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Celebrating Five Years of CORERJ

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We are happy to deliver Volume 5 of the Cambridge Open-Review Educational Research e-Journal (CORERJ). With open access becoming a very important issue in academia, CORERJ can be accessed by researchers and practitioners alike, and can have impact in both the public and policy arena. As we celebrate five years of CORERJ, we had three main goals for this volume: (i) expand outreach; (ii) continue reviewing capacity building; and (iii) further develop the journal's professional identity.

Firstly, in order to expand the journal's outreach, we collaborated with CORERJ's Communication Officer and developed a contact list of Education Departments and Faculties worldwide to which the call for abstracts was circulated. The campaign was successful as we had a significant increase in the amount of submissions received, and more so received submissions from across Asia, Europe, and North America. Also, in collaboration with the Faculty of Education Graduate Students Association (FERSA) at the University of Cambridge, a launch event will commemorate CORERJ's latest issue and provide the authors with an opportunity to present their papers.

Another objective that we focused on was capacity building for the journal. In order to achieve this, we ran a reviewing workshop in partnership with the Kaleidoscope conference chairs. Kaleidoscope is an annual two-day conference hosted by research students at the Faculty of Education, University of Cambridge. We have come to appreciate how difficult it is to write a good in-depth review and consequently are trying to help our reviewers develop their skills. The reviewing workshop was well attended and included presentations of reviewing templates and examples of good reviews. Additionally, we collaborated with the journal's Faculty Advisors, Professor Susan Robertson and Dr Louis Major to improve our reviewing templates so as to provide detailed practical examples as to how to write a good review. Finally, along with the Faculty of Education Library at the University of Cambridge we developed a reading list with resources that aims to improve reviewing skills and knowledge available in this area for early-career researchers.

In addition, over the five years since its inception CORERJ has already established its credibility and we aimed to further keep up the development. This year CORERJ was accepted to be listed at the Directory of Open Access Journals (DOAJ). DOAJ is a community-curated online directory that indexes and provides access to high quality, open access, peer-reviewed journals. This will increase CORERJ's visibility and reputation as DOAJ has a list of 12,195 journals from 128 Countries. More importantly, we decided to give CORERJ a visual revamp and collaborated with Georgios-Spyridon Athnanasopoulos to design a new cover and logo. The logo features a paper boat on coloured balloons and Pythagorean spirals and it was inspired by the architectural design of the Faculty of Education. Finally, we have managed to get persistent Digital Object Identifiers (DOI) for each article to allow easy identification of its location on the Internet.

The papers included in the volume highlight the diversity of educational research including mathematics education, qualification of teachers, leadership development in primary schools, self-worth and its relation to anger and aggression in children with autism spectrum disorder, democratic citizenship education, and target language learning. The papers went through two-stages, traditional peer review and open review, to ensure high quality. This issue features eight papers that comprise of four review papers, three empirical studies, and one special paper that features an interview with Dr Mark Carrigan on social media for academics. Mark is the author of An Introduction to Social Media for Academics and offers practical information for academics and young researchers who want to use social media. We felt that social media is becoming increasingly important in academic life and a special paper on this topic would be of interest to CORERJ's audience.

As is the case with most journals, the two main challenges CORERJ faced this year were to obtain good quality reviews and increase engagement with the open reviewing phase. We hope that the next editorial team will continue to build on the reviewing capacity and organise an outreach campaign to engage more researchers and practitioners in our open-reviewing process. We also feel that the role of the Faculty Advisors is crucial as they have years of experience and can help the Editorial Team improve the journal's processes. As CORERJ is the first journal to have an open reviewing component, it is an integral part of CORERJ's identity and should be preserved and expanded. What is more, inspired by the special paper this year, we would love to see the journal have a stronger social media presence as this is the future of academia.

On a personal note, through our experience we have learned a lot regarding editing and publishing that are important assets to help us in our futures in academia. We have also understood how collaborative work takes us further and gives us different perspectives that can improve the journal. Thus, we would like to thank all the reviewers and all the people who advised us and collaborated on Volume 5.

Assessing Formal Written Ability in Mathematics

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With demands to include literacy in mathematics lessons from Ofsted it becomes desirable to ask what mathematical literacy is and how can we assess whether students are mathematically literate. This paper reports on a study which is aimed at addressing these questions with regards to mathematical writing. We compare the mathematical writing of small group of A-Level students from a British sixth form college to the writing style of academic mathematics (i.e. research articles, undergraduate texts etc.). We seek to understand the similarities and differences of the students' writing style to that of academic mathematics. In doing so we also look at the quality of students' formal mathematical writing. To do this we construct a rubric and grading system which measures how well students incorporate certain characteristics of academic mathematical writing. The characteristics in the rubric are gleaned from literary and linguistic analysis of academic mathematics literature as well as advice from professional mathematicians as to what constitutes good written mathematics. As such, the rubric tries to capture what mathematical writing is. It is found that while the students in the study use voicing techniques and formality expected in academic mathematics, their writing tends to lack cohesion and narrative of academic text. Indeed, they tend to write algebraic content and descriptive content in separate blocks. At the end of the paper we discuss the implications of the findings for further research and mathematics education. Note that since this research is set in an English-speaking context, we shall only consider mathematics written in English.

Keywords: mathematics, extended writing, literacy, assessment, linguistics

Introduction

Over the past decade there has been an increased focus on literacy across the curriculum with Ofsted requiring each subject to include reading and writing within their teaching (Ofsted, 2013). As well as attempting to boost basic literacy, Ofsted are hoping to improve students' ability to interpret various different kinds of information and communicate their thoughts meaningfully. This thought is echoed by various educational theorists (Lave & Wenger, 1991) who believe proficiency with the style of language used in a subject is important for the students' participation with the academic community of that subject. The implication of all this is that a mathematics student should be encouraged to write mathematics in a way that is clear, coherent and in a way that is consistent with the style of writing in mathematics. However this raises the question, "what is the mathematical style of writing?" Following this, another natural question arises, "how capable our pupils of writing in that style?" These are non-trivial questions in mathematics education since, traditionally, extended writing has been sparse in mathematics classrooms, with most writing consisting of number of or symbolic manipulations (Baroody & Ginsburg, 1990; Nardi & Steward, 2003). A very real factor for this may be a lack of understanding among educators of what mathematical writing is.

The quality of students' mathematical writing has been considered by Santos and Semana (2014). However, their focus was on the clarity of students' mathematical writing. They do not investigate how well students' written work converges accepted form of academic

mathematical writing. The present work is dedicated investigating the similarities and differences between students' writing and that of academics. The study provides a rubric consisting the stylistic features found in mathematical writing. These qualities shall be distilled from literary and linguistic analyses of mathematical texts. However, since such analyses are scarce and they do not necessarily reveal what effective mathematical communication is, we shall also consult writing guides from research mathematicians on what makes good written mathematics. An assessment method is designed to go with this rubric which we shall use to assess the written work of small group of year 13 students. The students' texts will be from single writing task. Hence, no general conclusions will be drawn from this study but at the end of the paper we shall discuss the implications of the findings of this study for research.

It should be clarified the style of writing being investigated here is formal in style. Hence, it would not be appropriate to assess students' informal mathematical writing (such as maths journals) using the techniques presented here.

What is mathematical writing? A literature review

As one would expect, mathematical writing (and mathematical communication as a whole) has many facets to it. However, we can roughly categorise these characteristics into two groups; linguistic characteristics and structural ones. We shall address these two categories in that order.

Linguistic aspects: The mathematical language
The usage of language in mathematics has some very pronounced characteristics, some of which are unique to the subject. For this reason, some have dubbed it the 'language of mathematics' (Morgan, 1998). We outline the key linguistic characteristics of the language of mathematics in this section. As mentioned in the abstract, we shall only consider mathematics written in English.

Symbols
Syntax and the nature of the alphabet used clearly form an important part of any language. This takes on a particularly special role in mathematical discourse which uses a multitude of symbols outside of the English alphabet. So much so that Ervynck (1992) even characterised mathematical language purely by the symbol system used embedded within a meta-language. Similarly Kane defines "mathematical English" to be "a hybrid language … composed of ordinary english comingled with various brands of highly stylized formal symbol systems" (1967, p. 296). Kane explains that these formal symbol systems indeed have their own grammar i.e. rules for syntax and their semantics are derived from the context.

Embedding Symbols: Good use of Strings of Symbols
When writing symbolic content, mathematicians have expressed that care needs to be taken when embedding symbolic components of written mathematics into the text (Knuth, et al., 1989; Steenrod, 1973). Knuth and colleagues highlight that this symbolic component is a *component* of a general language being used in the text. Hence, they encourage writers to embed the symbolic statements within the natural langauge. This means, for example, avoiding starting a sentence with a symbol e.g. "$x^n - a$ has n distinct zeros". A better sentence would be "The polynomial $x^n - a$ has n distinct zeros". Similarly, Knuth advises separating formulae with words. So instead of "Consider $S_n, p < q$" he advises "Consider S_n, where $p < q$".

Mathematical Register

Morgan (1998) criticised Kane and Evrynk's characterisation of the mathematical language for not appreciating that "the non-symbolic 'ordinary' component also has specifically mathematical aspects" (Morgan, 1998, p. 10). Much like other technical subjects such as science and engineering, precise specialist vocabulary plays a large part in the communication of mathematics. Upon this observation, Halliday (1975) introduced what he called the *mathematical register*, a notion elaborated on by Pimm (1987). Halliday describes a *register* as "set of meanings that is appropriate to the particular function of the language, together with the words and structures which express these meanings" (Halliday, 1975, p. 65). The meanings in the mathematical register are extremely strict and can differ considerably from the meaning in natural language (Pimm, 1987, p. 78). For instance, the word 'group' in mathematics stands for a particular kind of algebraic structure.

Presence of Author and the Audience

In any piece of writing, the way in which an author refers to his or herself and the manner in which they refer to the audience is highly dependent on the purpose of the piece. In what we are studying here, which is formal technical writing, the style of writing is impersonal and hence, it is expected that the author and the audience are kept a certain distance from the content. This aspect springs forth from the *practice* of mathematics (i.e. what mathematicians do) which is key aspect of determining the discourse style (Bhatia, 1993; Gee, 2011). In mathematical texts the author is not trying to rely personal accounts but rather, establish absolute truths using deductive logic. Thus, the writing style tends to heavily detach human agency from content of the discourse.

In view of this, the use of the pronoun 'I' is generally avoided in mathematical writing (Knuth, 1985). By far the most common personal pronoun used in mathematics the impersonal 'we' (Knuth, 1985; Higham, 1998; Morgan, 1998). Gillman (1987) advises authors use *we* as 'you and the reader'. Notice that this is somewhat personal. However, it does manage to retain the impersonal tone sought after by not specifying the reader and thereby making the action associated with the *we* independent of the reader or author.

There are other grammatical constructs used in technical writing that further engender the impersonal style required such as *nominalisations* (Halliday & Martin, 1993). These are nouns created from adjectives or verbs. For example, "recommendation" is the nominalisation of the verb "recommend". Nominalisations are common in scientific disciplines and those formed from verbs tend to be particularly common in mathematics (Morgan, 1998). For example, Pillay and Ziegler choose to write "the inclusion" rather than "including" when stating, "The inclusions of X and Y in Z give inclusions $j_m(X)a \subseteq j_m(Z)a$, and $j_m(Y)a \subseteq j_m(Z)a$" (2003, p. 584).

Like nominalisations, the *passive voice* is also used in science and mathematics alike to distance the author and reader (Strube, 1989; Morgan, 1998). A sentence is in the passive voice if the subject of the sentence is acted on by the verb. For example, the sentence "It is shown that $\sqrt{2}$ is irrational" is in the passive voice whereas "I show that $\sqrt{2}$ is irrational" has an *active voice*. As with scientific writing, various instructors of mathematical writing call for caution with the passive voice arguing that it can lead to awkward phrasing (Higham, 1998; Knuth, et al., 1989; Krantz, 1996). For instance, the active variant "we show that $\sqrt{2}$ is irrational" reads more fluidly the passive version above. However, both Higham and Krantz claim that the passive voice does have a place in mathematical writing since it can add variety to the text and

direct   attention   to   the   subject   of   the   action   where   required.

A form of engagement with the audience which maybe unique to mathematics is the use of the imperative (Morgan, 1998). The requests of *let, suppose, define* etc. are frequently used in mathematics (e.g. "*Let* A be a set") and they enjoin the audience to make them participants in the process of mathematics thinking place.

Structure
So far we have considered how terms are phrased in mathematical writing. We now consider how such statements are woven to make paragraphs and the text as a whole. Halmos (1975) claims that the structure of a well written mathematical document will be guided the main purpose of the document, but as Steenrod (1973) points out, there are two aspects to this, the *formal* and the *informal* ones. The formal side of the main purpose consists of the main mathematical statements, called (main) *theorems*, that document is trying to prove while the informal aspect pertains to the relevance of this mathematics to the wider scope of human endeavour. Consequentially, these aspects lead to separate structuring consideration which we now explore.

Formal Structure
As mentioned above, the mode of reasoning in mathematics is deductive logic. Theoretically, any logical deduction of a statement, which is called a *proof* of that statement, can be written as a linear sequence of statements. Hence, it is common to find proofs presented in this way (Alibert & Thomas, 1991). The following proof from Pillay and Ziegler is an example of such a linear presentation.

"Lemma 3.4. Let (K, ∂) be a differentially closed field. Let V be a ∂-module of (K^n, ∂). Then V is defined over C_K.

Proof. Note that V^∂ is precisely $V \cap (C_K)^n$. By 3.1, we can find $v_1, \dots, v_r \in V^\partial$ which form a basis for V over K. So V is isomorphic to K^r over $\{v_1, \dots, v_r\}$. As each $v_i \in (C_K)^n$, V is already defined over C_K" (Pillay & Ziegler, 2003, p. 585)

This linear structure is not a universal rule and often mathematicians re-arrange the order of statements within a proof for what is perceived as better exposition (Roe, 1978; Konior, 299). In such cases Konior identifies examples of the use of certain linguistic and paralinguistic signals used in mathematics texts to assist readers on how to structure their reading. For example, 'It remains to be shown that…" to alert the reader that a previously unproved statement that was used is now going to be proved. Another example, given from Konior is 'Whence formula (36) follows' to signal that an earlier unproved statement is now proved.

Wider Formal Structure
Mathematical literature tends to prove several smaller statements (which are called 'theorems', 'lemmas', 'propositions' depending on their gravity) before proving the main theorem(s) (Steenrod, 1973). These smaller propositions are used to prove the main theorem(s). This is done for various reasons. One of which is to increase the readability by breaking down large proofs into smaller ones. It is also the case that before certain statements the author may like to make certain informal comments or need to define a concept for the following statements to be made.
Steenrod brings the organisation of these smaller statements into focus; since these statements become a part of the proof of main theorem, similar considerations arise for the sequencing of these statements as they do for the structuring of an individual proof. As he points out, there may be more than one way of ordering the propositions leading to the main theorem and that some orders and structures of statements may provide greater clarity than others. Thus, the

order is a point of careful consideration for the writer. The order of these statements should reflect an organic thinking process that leads to the main theorem.

It is customary in mathematics to signal and label a theorem, proof or definition with a mini-heading. This clarifies to the audience what kind of idea is to follow and allows the author to easily reference the idea at another point in the text. For example, in Pillay and Ziegler's lemma (and its proof) quoted above, the headings "Lemma 4.2" and "*Proof*" distinguish between the statement being made and its proof. The enumeration included in the heading of the Lemma allows for easy referencing of definitions, lemmas, theorems. We can see this in Pillay and Ziegler's proof of the lemma presented above, when they state, "By 3.1". Here they are referencing a previous proposition, labelled 3.1, to justify their next claim.

Informal Structure: Contextual Narrative

Steenrod (1973) asserts that the discussion around the informal aspects should attend to the following considerations:

> "(1)   brief   reviews   of   background   material   to   set   the   stage,
> (2)   presentation   of   the   motivations   or   leading   questions,
> (3)   consideration   of   examples   to   derive   conjectures,
> (4) rough descriptions of the results to be obtained and methods to be used, and "
> (Steenrod, 1973, p. 9)

That is to say, the manner in which the informal discussion is structured should serve to convey these points. In particular, Steenrod states that these points should be considered in the introductory section to 'set the stage', a thought which is echoed by Brendt (2014). However, these points can be revisited at other points in the document where appropriate.

Methodology

The methodology used in this paper is a case study wherein a sample of existing student writing (that is, written before the the research took place). The methodology shall follow Yin's (2011) five-phased process for qualitative research, which are *Compiling, Dissembling, Resembling, Interpreting* and *Concluding*. The compiling stage can be thought of as gathering data. The dissembling stage decomposes the data into key characteristics relevant to the research problem and then the resembling stage rearranges the data, according to these characteristics. The resembling is intended to make the data amenable to interpretation leading to a conclusion against the given research question or hypothesis. We shall firstly describe how the compiling stage was achieved in the proceeding subsection. Section 3.2 then explains how the data was deconstructed into the desired characteristics of mathematical writing, as outlined by the literature review, and then reconstructed so to be able to interpret whether students' writing contained these characteristics.

