; ‘Nah, nah, nah, let’s make it build up with this.’

A lack of agreeableness suggests someone who is comfortable upsetting or inconveniencing someone else in the pursuit of a particular goal. This is seen in some of the non-verbal actions. In one instance, Sophie places a block on the structure (attempting to become more involved). Nigel immediately removes the block, which does discouraging further interaction from. Sophie.

Kate increases her participation (and influence) by taking control of some of the important resources in the room, notably a meter stick that was provided so that the children could measure the height of their castle. It could be that her high level of conscientiousness (coupled with her high level of neuroticism) prompted her to ensure that the group met the assignment brief; she was motivated to do the job well and possibly worried if the group failed to perform.

### 4. Findings and discussion

While we must emphasise that this was a small-scale, pilot study, a number of potentially important findings have been constructed from our examination of the data. Our intention is to develop these into a ‘toolkit’ to support teachers in implementing more personality sensitive pedagogies in their classrooms. The key findings are summarized below:

- Openness & Agreeableness of other group members appears to be a key mediator of participation for target children. Low O and/or A tend to produce blocking and imperative language.

- Sometimes the target pupils were isolated, not always. Some target pupils self-isolated whilst others seemed to be isolated by the dynamic (i.e. were marginalised by other participants). Neuroticism seemed to mediate comfort with isolation.
- Some pupils did fit their Big 5 profiles precisely and others did not. Complexities of friendship and pre-existing social dynamics could be mediating factors.
- Pupils become influential via different means. Children high in E and low in O achieved this by 'bossing others around' (imperative language). Children low in E but high in O, C and A gained influence and participated by making procedural suggestions.
- Resources and physical space – where these were dominated and target pupils lost out, the dominating was done by an individual who was high in E and low in A. In the group composed entirely of 'target pupils' resources and physical space were not dominated by any single child.
- Failed attempts to participate constructively (which can be for different reasons) resulted in pupils high in N resorting to eliciting influence from subversive behaviours.
- When target pupils collaborate, there was a much more even distribution of interaction, influence and participation. Co-operation levels were high, competition/clashes non-existent. The tasks were completed more quickly.

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