The Sample

The sample consisted of texts from eight year 13 students from a sixth form college in London. The students had not ben explicitly taught how mathematical writing whilst at the college and, as far as I am aware, they were not taught such a thing elsewhere.

The students that were selected for this sample have exhibited strong understanding of statistics in internal and external examinations. All students in the sample were predicted between a B and A* for their Further Mathematics A Level when the sample was taken. Also, all students

achieved over 80 out of 100 UMS (standing for 'Uniform Mark Scale') score for their S1 paper that they sat the previous year. This score is relevant here because the task that was set comes under the topic of statistics. It seemed beneficial to analyse the writing of students with strong understanding of statistics so as to mitigate, as far as possible, mathematical misconceptions effecting their texts and to allow us to analyse their writing skills.

Method of Data Collection

The kind of data that was used was existing document data (Denscombe, 2010). More precisely, the analysis was performed on texts that students had already written as part of homework rather than setting a new task. The benefit of analysing existing data is that the writing they produced for this homework is that this writing would have more likely been done in a natural setting. Setting a new task would have required disclosure of the purpose of the task prior to their undertaking and hence possibly influenced into their writing style. The texts were all from the same written homework task and therefore were all discussing the same matter (see the next section for the details of the task). A sample of the students' texts is given in Appendix B.

The Task the Pupils were asked to Complete

The pupils were asked to show why, if given a sample from a population, the sample mean and sample variance (i.e. $\bar{x} = \frac{\sum x_i}{n}$ and $s = \frac{\sum x_i - \bar{x}}{n-1}$ respectively) are unbiased estimators of the population mean and population variance respectively. Not only were students required to provide a mathematical proof of this but they were also asked to define the concepts that led to the proof, and to motivate the problem (i.e. state why it is important). They were also asked to explain the method they use to investigate whether these estimators are biased or not so as to link their motivation with the mathematical proof. Hence, the task elicited a wide array of mathematical writing skills for analysis. The brief for the task given to the students is given in Appendix A.

Ethics

According to BERA (2011) it is important that all participants of an educational research study be informed of their participation and the purpose of the study. Therefore, a letter was sent out to all participants and their parents informing of them of both of these aspects. The letter informed them of the participants' rights with respects to this research. In particular, it informed them of their right to withdraw from the research.

Dissembling and Resembling: Analysing Texts
The texts were analysed for the qualities of written mathematics outlined in the literature review. In linguistic terminology, this was a *corpus analysis* (i.e. an analysis of the characteristics a collection of pieces of text) on a sample of students' writing (Bhatia, 1993; Hyland, 2013). To do this, an assessment rubric was created which attempted to crystallised the characteristics mentioned in the literature review. To create this rubric, writing characteristics were divided into two main categories, *Language* and *Structure*. These categories were then further sub-divided into two subgroups each, *ordinary English* and *mathematical English* within the Language category and *formal structure* and *informal structure* with the Structure category. The precise rubric is given in Table 1.

Table 1
The Assessment Rubric

Characteristic	Forms of characteristic to check for
Language	
Basic English	
Good Spelling	n/a
Good Grammar	n/a
Clear and concise sentence structures	n/a
Formal English	
Appropriate choice of words and terms used.	• Use of appropriate technical language (see below). • The words and terms that are used are of an appropriate sophistication to clearly, succinctly and fully convey meaning. • Absence of colloquialisms.
Appropriate distance of the author and audience from the text	• The impersonal we • Nominalisations • Use of the imperative • Passive voice (used in a way that is not awkward and not overused)
Mathematical English	
Appropriate mathematical terms are used to convey meaning and done so correctly.	• New terms are defined. • Terms are referred to correctly.
Mathematical symbols are used in a way that is correct and support the conveyance of meaning	• (Strings of) symbols are embedded within the text (not standing alone without explanation) • New symbols are defined. • Symbolic manipulations are accompanied by explanations of purpose and process of manipulation. • Symbols are strung together correctly. • Symbolic manipulations must be clearly laid out e.g. it is advisable that algebraic manipulations go down the page with equality signs aligned.
Structure	
Formal Structure	
Proofs must complete and clear	• Sequencing of steps in proof must be logical.

	• Appropriate number of steps must be given so as to make the argument clear. • Symbolic content and manipulation must be explained (see above). • It should be made clear what is being proved. • For larger proofs there should be an indication of how it is going to be proved.
The sequencing of theorems in the document must be such that it aids the reader to ascertain the author's thought process towards achieving the main result.	• Ordering of theorems, proofs and definitions must be logical. • Theorems, proofs and definitions should be clearly labelled. • The author should explicitly state when they are using a previous result in the document by clear referencing. • Where necessary, explanation is given between theorems to explain connections between separate statements.
Informal Structure The purpose of the text should be explained.	The author should explicitly explain the following (preferably in the introduction): • What the problem is that they are tackling. • What is the motivation for studying such a problem (e.g. historical context or/and answering problems in other fields of study) • The main theorem(s) that they shall prove in the text to address the main problem they mention.
The author should describe the method by which they will obtain their main results.	• Describe the main results that shall prove en route to the main theorem(s). • Where appropriate, discuss possible alternative treatments of the problem and why the author has chosen the current approach.

The educational level of the students was also considered when constructing the rubric. For instance, given the issues around the passive voice discussed in the literature review, some higher educational authorities may choose to omit the passive voice from the rubric entirely. However, some concession for was made here in view of the lack of experience the students had in technical writing.

Analysing

The texts were then analysed against the rubric grading the use of each feature and quality in the rubric according to the following "traffic light" grading system:
• G (for "Green)– Meaning that the characteristic is clearly present

- A (for "Amber")– Meaning that various aspects of the characteristic are present but requires some improvement to be absolutely clear.
- R (for "Red") - Meaning that there is a fundamental misconception of how that characteristic was used.
- X to signify the characteristic was absent from the text

The 'X' grade is included in the system because in some cases it is important to distinguish absence from a misconception. For example, the omission of nominalisations would not necessarily imply that the student misunderstands them or cannot use appropriate voicing. Where it was necessary and helpful for recording information regarding the text notes were also written alongside these grades.

This meant that the original data was resembled into new data recording the presence and quality of characteristics present in the text. Thus this completed the next of the five-phased process which is *reassembly*. Note, to protect the participants' anonymity their names were replaced by numbers in the resembled data i.e. in the tables in the next section.

The resembled data (along with the raw data) allowed us to *interpret* how well the writing compares to the academic style because of the quantitative nature of the grading system. Upon the interpretation a *conclusion* was drawn identifying the similarities and differences of the students' writing style to that of academic mathematics.

Data Analysis

Language

Table 2
Use of Ordinary English

Student	Basic English				Presence of the author and audience					Formalism
	Spelling	Grammar	Clarity of sentences and paragraphs	Complete Sentences	Inclusive *we*	Use of the Imperative	Nominalisation	Passive Voice	Other notes on author and audience presence	Use of formal terms and words
1	G	G	G	G	A	G	G	X		R
2	G	G	G	R	X	X	X	G		G
3	G	A	A	G	X	G	X	X	Used "If you…" which is not entirely distant	G
4	G	G	G	R	X	X	X	X	used "one"	G
5	G	A	R	G	G	X	X	G		G
6	G	A	R	G	X	X	A	G		G
7	G	G	G	G	A	G	X	X		R
8	G	A	A	G	G	G	X	G		G

Interpretation:

Table 1 shows that most aspects of ordinary English were good with only exceptions in each subcategory of shortcomings. The basic English skills (the spelling and grammar) were well exhibited. There were only a couple of instances of poor grammar which also coincided with lack of clarity of the writing. A further strength throughout the sample is that all texts used some form of distant authorial voice.

Some students decided to use a greater variety of techniques for creating a distant voice and distant audience. Whichever technique they did choose they employed well. The passive voice was only ever used to say, "it can be viewed". The appropriate active variant of this would "We can view it as". However, we can see that the active variant is one word longer, no easier to read and possibly brings unnecessary emphasis onto the actor of the verb "view" (that is, the persons doing the "viewing"). Hence, this use of the passive voice was deemed to be good. The audience presence was satisfactory in most cases except for student 3 who used 'you'. Though this was impersonal, it is still not the appropriate engagement for the style.

In general, the formality in the text was also good. Along with the distant authorial voice and correct audience presence, there was, in general, a good choice of words and terms. The only exceptions to this were students 1 and 7 who both chose to use terms such as 'When doing statistics' in their text. However, usage of statements such as "That's all the assumptions we need. Now let's do some maths!" suggest that rather than misunderstanding how to write formally, they made an intentional choice to write informally to be fun. Therefore, it would be inadvisable to assess their ability to write formally based on this evidence. Indeed, the original brief the students were given did not explicitly state that the style was to be formal and hence the lack of formality in the some of the texts can be taken to be failure of the brief.

It should be noted that certain texts, such as those of students 2 and 4, had little written content and the writing that was there was quite terse. This means that though these students exhibited formality and appropriate voicing in what they did write, it still remains open whether they would sustain these features if they elaborated in their writing.

Table 3
Mathematical English

Student	Definitions of new symbols and objects	Symbolic strings embedded well	Use of mathematical terminology
1	G	G	G
2	X	R	G
3	A	R	A
4	A	A	G
5	X	R	A
6	R	R	A
7	R	G	G
8	R	R	G

Interpretation:
The use of mathematical terminology was mostly good with some improper usages. These improper usages all seem tied to misunderstandings of the concepts explained. The exception to this seemed to be student 6's usage of *weighted* when stating for a discrete random variable "the mean is equal to the sum of over every possible value weighted by the probability of the value". Though the usage of the word is not incorrect, it is somewhat informal and ambiguous in this context and hence, open to misinterpretation.

A striking disparity between these students' texts and what one would expect of academic mathematical writing was the embedding of the symbolic content within the rest of the text. Most students did not embed their algebraic work into the main body text to extent expected for such a style of writing. Few defined all their variables and when performing manipulations, few described what manipulations they were performing. This was particularly the case in the texts that presented little writing overall (see the interpretation of the ordinary English). In some cases the algebraic content was presented as standalone units, not interacting with the standard English components at all. The sample from student 3's text given given in figure 1 highlights a number of these attributes and their impact on clarity.

Figure 1: The beginning of student 3's text.

The student has defined the symbols $X_1, \ldots, X_n$ but has not defined what $\mathbb{E}$ is nor what $\bar{X}_n$ is. Furthermore, immediately after defining the $X_1, \ldots, X_n$, the student embarks on a series of algebraic manipulation without explaining what the purpose of this algebraic work is. The algebraic manipulations themselves are all technically correct but are completely disjoint from the English with no explanation of how the steps are performed. A number of these steps require technical understanding of the function $\mathbb{E}$ to understand why they can be performed. Hence, in a formal mathematical text one would expect these technicalities to be explained for clarity. The same student does later try to give some explanation of what they have sought to show with these algebraic manipulations (see figures B2 and B3 in the appendix for the full text). However, all such written discourse happens at the end of student 3's text, which is after all the algebraic manipulations are completed. Student 3 was not the only one to layout their work in such a way. This suggests that such students see mathematics and writing as two separate things.

Structure

Table 4
Formal Structure

Student	Logical sequencing of statements in the proof	Presentation of steps in proof is clear	Presenting each step	Labelling of different results	Referencing of results where they are used	Logical presentation of results in text
1	G	G	G	G	G	G
2	G	G	R	X	X	G
3	G	G	A	Not needed in their approach	n/a	G
4	G	G	A	X	X	A
5	G	G	R	X	X	A
6	G	A	R	Not needed in their approach	n/a	R
7	G	G	A	A	A	G
8	G	A	A	X	X	G

Interpretation:
The logical structure of all of the documents was good; the sequence of statements in the proofs clearly reflected a natural sequence of thoughts that lead to the require results. Most layouts of these steps and results was good but a few could have been improved. For instance, students 6 and 8 wrote their algebra going across the page rather than separating each manipulation with a new line and aligning equalities. Figure 2 highlights how writing across the page effected readability of student 8's work.

$$E(S^2) = E\left(\frac{\sum x_i^2 - n\bar{x}^2}{n-1}\right) = \frac{1}{n-1} E(\sum x_i^2 - n\bar{x}^2) = \frac{1}{n-1}\left(E(x_1^2 + x_2^2 + \dots + x_n^2) - \right.$$

$$\left. - nE(\bar{x}^2)\right) = \frac{1}{n-1}\left(E(x_1^2) + E(x_2^2) + \dots + E(x_n^2) - nE(\bar{x}^2)\right).$$

$$Var(X) = E(X^2) - E(X)^2 \Rightarrow E(X^2) = Var(X) + E(X)^2. \text{ Substitute}$$

this result in our $E(S^2)$ formula.

$$\Rightarrow E(S^2) = \frac{1}{n-1}\left(\left(Var(x_1) + E(x_1)^2\right) + \left(Var(x_2) + E(x_2)^2\right) + \dots + \left(Var(x_n) + E(x_n)^2\right) - \right.$$

$$\left. - n\left(Var(\bar{x}) + E(\bar{x})^2\right)\right) = \frac{1}{n-1}\left(\underbrace{\sigma^2 + \mu^2 + \sigma^2 + \mu^2 + \dots + \sigma^2 + \mu^2}_{n \text{ times}} - n\left(\frac{\sigma^2}{n} + \mu^2\right)\right) =$$

$$= \frac{1}{n-1}\left(n\mu^2 + n\sigma^2 - \sigma^2 - n\mu^2\right) = \frac{1}{n-1}(n\sigma^2 - \sigma^2) = \frac{(n-1)\sigma^2}{n-1} = \sigma^2.$$

↳ shows that dividing by $n-1$ will ...

Figure 2: An excerpt of student 8's work

A more significant issue was the lack of labelling and referencing of results which reduced the clarity of various students' work. Not only did this mean that it was unclear what was being proved at any one given point, it also meant that when a result was used later on, this was not properly specified. This is also exhibited in figure 2 where the student has used a fact they proved earlier, namely that $E(\bar{x}) = \mu$, but they not have clarified they have used it. In academic mathematical literature, it would be expected that the writer would indicate that such a fact has been used and refer the reader to where in the document they can find the justification for it.

Table 5
Informal Structure

Student	Motivates problem	Discussing method of investigating the problem	Highlight what is going to be proved in the document
1	G	G	G
2	X	X	X
3	A	X	X
4	A	X	X
5	X	X	X
6	A	X	X
7	G	G	G
8	G	X	X

Interpretation:
This was perhaps the weakest of the four areas. In spite of being specifically asked to motivate the problem they were to investigate, three students failed to attempt this entirely, and only three managed to do this convincingly. Furthermore, only two of those three attempted to

describe their strategy for investigate the problem and the results they were going to prove. Though it should be noted that the two that attempted this did so very well. Figure 3 highlights some of the issues that students encountered when trying to discuss the informal aspects.

Figure 3: A standard English component from student 3

In fact, the student has done reasonably well at conveying why the results they have proved are important but they could have gone further and explained why estimation of such parameters is needed. Moreover, the student has not explained why their results allow us to estimate population means and variances. Indeed, they have not drawn out their claim here from the properties of the mathematical objects they have used. This may have been helped if this discussion would have been placed closer to the algebra being referred to since then the student could have referred to the specific mathematical objects more easily.

Conclusion

The analysis shows that the students' writing reflects the formality of academic mathematical writing very well. Most of the students created an appropriate distance between the persons participating (i.e. the author and the audience) and the actions of the text, often by choosing only one or two techniques for creating this distance but employing them well.
The students were also provide a formal structure to their documents. Their proofs were laid out in a logical and sequential manner, aiding the readers understanding of the reasoning process being presented.

However, a striking difference between the students' text and that of academic writing is the amount of ordinary English. The students' text generally exhibited far less explanation and description of their mathematics than would be expected in written mathematical discourse. There was often no commentary alongside their algebraic work to elucidate their thinking to the audience, poor referencing of previous mathematical results being used and a stark lack of informal discussion. This is quite possibly a by-product of the way algebra (and mathematics as a whole) is traditionally taught which is as a string of symbolic manipulations devoid of any descriptive writing (Baroody & Ginsburg, 1990; Morgan, 1998). A consideration for future research may be to consider if this a more general phenomena among mathematics students, and if so, why. We can also ask what strategies would help students produce more cohesive and well explained texts. We shall discuss this point further in the next section.

Evaluating Comments and Further Research

Combining with Assessment for Learning Strategies to improve Formal Writing

As discussed in the introduction, Santos and Semana (2014) found that using assessment for learning (AfL) strategies with students' written mathematics helped improve the clarity of mathematical explanations. AfL can be understood elicitation of the students understanding upon which a teacher makes decisions on how to proceed with their teaching. As a part of Santos and Semana's AfL strategy they also produced a rubric to assess the quality of written mathematics. However, this rubric focused on depth (i.e. how much they explained) and clarity of informal mathematical writing. This raises the question whether using similar AfL strategies with the rubric presented here can lead to improved formal mathematical writing. Santos and Semana's work suggests that such strategies should help improve the level of explanation in student texts. Therefore, it seems likely that such strategies would also help develop the cohesiveness of student texts e.g. merge text with algebraic work.

Writing a Tool for Learning

There is a large body of research that suggests writing can be used as a learning tool in mathematics (e.g. see Baroody & Ginsburg, 1990; Borasi & Rose, 1989; Pugalee, 2004; Pugalee, 2001). In particular, a study by Pugalee (2004) indicated that writing supports problem solving skills because it serves as metacognative framework for the student. In other words, writing thoughts make them apparant to the student and hence, more amenable to self-critique. Since the rubric here is intended, at least in part, to identify clear mathematical written communication, could this rubric be used in conjunction with writing strategies suggested by Pugalee to further enhance problem solving skills? More precisely, could this rubric be used with AfL strategies similar to those of Santos and Semana (2014) to enhance such skills?

Critiquing the Rubric and Grading System

It is feasible to think that the rubric and grading system could be used by educators in their teaching practice. Before such an implementation, it may be advisable to review the rubric and grading system since there are aspects of the grading system that maybe somewhat difficult to manage in day-to-day teaching usage. For instance, there could be confusion around the meaning of the X grade; in some cases the absence of a technique had no negative impact so long as another appropriate technique was used (e.g. authorial voicing) and others where the absence had a significant impact (such as the informal structural matters). Moreover, some of the qualities could not receive an X which may have added confusion to someone trying to interpret the grids. Also, the grading system produces quite a large string of data for one text. This could quickly become unmanageable if it is used with a large group of students. Hence, for any further use of the rubric or grading system one may wish to consider streamlining it first.

The Task given to the Students

The writing produced by the students was clearly heavily influenced by the task and how it was presented. This leads to the following two questions:
1.   Would a different task produce different results?
2.   Would a different presentation of the current task produce different results?

A task that required different mathematical techniques may, indeed, produce different results. The proof involved in the current task was quite algebraic in nature. Considering algebra has traditionally been taught with very little description to accompany the manipulations (Nardi & Steward, 2003; Baroody & Ginsburg, 1990), one may wish to consider a task which was not algebraic at all. Also, one could attempt a task that would require some other desirable features to be included in the writing such as a conclusion discussing historical connections to other work and further questions that can be asked about the mathematics presented in the text (Steenrod, 1973; Krantz, 2007).

The analysis of the students' text would suggest that the manner in which this task was presented in the brief did impact the students' output. For instance, though the brief implied that the text needed to be formal, it did not explicitly say so. As such, some students seem to have taken this as licence to use some informal language. Furthermore, it can be argued that the task brief could place more emphasis on motivating the problem and describing the method of addressing it. Hence, it can be investigated whether improvements are seen in students writing if the task were re-worded to explicitly mention these.

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Appendix A: Task Brief

The brief given to the students is given the green box.

I would like you to write up why we define the sample mean and variance as we do i.e. as-

$\bar{x} = \frac{\sum x_i}{n}$ and $s = \frac{\sum x_i - \bar{x}}{n-1}$.

Within this you should discuss-

• The purpose of these definitions i.e. what they are supposed to estimate.

• How we go about investigate whether these definitions do actually meet their purposes i.e.

• Explain how we formalise the situation with random variables.

After formalising[1], explain why the sample mean and variance can be viewed as a random variable.

Explain what we want to know about these random variables i.e. what property we want them to satisfy.

Prove that indeed they do satisfy these properties.

---

[1] In the original text there was a typo here and read "After *formalise*"

Appendix B: Examples of Student Texts

Note that the teacher's feedback is in green.

[Teacher feedback in green, top left] this not the reason why.

[Teacher feedback in green, top right] EBI: I do not really understand the opening paragraph

$$S_3 \text{ H/L}$$

$$\bar{x} = \frac{\sum x_i}{n}, \quad \text{var} = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

$\bar{x}$ is used to estimate the population mean μ and the second is an estimate for the population variance σ^2. These can be viewed as random variables because taking samples of equal size a few times and comparing their sample means will show that these are approximately Normally distributed as described by the Central Limit Theorem and thus the mean of multiple sample means will be expected to converge on μ as the amount of samples taken increases (same goes for sample var $\approx \sigma^2$). We want to show that the formula stated at the beginning show that $\bar{x}$ and sample var are valid approximations for μ and σ^2 respectively. *[green: EBJ: Explain why this means... want to look at expectation]*

Let X be our random variable of interest with parameters μ & σ^2 of X and S

$$E(\bar{x}) = E\left(\frac{\sum x_i}{n}\right) = \frac{E(X_1 + X_2 + X_3 + \ldots + X_n)}{n} = \frac{E(X_1) + E(X_2) + \ldots + E(X_n)}{n} = \frac{\overbrace{\mu + \mu + \ldots + \mu}^{n \text{ times}}}{n} = \frac{n\mu}{n} = \mu$$

[green: WWW: Good expectation algebra]

Hence $\bar{x}$ appears to be a valid approximation for μ.

Consider now s^2 the sample variance.

$$s^2 = \frac{\sum_i (x_i - \bar{x})^2}{n-1} = \frac{\sum (x_i^2 - 2x_i\bar{x} + \bar{x}^2)}{n-1}, \quad \sum x_i = n\bar{x} \Rightarrow s^2 = \frac{\sum x_i^2 - 2n\bar{x}^2 + n\bar{x}^2}{n-1}$$

$$= \frac{\sum x_i^2 - n\bar{x}^2}{n-1}$$

$$E(s^2) = E\left(\frac{\sum x_i^2 - n\bar{x}^2}{n-1}\right) = \frac{1}{n-1} E\left(\sum x_i^2 - n\bar{x}^2\right) = \frac{1}{n-1}\left(E(x_1^2 + x_2^2 + \ldots + x_n^2) - \right.$$

$$\left. - nE(\bar{x}^2)\right) = \frac{1}{n-1}\left(E(x_1^2) + E(x_2^2) + \ldots + E(x_n^2) - nE(\bar{x}^2)\right).$$

$$\text{Var}(X) = E(X^2) - E(X)^2 \Rightarrow E(X^2) = \text{Var}(X) + E(X)^2. \text{ Substitute}$$
this result in our $E(s^2)$ formula.

$$\Rightarrow E(s^2) = \frac{1}{n-1}\left(\left(\text{Var}(x_1) + E(x_1)^2\right) + \left(\text{Var}(x_2) + E(x_2)^2\right) + \ldots + \left(\text{Var}(x_n) + E(x_n)^2\right) - \right.$$

[green: W: continues]

$$\left. - n\left(\text{Var}(\bar{x}) + E(\bar{x})^2\right)\right) = \frac{1}{n-1}\left(\overbrace{\sigma^2 + \mu^2 + \sigma^2 + \mu^2 + \ldots + \sigma^2 + \mu^2}^{n \text{ times}} - n\left(\frac{\sigma^2}{n} + \mu^2\right)\right) =$$

$$= \frac{1}{n-1}\left(n\mu^2 + n\sigma^2 - \sigma^2 - n\mu^2\right) = \frac{1}{n-1}\left(n\sigma^2 - \sigma^2\right) = \frac{(n-1)\sigma^2}{n-1} = \sigma^2$$

This shows that dividing by $n-1$ will on average make $s^2 \approx \sigma^2$

Figure B1: Text from student 8

S3 Hwk – 2/1/16

Consider $\text{Var}(X) = E(X^2) - (E(x))^2$

$\Rightarrow E(x^2) = \text{Var}(X) + (E(x))^2$

Let $X_1, X_2 \ldots, X_n$ be random variables with mean μ.

WWW: Defining these variables
EBI: Explain why you are defining these?

$E(\bar{X}_n)$

EBI: Define what this is

$= E\left(\dfrac{\sum_{i=1}^{n} X_i}{n}\right)$

$= \dfrac{1}{n} E\left(\sum_{i=1}^{n} X_i\right)$

$= \dfrac{1}{n}\left(E(X_1) + E(X_2) + \ldots + E(X_n)\right)$

$= \dfrac{1}{n}(X_1 + X_2 + \ldots + X_n)$

$= \dfrac{1}{n}(n\mu)$ *WWW: Good expectation algebra*

$= \mu$

QED

Let s^2 be the sample

Let $s^2 = V$, the sample variance.

$V = \dfrac{\sum_{i=1}^{n}(X_i - \bar{X}_n)^2}{n-1}$

$= \dfrac{1}{n-1}\left(\left(\sum_{i=1}^{n} X_i^2\right) - n\bar{X}_n^2\right)$

$= \dfrac{1}{n-1}\left(\left(\sum_{i=1}^{n} X_i^2\right) - n\left(\dfrac{\sum_{i=1}^{n} X_i}{n}\right)^2\right)$

$= \dfrac{1}{n-1}\left(\sum_{i=1}^{n} X_i^2\right) - \dfrac{1}{n(n-1)}\left(\sum_{i=1}^{n} X_i\right)^2$

$s^2 = E(V)$

$\Rightarrow E(V) = \dfrac{1}{n-1}$ *WWW: Cunning approach*

$= \dfrac{1}{n-1}\sum_{i=1}^{n} E(X^2) - \dfrac{1}{n(n-1)} E\left(\left(\sum_{i=1}^{n} X_i\right)^2\right)$

WWW: Manipulating the definition of $\text{Var}(X)$

$\text{Var}(\bar{X})$

$= \dfrac{1}{n-1}\sum_{i=1}^{n}\left(\text{Var}(x) + (E(x))^2\right) - \dfrac{1}{n(n-1)}\left[\text{Var}\left(\sum_{i=1}^{n} X_i\right) + \dfrac{\left(\sum E(X_i)\right)^2}{}\right]$

EBI: Explain why you have used independence here

$= \dfrac{n}{n-1}(\sigma^2 + \mu^2) - \dfrac{1}{n(n-1)}\left(\sum_{i=1}^{n}\text{Var}(X_i) + (n\mu)^2\right)$

$= \dfrac{n}{n-1}(\sigma^2 + \mu^2) - \dfrac{1}{n-1}(\sigma^2 + n\mu^2)$

$= \dfrac{n\sigma^2 + n\mu^2 - \sigma^2 - n\mu^2}{n-1} = \sigma^2$ QED

Figure B2: First page of work from student 3

(should be here)

Put simply, this means that ~~so~~ if you collect ~~data~~ ~~and~~ ~~plenty~~ of enough
data from a population to have a large sample (where n is large), then this
can ~~be~~ help you indicate a distribution for the entire population. So, the sample
mean calculated can ~~so~~ estimate the population mean, and the sample variance
can estimate the population variance. So you only need a large sample to represent a entire population data.

EBI: Discuss this – Expectancy & Average

The sample mean ~~and~~ and the sample variance can be viewed as a random variable
because these too ~~to~~ ~~so~~ have a distribution; they ~~it~~ depends on your ~~selection~~ of
data for the sample and hence can ~~take~~ take many different values depending on
the selection of data for the sample.

WWW: Explaining why $\bar{X}$ and V and
be viewed as RVs

EBI: Use the fact that the ~~many~~ members of
our sample can be viewed as random variables

$f = ?$,

As proven, the sample mean provides an unbiased estimate of the mean of the
population. This is because, for a very large sample ~~the~~ the variance of the
sample mean decreases according to the Central Limit Theorem. As $n \to \infty$, $V \to 0$,
so ~~because~~ the mean converges to a specific value (the population mean).

What you have ~~shown~~ on does
not only on the size of the sample

Figure B3: Second page of work from student 3

So, we know that

$$\bar{x} = \frac{\sum x_i}{n} \quad \text{and} \quad s^2 = \frac{\sum x_i - n\bar{x}^2}{n-1}$$

These seem to be quite arbitrary definitions, can we improve them to be useful and accurate? When we use these statistics, we tend to compare them to an unknown set of population statistics, so, on average, these values should be equal to their population equivalents.

We can, in fact, treat sample mean and variance as random variables, as they are essentially sums of random variables (sums of all of the individual samples, which are random variables in themselves). So, we can define the following:

Let $\bar{X}$ be a CRV representing the sample mean.

Let V be a CRV representing the sample variance.

Let X_i be some sample. $X_i \sim N(\mu, \sigma^2)$

As we mentioned earlier, the expectation of $\bar{X}$ will be μ (the population mean) and the expectation of V will be σ^2 (the population variance) if these are good statistics.

Let's start with $\mathbb{E}(\bar{x})$:

$$\mathbb{E}(\bar{x}) = \mathbb{E}\left(\frac{\sum x_i}{n}\right)$$

$$= \frac{1}{n}\left(\mathbb{E}(X_1) + \mathbb{E}(X_2) + \mathbb{E}(X_3) + \cdots + \mathbb{E}(X_n)\right)$$

$$= \frac{1}{n}\left(\mu + \mu + \mu + \cdots + \mu\right)$$

$$= \frac{1}{n}(n\mu) = \boxed{\mu} \quad \therefore \text{The mean sample mean is a good indicator of the population mean.}$$

Figure B4: First page of work from student 7

Are native English-speaking teachers more qualified? A Critical Review of Blum and Johnson's (2012) Article 'Reading Repression: Textualizing the Linguistic Marginalization of Non-native English-Speaking Teachers in Arizona'

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With the profound and widespread influence of English in this globalised and interdependent world, scholars are paying more attention to the quality of English education; this quality intricately relates to the abilities and qualifications of English teachers. Therefore, a debate on how to treat native English-speaking teachers (NESTs) and non-native English-speaking teachers (NNESTs) is becoming increasingly prevalent both in the academic field and public discourse. Blum and Johnson's (2012) article is based on a phenomenon in Arizona, where the policymakers marginalised public school teachers who have accents. The authors mainly analyse the comments made in response to a *Wall Street Journal* article, and in fact, they strive to highlight the cultural and professional rights of NNESTs. In this critical review, I will firstly illustrate the socio-political and sociolinguistic background and a debate between NEST and NNEST in language teaching and learning, before summarising and evaluating Blum and Johnson's (2012) findings by relevant literature, as well as from a personal perspective. Considering the heated discussion about the importance of foreign accent in second language successful learning (Cook, 1999), issues about accent will be considered in this review. Specifically, issues such as the correlation between NNESTs and teachers who have strong accents, the impacts of teachers' accents on students' language acquisition, teacher evaluation as well as discrimination toward NNESTs will be discussed.

Keywords: native English-speaking teachers (NESTs), non-native English-speaking teachers (NNESTs), linguistic discrimination, English language education, teacher evaluation, critical review

Introduction

Since 2000, anti-immigrant legislation has been disseminated by media in the US, and this has influenced public opinion; subsequently, policymakers have successfully introduced laws limiting the rights of immigrants and language-minority communities. Blum and Johnson (2012) wrote this article - *'Reading Repression: Textualizing the Linguistic Marginalization of Nonnative English-Speaking Teachers in Arizona'* under this political and social background. They started with the hidden socio-political backdrop concerning immigrants and language-minority communities in Arizona, where many Mexican immigrants have been restricted from moving to the US.

Blum and Johnson (2012) state some punitive measures aimed at undocumented immigrants, which gave rise to a heated debate about immigration policies in 2000. They also describe how these legislative and policy attempts to illustrate the tendency toward ethnic assimilation in the Arizona Department of Education. Specifically, in the language education field, they focus on NESTs and NNESTs by analysing the debate over Arizona's teacher fluency requirement, which not merely aims to highlight social perspectives of educators, but also emphasise the general public's opinions about "acceptable English teacher" and appropriate accents for English teachers. In specific, the discussion further addresses the social and linguistic

homogenisation behind the education policies in Arizona and demonstrates their stance as advocacy against the cultural and professional discrimination (Blum & Johnson, 2012).

Under the circumstance that "native speakerism" (Holliday, 2005) has already been widely recognised and discussed in the English teaching and learning, this critical review draws on Blum and Johnson's (2012) article, aiming at analysing and discussing the vital issues involving discrimination of NNESTs and evaluation of English language teachers. By drawing on relevant literature, previous research and personal opinions, this review aims to cover some crucial issues such as: (1) whether NESTs are equal to the teachers who are standard English speakers; (2) whether teachers' accent is directly related to their students' English language acquisition; (3) whether there is a reasonable set of teacher evaluation criteria; (4) whether there are other factors behind discrimination, etc., in order to provide some theoretical and pedagogical insights in English language education.

A debate between NEST and NNEST

According to Blum and Johnson (2012), many scholars divergently position NEST and NNEST. For instance, the idea of NNESTs as deficient teachers is prominent in Quirk's (1961) study, which prioritises native speakers and proposes avoiding a variety of dialects. Scholars like Paikeday (1985) regard native speaker, especially educated native speaker as an arbiter for evaluating linguistic matters. Paikeday (1985) claims that native speakers have intuitive insights or senses that enable correct and appropriate language use both in a grammatical and ungrammatical way. Moreover, their language teaching and learning competence has become pedagogically significant in helping language learners correctly and appropriately acquire a language, especially when they aim to pursue a native accent (Canagarajah, 1999).

However, Blum and Johnson (2012) cited Medgyes (2001) who opposes the discrimination and marginalisation of NNESTs. Additionally, there are many scholars like Robert Phillipson challenging the myth of native speakers, putting forward to "the native speaker fallacy" (Phillipson, 1992, p.194) that is against the dominance of native speaker in teaching English. At the same time, the advantages of NNESTs have been seriously taken into consideration. For instance, Medgyes (1994) regards NNESTs as a group of positive models in English language learning who have empathy with their students. Compared with NESTs, they, as language learners, are more experienced in teaching students from their learning experiences, summarising many effective language learning strategies for them (Medgyes, 1994), assisting them to predict then prevent language learning difficulties, and taking advantages of their common mother tongue if applicable (Kamhi-Stein, 1999; Medgyes, 1999).

Method and key findings of Blum and Johnson (2012)

In practice, Blum and Johnson (2012) collected 158 comments responding to Miriam Jordan's online *Wall Street Journal* article titled *"Arizona Grades Teachers on Fluency"* to collect the public comments about Arizona Department of Education's latest approach to discriminate language-minority communities. They categorised the comments into two groups: those including criticisms of NNESTs (55 comments, 35%) and those including criticisms of the Arizona Department of Education (39 comments, 25%). Moreover, 64 comments (40%) interrelates with accents and they are about education policy as well as immigration.

Specifically, Blum and Johnson (2012) categorised the criticisms of NNESTs into three groups. Firstly, students prefer to learn to talk like and imitate their teachers, so some language errors the teachers have might be taken by students and negatively impact them. Secondly, there is a commonly recognisable sense that the ability to speak English, especially standard English with an idealised accent that is spoken by white, middle class speakers (Lippi-Green, 1997), is an undoubted pathway to success; some comments indicate there is a specific standard form of English for a country. Moreover, Blum and Johnson (2012) also illustrate the criticisms of the Arizona Department of Education including the absence of a definition of an ideal accent, the inaccuracy of equating teaching ability with an accent as well as racial discriminations. These criticisms call for a reassessment of the roles and effects of accent and the corresponding relations between teacher's accents and student's language learning performances.

In summary, Blum and Johnson (2012) outline the contributions that linguistic diversity (e.g. diverse dialects and accents) and cultural knowledge from immigrants make to society, and they recommend that schools become spaces to foster acceptance and curiosity rather than animosity.

Evaluation and discussion of Blum and Johnson (2012)

Blum and Johnson (2012) comprehensively summarise and analyse linguistic discrimination of NNESTs in Arizona. Firstly, they cite a variety of scientific and convincing theories and arguments. The authors not only take account of the reality itself, but also examine the socio-political and theoretical foundation to justify the research rationale in theoretical and practical fields, and these lay a solid foundation for further discussion and investigation. Secondly, the demonstration of two opposing notions – criticisms of NNESTs and criticisms of the Arizona Department of Education is clear and comparable. On the one side, people who criticised NNESTs believe that students prefer to talk like their English teachers; there is a form of standard English that undoubtedly has positive impacts on people's life. On the other side, people who criticised the Arizona Department of Education assert that the definition of ideal accent is not clear, and teacher's teaching ability does not entirely attribute to their accent. Also, the racial discrimination behind the linguistic discrimination has been highlighted (Blum & Johnson, 2012). These factual and persuasive arguments are provided to demonstrate the different notions from different groups of people, which may stimulate more insightful discussions in solving linguistic discrimination problems, benefiting teacher evaluation and promoting English language education.

To some extent, the article redresses existing stereotypes and misbeliefs that NESTs are bound to be more capable than NNESTs by demonstrating NNESTs' advantages in English education like understanding student's learning difficulties, having experiences in imparting effective language learning strategies and so on (Blum & Johnson, 2012). In the long term, these notions will pioneer a new approach to assess English teachers and encourage the idea of the equity of NESTs' and NNESTs' quality as well as value; ultimately this encourages equal treatment in recruitment, evaluations and working rights. Furthermore, Blum and Johnson (2012) provide suggestions for practice including prioritising respect towards various types of culture and accents as well as the contributions non-native speakers make to a country. They also emphasise the significant roles of schools where the diversity and curiosity of students and teachers should be advocated and valued.

However, Blum and Johnson (2012) have not discussed some critical issues in linguistic discrimination and teacher evaluation in more depth. Firstly, they did not prove or question whether the teachers who speak standard English can be considered the same as the NEST in language production. It is crucial to discuss the definitions of native speakers and non-native speakers. One definition describes an English native speaker as an individual who was born in an English-speaking country (Davies, 1991). Medgyes (2001, p. 430) claims "the native speaker of English is traditionally defined as someone who speaks English as his or her native language or mother tongue." According to Cambridge Dictionary, "native speaker" refers to "someone who has spoken a particular language since they were a baby, rather than having learned it as a child or adult (native speaker, 2018)." Cook (1999) further describes this definition, pointing out the key element of the native speaker is the language learnt first. Other characteristics, such as how well the person uses the language, are incidental. Therefore, the term "native speaker" is closely related to the infant period the first language is learnt, rather than individuals' language proficiency. Under this circumstance, it is not applicable to consider NESTs as teachers who speak standard English.

Actually, the simplistic dichotomy of NEST and NNEST may not be able to represent the varied linguistic and cultural experiences of millions of English teachers (Motha, Jain & Tecle, as cited in Blum and Johnson, 2012) and the popularity of world Englishes. The boundaries between nativeness and non-nativeness are blurred, and some researchers have discovered ambiguities in the dichotomy (Medgyes, 2001; Butler, 2007). Davies (1991) refers that if a person was born in an English-speaking country but grows up in a country that is dominated by another language, he/she may speak English with an accent (e.g. a person who was born in the UK and grew up in China may speak 'Chinglish'). From Medgyes's (2001) perspective, even for people who speak English as their first language, they may also have a variety of dialects with different accents in different countries and regions. According to Hugh, Trudgill and Watt (2013), there are 23 different dialects in various areas of the British Isles, where people have quite distinct accents. These dialects linguistically and geographically indicate regional variation. Therefore, NESTs and people who can speak English without any accents (e.g. Received Pronunciation) may be two separate concepts that should be differentiated.

Secondly, it should be recognised teachers' accent is not directly related to students' English language acquisition. In terms of comprehension, although some scholars such as Eisenstein and Berkowitz (as cited in Major, Fitzmaurice, Bunta & Balasubramanian, 2002) argue ESL (English as a second language) learners can understand accent-less English more easily than either foreign-accented English or working-class New York English, there are many scholars suggesting no significant links between teachers' accents and listening comprehension of students (Munro & Derwing, 1995; Butler, 2007). For instance, Butler (2007) fails to find any differences in students' performance regarding comprehension whether they were taught by teachers with accents or not (Butler, 2007). Similarly, Munro and Derwing (1995, p. 285) discover the little empirical relationship between the non-native accent and intelligibility. The notions of 'heavy accent' and 'low intelligibility' had often been confounded. Besides, Flowerdew (as cited in Major et al., 2002) suggests that students possess difficulties in comprehending accents that they are not familiar with, regardless of whether the accents are native or non-native. With regards to students' pronunciation, Griffen (as cited in Munro & Derwing 1995, p. 287) states "the goal of instruction in pronunciation is that students should learn to speak the language as naturally as possible, free of any indication that the speaker is not a clinically normal native." Practically, IELTS (International English Language Testing System), which serves as an international standardised English test for international studies, immigration and work, does not require candidates to use a standard accent (e.g. Received

Pronunciation) in the speaking test, even for proficient users. For instance, IELTS speaking descriptors for candidate at Band 8 as proficient users only require pronunciation "is easy to understand throughout; first language (L1) accent has minimal effect on intelligibility (Ielts.org, 2018, p. 1)". In this case, accent is not the only determinant factor for students to be a successful English learner, and teachers' accent may not be the most crucial factor that impacts their students' English language learning. Therefore, we should seriously take into consideration other important issues that may contribute to language learning, for example, language teaching quality, language learning strategies and the appropriateness of curriculum and pedagogy.

Thirdly, although Blum and Johnson (2012) assert the discrimination of NNESTs is undesirable and unadvisable, they do not indicate an ideal set of criteria for teacher evaluation. For instance, scholars like Seldin (1984) report the key point for a good teacher is to be able to communicate with students effectively. Cheung (as cited in Briane, 2005) states that good teachers can not only motivate and encourage students by combining learning with fun but also can respect their individuality and personality. Moreover, Azer (2005) lists 12 qualities for a good teacher that could be generalised into their commitments, rapport with students, teaching skills, critical thinking and cooperation. In my opinion, these criteria are theoretically advisable, but it is noteworthy to remember that there are no perfect teachers who can master all these aforementioned qualities. It is a mistake to treat NESTs as the "arbiters of proper pedagogy" with remarkable teaching abilities (Widdowson, 1994, p. 387). Fairly speaking, teacher's pedagogical competence and linguistic flexibility rather than NEST/NNEST status should be paid more attention to. In specific, NESTs and NNESTs have their unique advantages, and they are potentially capable teachers because their respective strengths and weaknesses balance each other out (Medgyes, 2001). On the one side, according to Ma and Ping (2012), NESTs may have high proficiency in English and the command to use English appropriately. They have more awareness of the cultures of English-speaking countries (Ma & Ping, 2012). On the other side, as mentioned above, NNESTs can easily anticipate and understand their students' difficulties, provide first-hand solutions on account of their own learning experiences, have high proficiency in students' L1 (Blum & Johnson, 2012; Ma & Ping, 2012). Besides, learning at least one foreign language and its corresponding culture will be beneficial for students engaging with various cultures (Velasco-Martin, 2004). Therefore, the balance and collaboration between NESTs and NNESTs, who complement each other in their advantages and shortcomings, are essential in an ideal English-teaching environment.

Fourthly, a more in-depth exploration into discrimination of NNESTs is necessary. Discrimination may be partly attributed to people's ideology and stereotypes. "Ideology does not mean political ideology, but the particular system of beliefs and assumptions that underlie every linguistic analysis and every social event" (Stockwell, 2002, p. 72), and stereotypes refer to an individual's set of beliefs about the characteristics or attributes of a group (Judd & Park, 1993). With regard to people's ideology and stereotypes toward NESTs and NNESTs, Tang (1997) reports that there is a generally held belief that NESTs are superior to NNESTs in Hong Kong, and Takada and Luk (1997) states that parents in Japan doubt the abilities of NNESTs and they are reluctant to accept them. In China, "the policymakers in China seem to adhere strictly to a belief that the native speakers of English are the best teachers and English-speaking countries set the standards (Pan, 2011, p. 255)." Some parents tend to choose teachers who are from English-speaking countries for their children rather than local teachers. This type of ideology and stereotype toward NNESTs will intensify the discrimination and marginalisation of NNESTs. Additionally, the reasons for discrimination might be differences in social power, and there may be privileges for the power elite if the standard variety of English is provided

(Coulma, 2013). The linguistic discrimination might evolve into social discrimination that worsens social inequality.

Finally, regarding the methodology involved in Blum and Johnson's (2012) article, Critical Discourse Analysis (CDA), which represents an approach to research the social changes through understanding how ideology mediates language use, has been integrally mentioned. Blum and Johnson (2012) state that CDA contributes to our better understanding of the importance of ideology in language use and analyse how dominated groups and the associated ideology affect public opinions. This methodology derives from a sociocultural and sociolinguistic perspective that the meaning and representation of language are not isolated but influenced by social and cultural factors. Therefore, CDA is beneficial for our comprehensive understanding of the debate between NEST and NNEST as well as its reasons. However, although Blum and Johnson's (2012) use CDA for analysing, emphasising its importance and typically present the influences of media as well as policymakers, they avoid the reasons why media and policymakers mainly voice the dominant groups' actions and minds. van Dijk (2003) defines CDA as a type of discourse analysis that is related to social power abuse, dominance and inequality in text and talk in different social and political contexts. He highlights the dominating group members mainly control social resources, so they can turn media into their tools that represent their will and positions, and force policymakers to make laws they prefer (van Dijk, 1995). In addition, Blum and Johnson (2012) only introduce the viewpoints of van Dijk (2003) and neglect other sides of CDA research. For instance, one of the most important standpoints from Stubbs (1997) is that CDA should base on firmer empirical research and ethnographic study rather than the case in many contemporary studies. He criticises the use of a small amount of data for supporting analysts' viewpoints and emphasises the necessity of valid and explicit interpretation of data such as how texts affect people's beliefs and values. Obviously, compared with van Dijk's (2003) perspective, Stubbs (1997) offers a broader way to envisage texts and data. Therefore, we should consider more comprehensively and deeply when we analyse texts by using this method.

Conclusion

Blum and Johnson's contribution to the debate on NESTs and NNESTs has theoretical and practical value for further research. The authors advocate diversity in language, culture and the rights of NNESTs. However, some important issues like (1) the correlation between NNESTs and teachers who have accents, (2) the link between teacher's accents and student's performance, (3) the solutions to address the discrimination towards NNESTs, and (4) the evaluation of English teachers have not been fully clarified in this article. In the future, we should objectively analyse accents that both NESTs and NNESTs have and assess the influence on learner's language development. Moreover, the distinction between NESTs and NNESTs should not be regarded as the only criterion when governors and administrators hire employees. The criteria for teacher evaluation must be perfected and should focus on levels of professionalism and collective cooperation rather than on ethnicity or linguistic background. Additionally, policies and laws against discrimination should be put forward and published by governments in due course.

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Learning Beyond School in Mentoring for Leadership development of middle managers in Singapore primary schools

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Middle managers play an important role in schools as their effectiveness in leadership will ensure schools achieve goals towards a common vision (Wise, 2001; Bush 2009; Koh, Gurr, Drysdale, & Ang, 2010). In the context of Singapore schools, the term 'middle managers' refers to heads of department, the subject or level heads of different departments in the school. School leaders have promoted them from the role of a teacher to a middle manager position based on their assessed potential and competencies in the leadership (Ministry of Education, 2016). A qualitative research study was conducted to study Singapore middle managers' perception on their leadership development through mentoring. This paper shared some of the findings derived from twenty one-to-one interview sessions with middle managers from different primary schools in Singapore in this study. In particular, middle managers' interpretation on how mentoring beyond the schools could have a positive impact on their leadership development. One of the significant findings was their interest to seek mentoring beyond their schools or even in organisations not from school context. There was a strong desire to learn from mentors from another school locally and beyond Singapore. In addition, middle managers also perceived mentoring experience from a different context could potentially develop their leadership in schools to meet their specific needs and overcome the challenges of their role in schools.

Keywords: mentoring, leadership development, middle managers

Introduction

Building the capacity of the middle managers is crucial to the success of schools in bringing positive change (Bush, 2009). Tucker, Young and Koschoreck (2012) have recognised school leadership as the key leverage to more effective schools and improved teaching and learning. Research in mentoring has shown mentoring can produce positive career outcomes and job satisfaction (Eby, 1997; Wanberg, Kammeyer-Mueller, & Marchese, 2006; Waters, 2004).

The role of middle managers has become more complex with more responsibilities at school instead of departmental level (Rosenfeld, Ehrich, & Cranston, 2008). In Singapore, the learning curve for middle managers is steep and mentoring from an experienced leader can enhance the leadership of the middle managers in this learning process (Lim, 2005). The leadership role of middle managers will encompass the need to lead teachers teaching and to improve student learning outcomes (Burton and Brundrett, 2005) This research study explored mentoring for leadership development from the perspectives of middle managers. It seeks to gather insights to explore mentoring as an avenue in development of leadership competencies defined in the Leader Growth Model (LGM) – A toolkit for leadership development for leaders. The LGM is a guide designed for middle managers in Singapore schools to support personal growth plans in leadership development (LGM, 2014).

To define the role of middle manager and mentoring for leadership in this study, the following outlined the description of the role and process.

Middle managers in Singapore

Middle managers in Singapore school are teachers who are identified with good teaching skills and leadership competencies or potential to lead in a department. The leadership development of middle managers in Singapore schools is depicted in the framework of Leader Growth Model which states six dimensions for leadership development – (1) Ethical leader, (2) Educational leader, (3) Visionary leader, (4) Culture builder, (5) Change leader and (6) Network leader (LGM, 2014). In Singapore schools, the supervisors (school leaders) of middle managers are responsible to develop middle managers in the leadership role. They use the Leader Growth Model (LGM) toolkit as a guide to develop the middle managers. LGM was developed by the Ministry of Education (MOE) in 2014 for development of educational leaders in Singapore schools to cope with the increasing demands in the leadership role placed in the increasing complex education landscape (LGM, 2014).

Mentoring for leadership development

In Singapore, middle managers (MMs) are mentored by the principal, vice-principals or senior middle managers. Using the Enhanced Performance Management System (EPMS), a developmental tool for work performance, middle managers and their mentors meet at the beginning of the year, mid-year and end of the year to plan, review and evaluate the work done as well as discuss the developmental progress in the leadership role of middle manager. EPMS is a competency-based performance management system and it aims to develop the knowledge, skills and professional characteristics for three different career tracks (Teaching, Leadership and Senior Specialist) in all Singapore schools at all levels (MOE, 2006). Guided by the LGM, middle managers are mentored by their supervisors for their leadership development and the progress is documented in the EPMS.

Literature review

The following literature review explored literature that gave insights on the complexity of the role of middle managers and how mentoring can develop the leadership capacity and competency to overcome these complex challenges.

Complexity in the role of middle managers

Middle managers play multiple roles in the school, these roles require them to be competent in accomplishing different tasks for different stakeholders and meet different expectations. Brown and Rutherford (1998), in their study on heads of department, concluded a middle manager was expected to be servant leader, organisational architect, moral educator, social architect and a leading professional. Furthermore, the leadership role of middle managers has become more complex with more responsibilities at school instead of departmental level (Rosenfeld, Ehrich, & Cranston, 2008). The study by Rosenfeld et al. (2008) found middle managers played the roles of instructional leader, curriculum strategist, learning architect and administrative leader. In addition, they were also expected to inspire a vision, build a culture and lead in collaborative learning. In Singapore, there were various studies also shared same challenges. For example, Seah-Tay (1996) documented how the role of middle manager in Singapore secondary schools demanded them to cope with many responsibilities in the multiple roles. In another study of middle managers in primary schools in Singapore, Alsagoff (2001) also found the role of middle managers was "overloaded" with administrative and supervisory responsibilities. She

had emphasized the development of leadership capacity of middle managers to cope in different roles as they are expected to multi-task as an administrator, a manager of a department, an organizational leader. They had to simultaneously plan, implement initiatives, develop staff and empower aspiring teachers to lead too.

Being middle managers, there are many expectations in their competencies to perform different duties. Esp (1993) identified competencies for the role middle managers in "Middle Management Competence Framework" and grouped them in four clusters: (1) *achieving* cluster (initiative, critical information seeking, result orientation), (2) *thinking* cluster (analytical thinking, conceptual thinking, forward thinking), (3) *self*-cluster (positive self-awareness, thoroughness, perseverance), (4) *working with others* cluster (concern with impact, interpersonal awareness, strategic influencing, assertiveness, independence, training and support needs of others). Congruent to Esp's description of the expected competencies, the Leader Growth Model (LGM) also stated similar competencies in the six dimensions for leaders in Singapore schools (LGM, 2014). Hence, middle managers in Singapore schools are expected to be equipped with multiple skills in managing and leading.

Middle managers will need to develop their leadership competencies in different roles effectively to lead their teachers in schools. Mentoring is an avenue to develop leadership where more experienced leaders in schools guide the middle managers to be competent leaders to perform various complex roles (Lim, 2006).

Mentoring for leadership development

Research studies have indicated mentoring could contribute in positive career outcomes and job satisfaction (Eby, 1997; Wanberg, Kammeyer-Mueller, & Marchese, 2006; Waters, 2004). Mentoring relationship supports mentee's career development and it has positive effects on mentee's learning through development of a successful relationship (Ragins & Kram, 2007). Mentoring will also reinforce the mentees' confidence in learning (Lankau & Scandura, 2002). Besides mentoring, coaching is also considered as a means to develop leadership, for example, in a study on executive coaching program, Moen and Federici (2012) indicated coaching has positive impact on participants. Both mentoring and coaching are approaches for development of leadership, some literature would make the distinction between them, for instance, Fielden (2005) defined mentoring as helping mentees in longer term for both career and personal development in preparation of the future roles and coaching would focus on development in specific area for achieving specific goal in a defined time frame. However, Clutterbuck (2012) has posited the functions of coaching and mentoring can be overlapped. The researcher in this study adopted the stance to regard coaching as part of mentoring in leadership development of middle managers. In the Singapore context, the supervisor of middle managers inherently play the role of a mentor as they share experiences and knowledge as a leader. Coaching is an integral process of mentoring for the leadership development of middle managers using the developmental tool of EPMS (LGM, 2014).

Mentoring can be an effective approach in developing leadership for middle managers (Lim, 2006) but it needs the exploration on how it can better cater to middle managers' needs in the development of the complex leadership role in schools. This paper uncovered the perception of middle managers on desired changes in mentoring, in particular, the findings indicated the need to have mentoring beyond the school.

Research methodology

In this study, the research adopted the exploratory multiple case studies using the qualitative approach anchoring on the participants' perceptions as key source of data. The method was to conduct in-depth semi-structured interviews with middle managers from 20 different primary schools who were attending a leadership development course, Management and Leadership in Schools (MLS) at National Institute of Education, Singapore.

DiCicco-Bloom and Crabtree (2006) described a semi-structured interview as "generally organized around a set of predetermined open-ended questions, with other questions emerging from the dialogue between interviewer and interviewee" (p. 315). This is adopted in this study, hence, there were open-ended questions used in the interview guide for the interview sessions. During the interview sessions in the research, the interviewer also used probes to derive more information and clarify points or expand on an idea. Creswell (2014) suggests that such probes should be used to clarify purposes, or to elicit more details from the interviewee. In this paper, the sharing focused on the responses for one of the research questions: *What are the desired changes in mentoring?*

Data analysis

After the interviews, transcripts were read word for word where key information was highlighted to derive codes for key thoughts and concepts. Hsieh and Shannon (2005) posit that in a conventional analysis of data, labels of codes emerged from the data are sorted into categories after interpreting the codes that are related or linked before they are organised into meaningful cluster. It is a process of data reduction. In the same light, Miles and Huberman (1994) described it as the "process of selecting, focusing, simplifying, and transforming the data that appear in written up field notes or transcriptions" (p. 10). Data then became "organized, compressed assembly of knowledge that permit conclusion drawing and action" (Miles & Huberman, 1994, p. 11). Adopting this approach, the final process in data analysis of this research was to derive themes when data were clustered by making comparisons, verifications and conclusions.

Findings

Participants had provided interesting insights and perspectives on leadership development of middle managers on mentoring. Among them, three out of eight categories of codes in the clustered responses, were related to the desire to explore mentoring experiences beyond school as seen in Table 1.

Table 1
Perception of middle managers on desired changes in mentoring

Desired Changes	No. of Participants	Percentage
Provide mentoring beyond schools with different mentors	**8**	**40**
Need to find a good mentor outside school	**7**	**35**
Differentiate mentoring	7	35

Replicate the model of mentoring for teachers	6	30
Recognize role and effort in mentoring	4	20
Evaluate mentoring	4	20
Allow choice in mentoring	**3**	**15**
Ensure mentorship continuity	3	15

As seen in table 1, in response to the desired changes in mentoring for leadership development of middle managers, participants suggested several changes in the mentoring process and structure. Most of the participants suggested provision of mentoring experience for middle managers beyond school contexts and with different mentors (40%). Congruent to this desired change, there were other responses that were related to mentoring beyond schools - the need to find a good mentor outside school (35%) and to be allowed to have choice as mentoring were also interpreted from the participants' perception. The findings indicated the desire for a mentor beyond school to learn specific skills or good practices and learning experiences in a different and diverse environment. These interpretations were evident in the corresponding quotations from the responses shared in the following.

Desire for a mentor beyond school
The participants had indicated implicitly and explicitly that they needed a mentor beyond school to learn from the good practices that could value-add their leadership development.

Need to find a good mentor
The participants in the study emphasized the need to find the "right person" to guide them in the "right way". The mentor can be someone who is remote but accessible whenever the need arises.
> "…personally I find mentoring is having the right person there to help guide another person in the right way and you don't need to be there 24/7, when the person needs it, you are there…A bit like the apprenticeship in the past, you learn the skills already, then you go, but every time you need the shifu's (mentor's) help, then you go and look for the shifu (mentor) so that's the whole idea."

Choice in mentoring and interest in "external mentor"
Participants of the study also suggested that mentee should have a choice on the mentor.
" the mentee needs to have a choice over who is the mentor…Mentee should have a choice and decide."
In expressing the need to choose their mentors, participants also suggested instead having the supervisor as mentor, middle managers want to have an "external" mentor from "another organization".
> "Although supervisor is a possible mentor, but we should have a mentor who doesn't have to be your boss…I suppose…but you can have a mentor from another organization…an external mentor and having a once a week meeting with him or her. You move away from school and to talk to someone outside school about your leadership…"

Interest in strengths of leaders and best practices beyond their own schools
Participants also recommended middle managers to learn good practices or strengths of leaders from another school. Middle managers could learn "from another school's perspective" with someone who could be good in the leadership competency of a specific area.
> "So maybe that VP (vice-principal) in another school is very strong in student leadership area, so it's good to learn from another school's perspective, I thought it

would be nice to be mentored by him or her instead of just confined within your school scope."

Desire for mentoring experience beyond school
In this study, participants expressed their strong desire to learn through mentoring in a different context or relationship beyond school. They believed such diverse experiences would provide better insights and inspiration for their leadership development.

Refreshing and energy booster from external mentors
Middle managers should have a mentoring experience in a different context. This was also a common suggestion gathered from the interviews. It would be "very refreshing" and would give middle manager the "energy booster" from mentoring in other organization too.

> "Attach the MM to HODs in another school, so you see another culture, you see another set of approaches. This will allow the officer see a bigger perspective and not just within your own school context….what about attaching to those managers, not relating to teaching. Then you will have different set of thinking which I think…can be very valuable. Like in MLS course, we went for an industrial visits that were not in school context and we saw how other organisations were run, the way they approach leadership is very different. It gives us the energy booster. In a school context, all of you will do the same thing. But if we really pull ourselves outside the comfort zone, really learn from another organization, what do they have to say about how they develop their own management, it will be very refreshing."

Explore different culture and system overseas
Some participants in the study believed when middle managers attached to a strong school leader overseas for mentoring, they would be able to learn how to lead better from different culture and context.

> "So I felt it would be good if I have the chance to attach to this school overseas and be attached to the school leader…I did once had the opportunity to go China and attached to a school principal there…I learned how she worked, how she conducted meetings and managed so many teachers. Weekly, she would conduct a meeting for 5 campuses so all the teachers would meet in one place…I felt we can learn so much especially on how she observed teachers' lessons…how she managed and led with so many responsibilities at the same time, so this is something I hope I have a chance to learn again…from in a different culture, different context, it will be a good learning experience…"

Learn from another sector
A few participants suggested having leadership development mentoring experience in the private sector for middle managers. They could learn to be "inspirational" and become more effective in "managing people".

> The mentors may be some directors from the private sectors. Because recently, we just visited the Boncafe, the manager shared about management with us, you can see that he's really passionate, we can understand how the vision, mission really materialized under his leadership…I was amazed by these people in the private sector, …You learn to be inspirational especially in managing people, I think they are quite strong in this area and their vision. Their vision and mission are not only words on the wall..."

Discussions and Implications

The study indicated that most of the participants in this research aspired to learn to lead through mentoring beyond their own schools. They were interested in specific skills or areas of leadership development which they aspired to learn from the identified leaders through mentoring beyond school. In particular, they mentioned that they would benefit the learning in people management, management practices and realization of vision.

Participants in this research suggested mentoring for middle managers in another organization or school would be beneficial for their leadership development. They expressed the desire to have mentors from another school or organization in a different industry. They opined that mentoring beyond their own schools with these different mentors would provide opportunities for them to learn different best practices. Their preference to learn from good leadership practices in a different context stemmed from the belief they can be more competent in leadership when they learn from a mentor for specific strengths. Instead of "one-mentor-fits-all", having no choice on the mentor or limiting their learning from mentor in the same school, they preferred mentoring beyond school experience that can cater to their needs in leadership development. They believed this would benefit them especially when they identified specific competency or strength for their own leadership development and believed the identified mentors who could guide them effectively. This research indicated their keen interest in the "cross pollination" of learning experiences through mentoring for leadership in different and diverse contexts outside school – being mentored by leaders in other schools locally or overseas. Through this mentoring beyond schools, the participants believed they would gain greater insights, fresh perspectives and learn from the best practices at the targeted areas.

After this study, it would be useful to have further exploration in the possibilities in mentoring beyond schools especially based on strengths of different mentors in other schools or organisations for leadership development of middle managers. As technology advances, we could also study how to overcome time and space constraints in mentoring beyond schools by exploring online or remote mentoring to develop middle managers in leadership.

Limitations and future research

Extend to a quantitative study

The study has focused on perceptions from middle managers in 20 primary schools. A quantitative study can further research in this area by translating the findings in this research into survey questions on desired changes in mentoring for middle managers. The survey findings can then confirm if the suggested recommendation of mentoring middle managers beyond school for leadership development is a common desired change among most middle managers.

Include perception of mentors in the study

Future research can also explore mentors' perception on mentoring beyond school for middle managers' leadership development. This will provide a more holistic perspective. Comparing perceptions of mentors and mentees can further contribute to the understanding of mentoring in leadership development of middle managers. In particular, the perception on mentoring

middle managers from different schools or organization would reflect if the idea of mentoring beyond school is supported from a mentors' point of view.

Conclusion

Middle managers are the nexus between vision and practice in schools as they lead and empower teachers to teach and inspire our students. Their leadership developmental needs are complex. This study revealed middle managers' desire in learning to lead through mentoring beyond their school context. The participants indicated they need to find the right mentor who can help them to grow and they wanted to have the autonomy in deciding who will be their mentors beyond the school, especially for a specific area of interest or strength. It was also evident in this study, participants believed that through mentoring for leadership development beyond schools, they will be able to bring fresh perspectives and creative ideas in executing their leadership role.

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Evidence that low self-worth could be linked to anger and aggression in children with ASD

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Autism Spectrum Disorder (ASD) is a condition defined by symptoms and behaviours which affect social and emotional interaction, including poor anger control and aggression, creating great difficulties for the families of those children and adults with ASD. A common trait within ASD is the need for "rules" to be followed. The proposal upon which this literature review is based is that these rules are a form of social inclusion, even if that means a society of one, and adherence to them underpins the ASD person's self-worth. This literature review considers the evidence in current research for a link between self-worth and anger/aggression in the hope that a method can be developed to improve self-worth and so reduce the incidence of anger responses in the ASD population. The review first considers any links between low self-worth (self-esteem) and aggression in the neurotypical (NT) population. This is a controversial subject with contradictory results: Baumeister, Bushman and Campbell (2000) dismiss any link; Ostrowsky (2010) states there is evidence for and against a link, then Eromo (2017) explains the ambiguities through differentiating self-esteem into eight sub-categories which validates a negative correlation between true high self-esteem and aggression. In the second theme, the value of self-worth is considered in terms of mental well-being. High self-worth scores are shown to correlate with low anxiety, and self-esteem contingent on academic success is also shown to correlate with stress and depression. The final theme details the prevalence of anger/aggression in the ASD population and the value of emotion regulation (ER) techniques. In conclusion, there is sufficient evidence of the link between low self-worth and anger/aggression in the ASD and NT population and a programme is proposed to measure the impact of improving self-worth in a small ASD population with the intention of a more widespread therapeutic programme.

Keywords: autism, self-worth, anger, aggression, self-esteem.

Introduction

This is a scoping literature review exploring the possible link between low self-worth and anger/aggression in children with Autistic Spectrum Disorder (ASD) or Asperger Syndrome (AS). The intention is that it will prove the relevance of devising a therapeutic programme to improve self-worth in a small ASD/AS population with the expectation that there will be a resultant measured reduction in the incidence of anger and aggression levels.

For the purposes of this study, my definitions of ASD and AS come from Professor Baron-Cohen, leading researcher in the field of autism. ASD children typically demonstrate: "difficulties in social development, and in the development of communication, alongside unusually strong, narrow interests and repetitive behaviour…a diagnosis of Asperger's syndrome requires that the child spoke on time and has average IQ or above." (Baron-Cohen, 2008, p.112). In this review, as per DSM-5 (American Psychological Association [APA], online, 2018), I will include autism and Asperger syndrome under the banner of ASD. I will be defining anger as per the APA: "an emotion characterized by antagonism toward someone or something you feel has deliberately done you wrong." (APA, online, 2017).
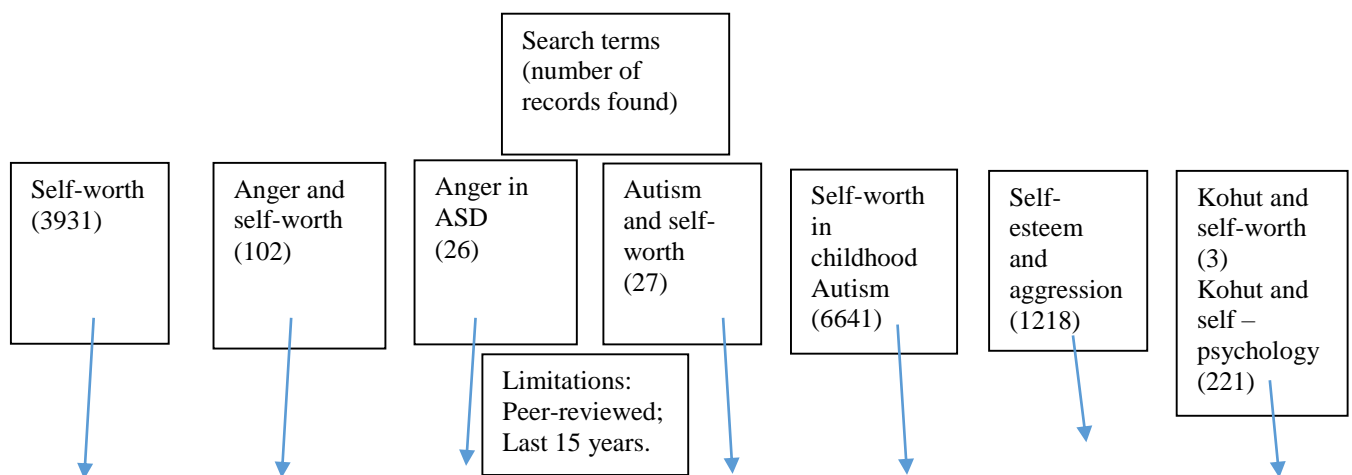
Eromo (2017) defines self-worth as the "emotional component" of self-esteem. 'Self-Esteem' was the predominant search result in my primary research using the term 'self-worth' (see below). It is a controversial subject; I have used Eromo, whose literature review overviewed all current theories on its psychological impact. My working definition of self-esteem is: "The appraisal of one's own personal value, including both emotional components (self-worth) and cognitive components (self-efficacy)." (Eromo, xvii)
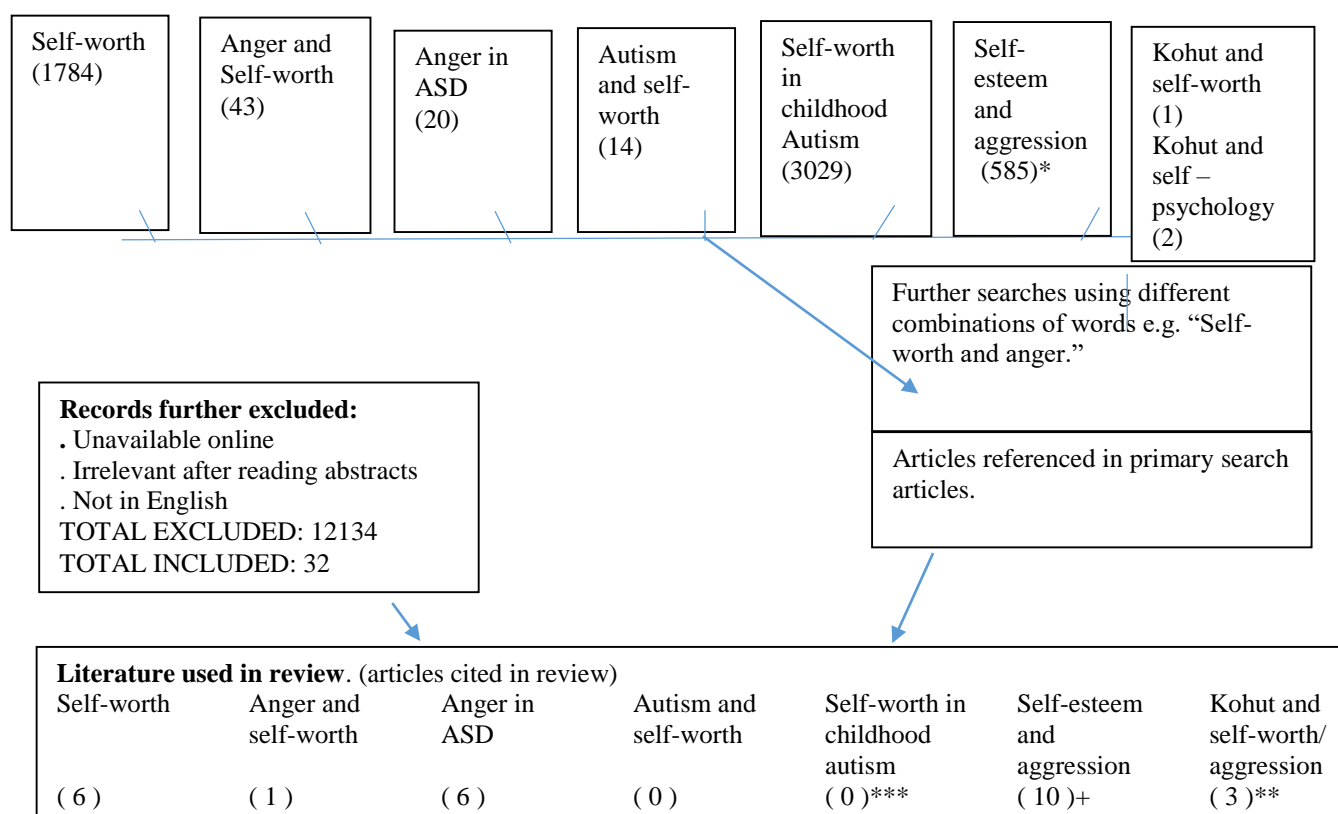
Anger control is a significant issue in children with ASD. Having observed that boys with ASD seem to follow strict 'rules' concerning their interaction with the world and their enthusiasms, it was clear that the boys expected other people to abide by them as well, in terms of the level of respect shown the boys and in encouraging their passions. When these rules are broken there can be a rapid anger response. I suggest that the rules are in fact a form of social inclusion, that struggling as ASD children do to understand social/emotional interaction, the boys' self-worth is damaged when their rules are broken, which led to my hypothesis that improving their overall self-worth would help control their anger.

To test my hypothesis, following this review I will introduce a pilot study, which I have referred to above, in my school which has a high intake of boys with special education needs and disabilities (SEND). If it is successful and anger levels are seen to significantly reduce through the improving self-worth, I will conduct a larger study. The purpose is to move towards an intervention which could improve the quality of life of ASD children and those of their parents, commonly hindered by anger and aggression in this population.

I have illustrated my literature search process in Figure 1 below. Some of the search terms, such as "anger in ASD", are self-explanatory; others, such as "anger and self-worth" and "self-esteem and aggression" were chosen to investigate contributory factors to anger and aggression in the neurotypical (NT) population which might have significance in the ASD population. (Neurotypical: "not suffering from or associated with an unusual brain condition, especially autism" (Univ. of Cambridge Dictionary, online, 2017). The antonym is neurodiverse.) A broad-based search was carried out initially because of quite limited results when the search was specific to ASD. Further articles were investigated as they were referenced in the primary search articles. There was a gap in the research specifically linking self-worth to anger/aggression so "self-esteem" became a focus as a synonymous search term and I was then able to differentiate to specify self-worth.

The literature search process follows:

Self-worth (1784)	Anger and Self-worth (43)	Anger in ASD (20)	Autism and self-worth (14)	Self-worth in childhood Autism (3029)	Self-esteem and aggression (585)*	Kohut and self-worth (1) Kohut and self – psychology (2)

Further searches using different combinations of words e.g. "Self-worth and anger."

Articles referenced in primary search articles.

Records further excluded:
. Unavailable online
. Irrelevant after reading abstracts
. Not in English
TOTAL EXCLUDED: 12134
TOTAL INCLUDED: 32

Literature used in review. (articles cited in review)

Self-worth	Anger and self-worth	Anger in ASD	Autism and self-worth	Self-worth in childhood autism	Self-esteem and aggression	Kohut and self-worth/ aggression
(6)	(1)	(6)	(0)	(0)***	(10)+	(3)**

* Baumeister, Bushman and Campbell (2000) was selected for inclusion to show contrasting views on self-esteem.

** Berzoff, Flanagan and Hertz is very useful on Kohut but was published in 1996.

*** The large volume of search results was narrowed by selecting 0-12-year-old children as subjects and the rather poor differentiator of "childhood development" as a sub-category but the results were not useful.

\+ Leary, Schreindorfer and Haupt (1995) and Ornstein (1997) are used to demonstrate earlier study on self-esteem.

Figure 1. Literature Search Process   Databases used: PsycINFO, ERIC.

Table 1 notes the literature included in this review by search term.

Table 1
Literature used in this review, by search term

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Self-worth

Fan, W., Chen, H. (2002). A study of self-worth and mental health. *Psychological Science* (China), 25(3)

Grills, A.E., Ollendick, T.H. (2002). Peer victimization, global self-worth, and anxiety in middle school children. *Journal of Clinical Child and Adolescent Psychology*, 31(1)

Leary, M.R. (2012). Sociometer Theory in Van Lange, P.A.M., Kruglanski, A.W., Higgins, E.T. (Eds.), *Handbook of* theories *of social psychology, 2.* 141-159. Thousand Oaks, CA. Sage Publications Ltd.

Leite, C., Kuiper, N.A. (2010). Positive and negative self-worth beliefs and evaluative standards. *Revista de Psihologie,* 56(3-4).

McCormick, W.H., Turner, L., Foster, J. (2015). A model of perceived parenting, authenticity, contingent self-worth and internalized aggression among college students. *Personality and Individual Differences*, 86

Robinson, J.C.: (2008). A process model of self-worth: Management of the self-evaluative and self-regulatory consequences to relational devaluation in daily life. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 69(6-B)

Zeigler-Hill, V., Besser, Avi. (2013). A glimpse behind the mask: Facets of narcissism and feelings of self-worth. *Journal of Personality Assessment*, 95(3).

Anger and self-worth.

Shanahan, S., Jones J., Thomas-Peter, B. (2011). Are you looking at me, or am I? Anger, aggression, shame and self-worth in violent individuals. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 29(2).

Anger in ASD

Ambler, P.G., Eidels, A. (2015). Anxiety and aggression in adolescents with autism spectrum disorders attending mainstream school. *Research in Autism Spectrum Disorders.*

Hayman, E.L. (2016). Reducing verbal and physical aggression in elementary students with Autism Spectrum Disorder using the Aggression Replacement Training Program. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 77(1-B)(E).

Quek, L.H., Sofronoff, K., Sheffield, J., White, A., Kelly, A. (2012). Co-occurring anger in young people with Asperger's syndrome. *Journal of Clinical Psychology*, 68(10).

Rieffe, C., Camodeca, M., Pouw, L.B.C., Lange, A.M.C., Stockmann, L. (2012). Don't anger me! Bullying, victimization, and emotion dysregulation in young adolescents with ASD. *European Journal of Developmental Psychology*. 9(3).

Samson, A.C., Wells, W.M.; Phillips, J.M., Hardan, A.Y., Gross, J.J. (2015). Emotion regulation in autism spectrum disorder: evidence from parent interviews and children's daily diaries. *Journal of Child Psychology and Psychiatry*, 56(8).

Scarpa, A., Reyes, N.M. (2011). Improving Emotion Regulation with CBT in Young Children with High Functioning Autism Spectrum Disorders: A Pilot Study. *Behavioural and Cognitive Psychotherapy*, 39.

Self-esteem and aggression

Baumeister R.F., Bushman, B.J., Campbell, W.K. (2000). Self-Esteem, Narcissism, and Aggression: Does Violence Result From Low Self-Esteem or From Threatened Egotism? *Current Directions in Psychological Science.* 9(1).

Besharat, M.A., Shahidi, S. (2010). Perfectionism, anger, and anger rumination. *International Journal of Psychology*, 45(6).

Bushman, B.J., Baumeister, R.F., Thomaes, S., Ryu, E., Begeer, S.,West, S.G. (2009). Looking again, and harder, for a link between low self-esteem and aggression. *Journal of Personality*, 77(2).

Diamantopoulou, S., Rydell, A-M., Henricsson, L. (2008). Can both low and high self-esteem be related to aggression in children? *Social Development*, 17(3).

Eromo, T.S.L. (2017). The rise and fall of self-esteem: A critical review, reconceptualization, and recommendations. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 77 (8-B) (E).

Ornstein, A. (1997). A Developmental Perspective on the Sense of Power, Self-Esteem and Destructive Aggression. *The Annual of Psychoanalysis*, 25.

Ostrowsky, M. K. (2010). Are violent people more likely to have low self-esteem or high self-esteem? *Aggression and Violent Behavior*, 15(1).

Schöne, C., Tandler, S.S., Stiensmeier-Pelster, J. (2015). Contingent self-esteem and vulnerability to depression: Academic contingent self-esteem predicts depressive symptoms in students. *Frontiers in Psychology*, 6.

Turner, K.A., White, B.A. (2015). Contingent on contingencies: Connections between anger rumination, self-esteem, and aggression. *Personality and Individual Differences*, 82.

Wood, A. M., Linley, P. A., Maltby, J., Baliousis, M., Joseph, S. (2008). The authentic personality: "A theoretical and empirical conceptualization, and the development of the Authenticity Scale". *Journal of Counseling Psychology* 55 (3).

Kohut and self-worth/aggression

Banai, E., Mikulincer, M., Shaver, P.R. (2005). 'Selfobject' Needs in Kohut's Self Psychology: Links with Attachment, Self-Cohesion, Affect Regulation, and Adjustment. *Psychoanalytic Psychology*, 22 (2).

Flanagan, L.M. (2016). The Theory of Self-psychology in Berzoff, J., Flanagan, L.M., Hertz, P. (Eds.). Inside out and outside in. (4th edition), Northvale, New Jersey: Jason Aronson.

Kottler, A. (2015). Feeling at home, belonging, and being human: Kohut, self psychology, twinship, and alienation. *International Journal of Psychoanalytic Self Psychology*, 10(4),

Themes

The search terms on PsycINFO and ERIC led to a cluster of literatures exploring the link between self-esteem and aggression, with reference to, rather than a focus on, self-worth. A lot of the research was valid, so my first theme is the link between self-worth and anger/aggression. The other search terms produced more specific results, so they were simply expanded or clarified to create the remaining theme titles: self-worth in the neurotypical population, and anger and emotion regulation in ASD and AS.

The link between self-worth and anger/aggression

In this section the controversial definition of self-esteem will be discussed, and how self-esteem relates to self-worth. Leary and Baumeister (2000), Banai, Mikulincer & Shaver (2005) and Kottler (2015) discuss the importance of belonging and its influence on self-esteem; Leary, Schreindorfer and Haupt (1995, p.297) and Ornstein (1997) consider the link between low self-esteem and aggression, which Baumeister, Bushman and Campbell (2000) refute. Diamantopoulou, Rydell and Henricsson (2008) and Ostrowsky (2010) consider the ambiguous nature of the relationship and Bushman, Baumeister, Thomaes, Ryu, Begeer and West (2009) revisit the link and conclude there is a positive correlation between low self-esteem and aggression if narcissism is a contributory factor. Besharat and Shahidi (2010) consider low self-worth and internalised anger and its relation to negative and positive perfectionism. Shanahan, Jones and Thomas-Peter (2011) suggest that unhealthy, as opposed to healthy, anger traits are used as protection against feelings of low self-worth, and Turner and White (2015) show that self-worth which was contingent on the approval of others was a predictor of aggression. Finally, Eromo (2017) demystifies the ambiguity of self-esteem and its relation to anger/aggression by sub-categorising self-esteem.

My theoretical starting point is Heinz Kohut, and his theory of self-psychology (1977, 1984). I have chosen Kohut because several studies within my first theme relate to his theories. Kohut controversially proposed that a person's psychological stability is reliant on three "self-states", including self-worth, which result from developing relationships with others. The relevance to my research of children developing relationships with others cannot be over-stated. This is in contrast to Freud, who believed that we are reliant on internal drives (Flanagan, 1996, p.166). Kottler (2015) discusses the importance of Kohut's twinship theory - the need to feel alike to another person - and of achieving a sense of belonging - through her own experiences of physical/geographical alienation and how it relates to psychological alienation in her own patients. Banai, Mikulincer & Shaver (2005) conduct a meta-analysis on seven studies on Kohut's work, focusing on the validity of Kohut's "selfobject" needs: mirroring, idealization and twinship, where children have a need to be immersed in and feel part of the competencies of others. In their conclusion they suggest that:

> The hunger for mirroring and … twinship are two forms of psychological insecurity that are associated with a sense of worthlessness, helplessness, and vulnerability and … they can be viewed as risk factors for the development of emotional maladjustment and affective disorders. (Banai et al, 2005, p.251)

Worthlessness and vulnerability caused by a sense of not belonging or not being accepted by one's peers can create the negative psychological state of low self-esteem. Several studies suggest a link between self-esteem and aggression: Leary, Schreindorfer and Haupt (1995, p.297) state "Low self-esteem ranks amongst the strongest predictors of emotional and behavioural problems" and that it is associated with aggression as well as several other negative behaviours. Ornstein (1997), cites Kohut's self-psychology in a discussion of self-esteem and

destructive aggression throughout childhood, suggesting: "destructive aggression arises when, instead of affirmation and validation, the child's grandiosity is debunked; in place of pride and pleasure, there is shame and humiliation." (Ornstein, p.145)

Baumeister, Bushman and Campbell (2000), however, in a review of contemporary study on self-esteem, dispute the link entirely:

> At present, the evidence best fits the view that aggression is most likely when people with a narcissistically inflated view of their own personal superiority encounter someone who explicitly disputes that opinion… Threatened egotism, rather than low self-esteem, is the most explosive recipe for violence. (Baumeister et al, 2000, p.28-29)

One could suggest, though, that 'narcissism', 'superiority', 'self', and 'ego' are quite fluid terms; doesn't "threatened egotism" equate to threatened self-worth? If someone's "highly favourable view of self" is deflated then both their self-esteem and self-worth can be damaged, depending on their psychological fragility.

Indeed, Bushman, Baumeister, Thomaes, Ryu, Begeer and West (2009) revisit the link between low self-esteem and aggression, with Bushman and Baumeister reviewing their own experiments in a study of 280 (140/140 male/female) NT students. They conclude that there is indeed evidence for a link between low self-esteem and aggression, however, they qualify that there is evidence for the link when low self-esteem is found in combination with narcissism: narcissism & high self-esteem producing the highest levels of aggression. The work reinforced earlier studies by Kohut which concluded that there were different forms of narcissism: overt and covert which have low- and high effect on aggression, respectively. I mention studies relating to narcissism briefly as personality disorders are beyond the scope of this review but narcissism as a self-obsessive tendency in children is relevant and the link between emotional rejection and low self-esteem is of interest to my proposal. On this note, Zeigler-Hill and Besser (2013) investigated the link between self-reported self-esteem and self-reported narcissistic tendencies relating to self-worth (N=372, adults) and recorded that low levels of self-esteem were reported when the subjects had felt rejection or had been in a conflict with others.

With reference to rejection, Leary and Baumeister (2000) discuss self-esteem in relation to Leary's 1999 "sociometer theory" which defines self-esteem as "a psychological gauge of the degree to which people perceive that they are relationally valued and socially accepted by other people" (Leary, 2012, p.141). Leary and Baumeister reference the link in several studies between self-esteem; one's sense of "belongingness" and the acceptance that one's world view is valid. Self-esteem, they suggest, is also contingent upon one successfully meeting the requirements of one's world view, thus linking with the ASD trait of perfectionism.

Other papers have focused on the ambiguity shown in studies of the causal effect of low self-worth and/or low self-esteem on aggression, indeed, Diamantopoulou, Rydell and Henricsson (2008), ask, in their self-explanatory study title: "Can both low and high self-esteem be related to aggression in children?". 652 12-year-old Swedish children were asked to self-report their self-worth in terms of social acceptance whilst their peers evaluated the individuals' social status from their own perspective. This led to the notion of having 'exaggerated but disputed self-esteem' (Diamantopolou et al, p.682). Both self-reported low self-worth and exaggerated/disputed high self-esteem were linked to aggression, leading to the authors stating: "depending on how self-esteem is conceptualized, aggressive children may appear to have both a low and a high self-esteem" (p.682).

In a literature review on aggression and violent behaviour, Ostrowsky (2010) concluded that there was evidence for and against a link between low self-esteem and aggression and that, again, narcissism was a factor. Besharat and Shahidi (2010) considered the effect of low self-worth and the resultant anger response when it is turned in - on the subject - rather than externalised. Their focus was perfectionism which they sub-categorised into positive and negative. Positive perfectionism is seen as healthy and has good outcomes whereas negative perfectionism has been linked to neuroses and poor psychological health including depression. Whereas positive perfectionism allows for pleasure to be derived from striving for success, negative perfectionism correlates with unrealistic expectations and self-recrimination for failure. In this study of 384 Iranian students, Besharat and Shahidi found that anger and anger rumination were high in individuals who report negative perfectionism and that their (low) self-worth was dependent on unachievable goals, thus making them vulnerable and prone to anger. Anger rumination is a behavioural trait common in ASD: dwelling on the 'wrongs' done to them by others even though the moment and the immediate 'retribution' has long passed. Like negative perfectionism, and, one could argue, quite closely linked to it; it is not a healthy psychological trait. Following this review of literature, I would suggest the link between self-worth, perfectionism and depression in the ASD population will be worth exploring in further research.

Self-worth as a causal link to anger in a neurodiverse population was studied by Shanahan, Jones and Thomas-Peter (2011). Much as narcissism was sub-categorized, the term anger was sub-divided into "healthy" and "unhealthy" by Shanahan et al in this small, male prison population (N=44, equally divided) where the study focused on violent "anger disordered" individuals when compared to violent individuals with typical anger attributes. Their conclusion was that unhealthy anger "may serve as an attempt to protect against shame and low self-worth." This is reinforced by a much larger study by Turner and White (2015), investigating if the contingency of external factors on perceived self-worth, which they equate to contingent self-esteem, would predict aggression in a population of 729 students. The study showed that self-worth which is dependent on the approval of others, interacts with anger rumination and predicts aggression. Similarly, McCormick and Turner (2015) demonstrated a close correlation for the relationship between the psychological control of a child by its parent and low authenticity ("living in accordance with one's values and beliefs" (Wood, Linley, Maltby, Baliousis and Joseph, (2008). p.386) which in turn correlates with higher contingent self-worth which itself correlates with internalized aggression.

Referencing the most up to date research in this review, the discrepancy in findings about the relationship between low self-esteem/self-worth and aggression can possibly be explained by the sub-categorizing of the broad term "self-esteem" as described by Eromo in 2017. She discusses the 2003 literature review of the effects of self-esteem on social behavior and concurred with Baumeister et al (2000) stating it showed "that (self-esteem) is actually not a major predictor of almost anything" (Eromo, xvii) and reports on her updated study using "specific critical thinking principles" to suggest a new theoretical model for self-esteem. In her definition, self-worth is the "emotional component", with the other component being "cognitive", which she labels "self-efficacy". With so many variables influencing one's self-esteem, Eromo's study concluded that there are eight types, based on self-appraisal:

Table 2
Eromo's self-esteem sub-categories

Self-esteem type	Definition by self-appraisal: sub-categories
Optimal high	Accurate / positive / stable
Fragile high	Accurate / positive / unstable
Accurate low	Accurate / negative / stable
Fragile low	Accurate / negative / unstable
Non-compensatory narcissism	Distorted / inflated / stable
Compensatory narcissism	Distorted / inflated / unstable

Consider a subject with "fragile high" self-esteem, whose strong self-belief is conditional on their psychological needs being met, and who does not have the coping mechanisms of a person with "optimal high" self-esteem to maintain psychological control when a crisis is encountered. Their personality traits would show a strong correlation between, e.g., high self-esteem and low anger-control. With the undifferentiated label "high self-esteem", this would lead to erroneous conclusions. With sub-categorization, Eromo has possibly explained why there is so much discrepancy in the research and her conclusion ties in well with Baumeister et al's revisiting of the link between self-esteem and aggression.

This section has discussed the complexities of defining self-esteem and therefore also its previously ambiguous relationship with anger/aggression. With sub-categories of self-esteem accurately defined, this relationship is more readily acknowledged. To further evaluate my research proposal's validity, the role of self-worth, as the emotional component of self-esteem, will now be discussed.

Self-worth in the general population – implications for well-being

Studies into self-worth in the general population have posed questions concerning its significance and effect on human well-being. In this chapter I will consider the evidence for the psychological value of self-worth.

Fan and Chen (2002) and Leite and Kuiper (2010) show a link between high self-worth and low incidents of depression/anxiety, and Grills and Ollendick (2002) demonstrate a link between victimization and low self-worth, also showing a disparity in female/male results related to lower emotional intelligence in boys. Schöne, Tandler and Stiensmeier-Pelster (2015) show another gender bias in the link between contingent academic self-esteem (aCSE) and depression.
Leite and Kuiper (2010) used the self-schema model for self-worth evaluation and its correlation with depression and self-esteem in a group of 137 University students. They were able to show a strong link between positive self-worth reporting and higher recorded self-esteem levels and less depression. Also, interestingly in relation to Kohut, perceived independence and a sense of control over the respondent's environment were better predictors of high self-esteem than positive reporting on relationships with others. With relevance to developing a method of improving self-worth to possibly reduce aggressive tendency in the ASD population, it is also interesting that the study concluded that the self-schema model was a significantly better predictor of well-being than the model it was compared to: Crocker's self-worth contingency model. Positively evaluating what one "has" in terms of self-selected criteria for psychological well-being seems to have more impact on one's psychological state than focusing on identifying what one needs, to achieve well-being.

Defining self-worth as the emotional component of self-esteem is also valuable. Grills and Ollendick (2002) reported on the effects of global self-worth on the relationship between peer victimization and anxiety in 279 11-13-year-old girls and boys in Virginia, US. In the girls' population, victimization negatively affected their view of themselves which tied in with their reported increased anxiety. In the boys' population, however, global self-worth moderated the relation between peer victimization and anxiety; higher self-worth in boys correlated with lower anxiety, possibly due to them being less likely to internalize the negative views of others, compared to girls. A study of 41 women and 37 men by Robinson (2008) showed that a focus on rejection cues, compared to interpersonal cues, in their relationships over three days resulted in "decreased state self-esteem and increased feelings of hurt and anger" (Robinson, iv) with no differentiation between sexes. The difference in the two studies could relate to the disparity in levels of emotional or social intelligence in the different sexes in childhood, resulting in boys being protected by a lack of awareness of how psychologically damaging victimization (Grills and Ollendick) is intended to be by the perpetrators, a disparity which slowly disappears with maturity.

A Chinese study reinforced the suggested value of self-worth in terms of general psychological well-being. Fan and Chen (2002) created assessment tools: The Sense of Self-Worth Scale (SSWS) and the Mental Health Diagnostic Scale (MHDS), to compare the mental health of 132 students with high self-worth scores and 129 students with low self-worth scores. The results showed a correlation between high self-worth scores and low anxiety / good mental health. With relevance to my suggested hypothesis, there was also a negative correlation between students with "autistic tendency" and mental health.

Contingent self-esteem has also been linked to mental health. Schöne, Tandler and Stiensmeier-Pelster (2015) measured the correlation between academic contingent self-esteem (aCSE) and depression in 1888 10-16-year-old German students. The results showed another gender bias: girls after 10-11 years old showed higher aCSE and depressive symptoms and lower self-esteem; boys demonstrated a reduction in aCSE and depressive symptoms and an increase in self-esteem as they mature, whereas girls remain generally stable in all criteria. Contingent self-esteem (academic) was a better predictor of depressive symptoms than perceived self-esteem level and there was a strong correlation between high academic stress and increased depressive symptoms in students with high aCSE.

In relation to my hypothesis, it can be suggested that social inclusion could be as significant a contingency for self-worth in children with ASD as academic success in Schöne et al.'s study.

Anger and aggression / emotion regulation in ASD

In the ASD population, where emotional interaction is often dysfunctional, poor anger control is a commonly reported issue. I will now consider the prevalence of anger in the ASD population and possible interventions such as Aggression Replacement Therapy (ART), Emotion Regulation (ER) and Cognitive Behavioural Therapy (CBT).

In a study by Quek, Sofronoff, Sheffield, White and Kelly (2012) 41% of a small group (N=62) reported significant levels of anger, anxiety and/or depression with depression being the only variable which could predict anger. Hayman (2016) considered the effect of Aggression Replacement Training in reducing aggressive behaviour in a small population of children with ASD. ART is focused on anger and stress management and self-control and was proven to be

effective in reducing incidents of physical and verbal aggression in this group. Maintaining self-control as a contributory factor to effective anger management is of particular interest in relation to the hypothesis proposed here.

Ambler (2015) focused on social anxiety in an ASD population in a mainstream high school, and its role as moderator for aggression: "For ASD students, but not for the control students, there was a strong, positive relationship: higher levels of anxiety were associated with higher levels of physical aggression. However, ASD students with high anger control did not display physical aggression". (Ambler, p.97). Physical aggression was also seen to increase with level of social anxiety. Also, relevant here, Rieffe, Camodeca, Pouw, Lange and Stockmann (2012) considered the moral dynamic of shame and guilt in the likelihood of bullying and victimization in a study of 130 Dutch school children (64, ASD; 66, NT). They found that ASD children and NT children with low self-reported guilt responses, were more likely to engage in bullying than those with higher reported guilt responses, whereas ASD children, with typically poor anger control, were "strongly and uniquely associated with more victimization" (Rieffe et al, p.351). These studies reinforce the validity of continuing research into finding a therapeutic method to mediate between anger arousal and anger diffusion in ASD.

Samson, Wells, Phillips, Hardan and Gross (2015) focused on the practicalities of therapies and examined the efficacy of 10 emotion regulation (ER) strategies (problem solving, seeking support, cognitive reappraisal, distraction, acceptance, relaxation, exercise, avoidance, suppression and repetitive behaviours) available to parents of ASD children. The children were assessed in three categories: anger, anxiety and amusement. It was noted that children in the ASD population, as seen in other studies, reported higher anger and anxiety, and, predictably, less amusement than the non-ASD population. They also did not effectively use adaptive ER strategies and made more use of maladaptive strategies, thus repeating the same behaviours which led to their (persistent) negative psychological states.

Scarpa and Reyes (2011) also focused on a practical therapeutic approach, providing Cognitive Behavioural Therapy, in the form of "skill-building via affective education, stress management, and understanding expressions of emotions" (Scarpa and Reyes, p.497). The study was on a population of 11 children, but the outcome was overwhelmingly positive with Scarpa and Reyes reporting better emotion regulation and an increase in the children's ability to deal with anger and anxiety.

With anger/aggression being prevalent in the ASD population and self-esteem/self-worth being integrally linked to anger/aggression and psychological well-being, this review has shown the relevance of my proposed continued research and of developing a programme of therapeutic intervention, based on self-worth, for ASD children with anger management control issues.

Conclusion

This literature review details the correlation between low self-worth and/or self-esteem and anger/aggression in the neurotypical population and in the ASD population. There is also evidence of the link between social anxiety and anger/aggression in the ASD population. Though there has been conflicting evidence about the former, by sub-categorizing self-esteem, that which could be identified as high self-esteem can in fact be categorised as a fragile state where the subject is prone to anger responses.

Kohut's self-psychology models have been very useful in pin-pointing the psychological basis of the importance of self-worth, i.e. self-worth which is contingent on relationships with others. Children with ASD can have poor social skills stemming from low emotional intelligence so they are inherently disadvantaged when it comes to forming relationships with others. My proposed study is focused on the benefits of children with ASD improving these relationships to then improve their self-worth.

In self-worth in the general population, I referenced Leite and Kuiper's (2010) study, which discussed the value of a subject assessing what s/he 'has' rather than what s/he 'needs' as it relates to psychological well-being. It also links directly to the suggested value of improving self-worth in ASD. In the ASD population, this links to Besharat and Shahidi's (2010) study of perfectionism. An ASD child, due to obsessional tendencies, and the 'rules' they would like others to abide by, would probably have the trait of negative perfectionism. In very simplistic terms: they want what they want. Improving their self-worth could come in part from training them to accept less so that they are not constantly disappointed by people and do not feel that they have been rejected. It could be an aim of the intervention to retrain ASD children to accept that what they 'have' should be more important to them, e.g. having a friend who accepts that the ASD child has high expectations but that they, the friend, won't always be able to meet them, compared to the ASD child wanting (but lacking) a friend who will always meet their needs.

In self-worth in the general population, I also referenced Grills and Ollendick (2002), who showed a positive side-effect of low emotional intelligence in adolescent boys, in that it allows them to be buffered from emotional trauma. The most up to date and thorough meta-analysis of studies in self-esteem (Eromo (2017)) defines self-worth as the emotional component of self-esteem so it is valid to propose that finding a therapeutic pathway to improve self-worth would have a positive influence on the emotional response to adversity and thus reduce resultant anger/aggression associated with low self-esteem. A side-effect of this study may be that after a successful intervention, the subjects may require some emotional safeguarding as they become more emotionally mature and so more emotionally vulnerable.

As referenced in the main body, a limitation of this review is that it has not uncovered any specific study on the effect of improving self-worth on anger control in ASD children, but that suggests a gap in the research. I therefore propose a further study, of methods to increase self-worth in ASD children and to implement selected methods in my school on a small ASD population. I will measure anger levels in the boys and then compare them with levels recorded after the intervention. I will then implement a larger scale study, hopefully leading to a vital intervention for ASD children to improve their quality of life.

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What are the benefits of extended writing in mathematics education?

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In this literature review we aim to understand the place literacy and in particular, extended writing, should hold within mathematics education. More specifically, we seek to understand in what sense is extended writing relevant to the study of mathematics, how can it benefit the development of literacy skills and how can it aid mathematical understanding. Firstly, we will look to understand the role language and expression has within communities of academics and professionals that use mathematics. In doing so we shall argue that importance of training students to be literate in a language style for them to enter such working spheres. Upon doing this, we shall extrapolate a number of benefits of using extended writing in mathematics education for student's literacy skills and their understanding of mathematics. In the process, we shall discuss various theories, such has Vygotsky's (1986) inner speech and the write-to-learn movement that purport that writing is a learning tool. In particular, we shall look at the work of authors such as Pugalee (2004; 2001) and Santos & Semana (2014) who have applied such theories to mathematics education and reported numerous advantages of doing so.

Keywords: Mathematics, extending writing, language, literacy, write-to-learn

Introduction

The relationship between language and learning has received significant interest in research. This has been brought to attention again in recent years in the United Kingdom with concerns regarding the levels of literacy of school and even college leavers (Wilshaw, 2014). Indeed Ofsted have increased their emphasis on literacy across the curriculum (Ofsted, 2013). Furthermore, across the national curriculum for mathematics the "importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically" (Department of Education, 2014, p. 4; Department of Education, 2014, p. 3; Department of Education, 2013, p. 4) is emphasised. As a part of this drive Ofsted have put a particular focus on writing stating that all subjects should "develop writing skills" (Ofsted, 2013, p. 4) and "use writing as a means of reflecting on and exploring a range of views and perspectives on the world" (Ofsted, 2013, p. 5). Ofsted also suggests that literacy would aid learning in other subjects as well. However, extended writing has traditionally been sparse in

> *Key Question:* What are the benefits of extended writing in mathematics education?

mathematics classrooms (Morgan, 1998, p. 1) and the writing that has occurred has been heavily procedural consisting of numerical and symbolic calculations (Baroody & Ginsburg, 1990; Nardi & Steward, 2003; Morgan, 1998, p. 1). As such, literacy, and in particular extended writing, can seem disjoint from the practice of mathematics. Moreover, attempts to include extended writing in a mathematics lesson can seem artificial and even pointless by not going beyond practicing basic literacy skills. This prompts the following question which we address in this literature review.

We will shall show that research indicates that there are many benefits both for literacy and learning mathematics. In fact, we will argue that not only is writing desirable for mathematics education, but it can be viewed as an essential part of it.

To understand the importance of extended writing to learning mathematics we shall initially look at the importance of literacy to the discipline of mathematics. We shall discuss Lave and Wenger's (1991) observation that specific styles and uses of language within a subject play a major role in characterising academic and professional communities that use that subject. It can therefore be argued that not only is it important for students to be literate in such use of language for their future employment prospects, but an education without due regard to such literacy gives an improper reflection of the subject itself!

From establishing the importance of language in mathematics, and using other research, we shall be able to glean many different benefits of the use of extended writing in mathematics education. Firstly, we shall use Lea and Street's (2010) idea of *academic literacy* to suggest that mathematical literacy activities develop not only basic literacy skills but also the student's ability encode and decode information within the context of a particular academic field. Focusing on writing, we shall also discuss the various studies that have been done that suggest that extended writing helps students learn mathematics and solve problems. These are heavily based upon Vygotsky's (1986) theory of inner speech and the *write-to-learn* school of thought. As such, we will give a summary of these theories and their connections to mathematics education. We shall also analyse the work of Pugalee (2001) whose case study suggests extended writing gives an insight into the students' metacognitive processes and hence, can be a unique assessment tool.

It should be noted that though we shall discuss certain kinds of extended writing activities in mathematics, we shall not describe them in great detail. Instead, we shall talk about the relative benefits of certain kinds of writing activities.

Literacy a Natural Part of Mathematical Communities

As in any academic field, communication in mathematics is key for development of the subject. This was observed by work Lave and Wenger (1991) when they introduced the idea of a "community of practice" which they defined as "a system of relationships between people, activities, and the world; developing with time, and in relation to other tangential and overlapping communities of practice" (1991, p. 98). They state that the use of language is a key characteristic of any such community since different communities have different literary styles and its own jargon. As a result of this, if one is to become an expert member of the community, they must gain fluency in its language style (Lave & Wenger, 1991). Lea and Street (2010) and Seligmann (2011) echo this thought by suggesting each academic field has its own form of literacy. Therefore, if we are to view classrooms as preparing or even being a part of a wider academic community, the language of that community needs to be an intrinsic part of the classroom.

Moreover, with Lave and Wenger's (1991) conceptualisation of communities of practice, it becomes clear that developing in an academic language style gives the learner greater sense of belonging in that academic community. Lea and Street (2010) argue that this identification as a member of the community helps pupils feel empowered and gives them ownership over their learning. In particular, Johnston-Wilder and Lee (2008) stress that by wrestling mathematical

language within a context where pupils view themselves as mathematicians develops their academic resilience. Evidence for this claim is given in a case study by Goos (2004).

Monroe (1996) argues that not only is the mathematical language is key for the mathematical communities to communicate ideas but can be a tool by which they create new ones. She claims that foundational mathematical ideas can arise naturally from contexts that are formed in discourse and language. As an example, she points out that the idea of geometry naturally arises when pupils asked to place a book in the middle of a table. With this in mind, the mathematical language becomes elevated from just a means of communication for the student to an actual learning tool.

Benefits for literacy

There is evidence to suggest that including literacy activities in other subjects on which students are given effective feedback could improve their literacy skills. The increased opportunity to practice literacy should, under the constructivist model of learning proposed by Piaget (1965), lead to development in literacy skills. Though authors such Willingham (2009) and Ericsson (2004; 1993) do support this idea, they point out that experience alone does not lead to expert performance. Ericsson's influential work with his colleagues on expertise aquisition showed that expert preformance is attained when, what they call, *deliberate practice* is employed. Ericsson characterises this as practice where "individuals [are] 1) given a task with a well-defined goal, 2) motivated to improve, 3) provided with feedback, and 4) provided with ample opportunities for repetition and gradual refinements of their performance" (Ericsson, 2004, p. 991). Indeed, from their observations of schools with good literacy outcomes, Ofsted recommend "embedding good practice in schemes of work and development planning" and "systematic and effective monitoring and evaluation" (Ofsted, 2013, p. 40).

Moreover, having a cross-curricular literacy strategy meets Ofsted's wider definition of literacy that goes beyond "mechanics of reading, writing, speaking and listening" (Ofsted, 2013, p. 5). For Ofsted it also entails:

> "that connections be made between each strand and across subjects, which calls for thought and understanding, for recall, selection and analysis of ideas and information, and for coherent, considered and convincing communication in speech and in writing" (Ofsted, 2013, p. 5)

This can be thought of as what Boomer (1985) describes as "active literacy" which, as well as encoding and decoding information into the syntax of the language, requires a person assimilating the information into their existing body of knowledge. Such a definition is theoretically supported by Halliday's claim that language is "the prototypical form of human semiotic" (Halliday, 1993, p. 93) which, in other words means that language is the fundamental process by which we make meaning. Thus, to become literate in this sense the pupil is required to be able to extract information from the various different ways that language may be used. Since different academic disciplines use language in different ways it therefore becomes necessary for pupils to experience these different literacy forms in different subjects to achieve active literacy.

Unique Aspects of the Mathematical Language the Support Literacy Development

There are various components of mathematical language, many of which can possibly help general literacy skills. One of the most unique characteristics of mathematical language is its symbolic content. This aspect has been studied by Ervick (Mathematics as a foriegn langauge, 1992) and Kane (1967) with Kane even defining "mathematical English" as "a hybrid

langauge…composed of ordinary english commingled with various brands of highly stylized formal symbol systems" (1967, p. 296). These formal symbol systems indeed have their own grammar i.e. rules for syntax and of course their semantics are derived from the context (Kane, 1967).

Morgan (1998) criticised this approach for not appreciating that "the non-symbolic 'ordinary' component also has specifically mathematical aspects". Upon similar observations, Halliday (1975) introduced what he calls the *mathematical register*, a notion elaborated on by Pimm (1987). Halliday describes a *register* as "set of meanings that is appropriate to the particular function of the language, together with the words and structures which express these meanings" (Halliday, 1975, p. 65). The meanings in the mathematical register are extremely strict and can differ considerably from the meaning in natural language (Pimm, 1987, p. 78). Pimm explains how these two factors result in significant scope for misunderstanding for the pupil that has not grasped the register fully (1987, pp. 88-93). So in this sense, by engaging with the mathematical register pupils are learning to appreciate precision of meaning in certain formal contexts.

However, Morgan highlights that "it is not clear that the idea of a single mathematical register is sufficient to cope with the variation of functions and meanings" (Morgan, 1998, p. 10). She draws upon work of Richards' (1991) who identifies different 'domains of discourse' within mathematics such as that written in journals and spoken by mathematicians. Richards' claims that between two such domains not only may the subject matter be different but the very nature argumentation as well. Sipka (1990) identifies further different categories that tend to occur in written school mathematics, namely-

- Formal activities which include proof, paper writing, lecture notes and even writing letters to authors.
- Informal activities which include mathematical autobiographies, journals, free writing and reading logs.

Hence, as pupils learn mathematical literacy they are required to navigate between what Lea and Street (2010) call *genres* meaning different styles of mathematical text. As a result, they exercise the very skills extracting and translating information encoded in different text that are required by the above definition of literacy.

Benefits for Learning Mathematics

As indicated in the introduction, exercising literacy within mathematics can help learning of mathematics also. Namely, we stated that mathematical literacy enables pupils to engage with literature, lectures and discourse (both written and oral) within a discipline. We also discussed how deficiencies in aspects of the mathematical literacy, in particular the mathematical register, can obscure mathematical understanding. Many have suggested various other benefits of literary exercises in mathematics which will be discussed in the following section.

Impact of Language on Thought

These benefits rest upon language being a conduit of thought (Halliday, 1993). However, there is a large school of thought that believes in a converse relationship, i.e. that language impacts thought (see Gleitman & Papafragou, 2012). It has been suggested by linguistic anthropologists such as Whorf (1956) and Sapir (1929) that language not only conveys thought but it shapes it too. This is in contrast with Piaget (1965) who believed that thought preceded language. However, this in turn was rebutted by Vygotsky (1986) who, in his landmark work *Thought and Language* presents the idea of inner speech. Vygotsky says the following:

> *"Inner speech is not the interior aspect of external speech - it is a function in itself. It still remains speech, i.e. thought connected with words. But while in external speech thought is embodied in words, in inner speech words dies as they bring forth thought. Inner speech is to a large extent thinking in pure meanings"* (1986, p. 149)

Various theorists of education derived pedagogies and theories of thought upon Vygotsky's idea of inner speech. Notably, Alexander (2006) proposes a pedagogy based on dialogue in the classroom and Sfrad who defines thinking to be "an individualized version pf (interpersonal) communication" (2010, p. 81).

The Role of Writing

Vygotsky commented on the importance of writing as a means of expressing inner speech because he viewed it as a deliberate act of making meaning and because he believed it was the "maximally detailed" form of speech (1986, p. 100). On this basis Britton et al. (1975) argued that writing enables people to access inner speech. Britton also claims that writing helps organise experience (Britton, 1970). Emig (1971) built on this idea and argued that writing is a unique learning tool because it connects cognitive and physical means of interrogating, connecting and reviewing ideas. It is thought that the work of Emig and Britton et al. gave rise to the *Write-to-Learn* movement which emphasised writing as a means for learning (Bazerman, et al., 2005).

This movement has come into criticism in the past for lacking empirical evidence to support its claim (Morgan, 1998, p. 25; Shield & Galbraith, 1998). However, over past 15 years there have been a number of case studies on extended writing in mathematics education which report various benefits (Baxter, et al., 2005; Pimm, 1987; Pugalee, 2004; Pugalee, 2004; Pugalee, 2001; Santos & Semana, 2014). There is now a considerable body of evidence to support the idea of writing as a learning tool (for a good overview of the research see Klein & Boscolo, 2016).

Most of the case studies have sought to use writing to aid higher order thinking and access what Skemp (Skemp, 2002) famously called *relational knowledge*. Skemp defined this the knowledge of relationships between ideas being presented i.e. the *why* behind an idea. The traditional writing in mathematics classrooms mentioned in the introduction has only accessed what Skemp (Skemp, 2002) calls *instrumental knowledge* i.e. *how* a process or technique works. Skemp explains that though instrumental knowledge has the benefit of being easier to apply and gives quick rewards, he goes on to explain that relational knowledge is more adaptable and endows the pupils with more transient problem solving skills (Skemp, 2002, pp. 8-10).

Writing Exercises that Access Higher Order Thinking

There are also various forms of informal writing that have been found to access higher order and relational thinking. One of the most popular is that of mathematics journals which are the student's own log of mathematical thought on the material they are being taught. These offer pupils the opportunity to reflect on their learning. Many benefits of such journals have been reported. For instance Waywood (1994), Powell & Ramnauth (1992) and Powell & Lopez (1989) report significant improvements in questions posed (Waywood, 1994). Moreover, Powell and Lopez (1989) claim that over time pupils' writing became more reflective. Powell and Ramnauth (1992) suggest that there is increased confidence in expression of ideas. Furthermore, Borasi and Rose's case study (Borasi & Rose, 1989, p. 352) suggest that articulation of this reflection in journals also leads to:

- "A therapeutic effect on the emotional components of learning mathematics can result as students express and reflect on their feelings about the course, mathematics and schooling"
- "Increased knowledge of mathematical content".
- "Improvement in learning and problem solving skills"
- "Steps towards achieving a more appropriate view of mathematics". (1989, p. 352)

Another informal writing exercise that has been studied by Pugalee (2004) is that of writing "global plans" to a mathematical problem before attempting to solve it. In this study Pugalee found that pupils that gave an oral or written description of global plans were more successful in solving the problem. Furthermore, he reports that writing had a more significant effect than orally verbalising.

There are relatively fewer forms of formal writing which have been investigated in the literature. Nevertheless, Grossman et al. (1993) did investigate a certain kind of formal questioning in which students had to compare, contrast and describe different mathematical processes. They concluded from their findings that "a student's ability to explain concepts is related to the student's ability to comprehend and apply a concept" (Grossman, et al., 1993, p. 4). Also, Santos and Semana (2014) conducted a study of formal expository writing also document that greater "the elaborateness of students' expository writing" (2014, p. 84).

Writing as an Assessment Tool

Aside from the benefits for learning, there are many claims that have been made about extending written exercises in mathematics as an assessment tool (Burns, 2014; Pugalee, 2001; Morgan, 1998, pp. 115-121; Baxter, et al., 2005; Borasi & Rose, 1989; Santos & Semana, 2014). For instance, Pugalee (2001) evidences that writing descriptions of global plans to mathematics problems exhibit their "metacognitive framework" and hence give a unique insight into a pupil's understanding of relational knowledge. Various authors have also reported the benefits of journal writing in mathematics. Borasi and Rose claim journals give the educators:

- "More appropriate evaluation and remediation of individual students" (1989, p. 353)
- "Immediate changes and improvements in the course" (1989, p. 353)
- "Long-term improvements in teaching approach and methodologies" (1989, p. 353)
- "More individualise teaching can be achieved" (1989, p. 353)
- "A more caring and non-adversarial classroom atmosphere" (1989, p. 353)

Baxter et al. (2005) give evidence that of attributes of journals significantly aid teachers in supporting mathematically low achieving pupils.

Following findings from students' writing with effective feedback can result in improved understanding and literacy skills. Indeed, Santos and Semana (2014) found that using formative assessment techniques with students' expository writing resulted in "more relational justifications, instead of vague statements, rules or procedural descriptions when we compare first and second drafts of each" (Santos & Semana, 2014, p. 65). This harkens back to Ericsson's (2004) model of 'deliberate practice' mentioned above wherein prompt and precise feedback is essential for a learner to make rapid progress.

It should be noted that the findings of Santos and Semana contradict those of Shield and Galbraith (1998). However, as Santos and Semana explain, this maybe a result of differing aims in the two studies; Shield and Galbraith sought to present "scheme for coding the parts of written mathematical presentations" whereas Santos and Semana's main pedagogical aim was to improve expository writing.

Conclusion

The work of Lave and Wenger (1991) highlights that the way in which language is used of language is at the very heart of how academic and professional communities function. As such, it becomes not only desirable to teach subject based language, but it is important to do so. Evidence shows a myriad of possible benefits for the pupil from engaging with academic literacy and, in particular, writing within mathematics. These include -

1.   Improved literacy, both mechanical and active. In particular, some of the unique aspects of the mathematical language, such as the syntax in its symbol system or the preciseness of terms, may offer students a different way to study aspects of linguistics.

2.   Confidence and resilience in the subject through deeper identification as member of that academic community.

3.   Being able to access a wider scope of discourse in the subject.

4.   Literacy, and in particular writing, aiding metacognitive processes.

5.   Written tasks can offer a unique assessment tool for the teacher.

In spite of the large body of research advocating the use of writing in mathematics, surprisingly little extended writing is used in British mathematics classrooms (Baroody & Ginsburg, 1990; Nardi & Steward, 2003). Studies have indicated this is much to do with teachers' belief of what mathematics is and, hence, how it is best learned (Kenney, et al., 2014; Kuzle, 2013). It is also recognised that the nature of high-stakes exams has a large part in these beliefs (e.g. see Willis, 2007; Polesel, et al., 2014). Therefore, more work needs to be done to investigate how exams can be altered so as to encourage writing. It could be argued that this process has already begun since the new mathematics GCSE and A-Level have placed greater emphasis on problem solving. Therefore, a very real and current research question would be, "what writing strategies improve success rates of solutions to GCSE problem solving questions?" Studies from Kenny et al. (2014) and Kulze (2013) suggest that if a trainee teacher is asked to utilise extended writing then many tend see the benefits of it causing those that were against it to reconsider their beliefs. This suggests that it would be worth considering writing strategies are taught to trainee teachers.

On another note, involving extended writing in mathematics poses an interesting question for student engagement which, considering the low uptake in the subject despite the high demand (Boaler, 2009), is always a pressing issue. In view of the difference of extended writing to traditional activities in mathematics classrooms, would extended writing engage a new group of students who enjoy writing? On the other hand, would it disengage students who do enjoy mathematics lessons? It is thought by some that those students that enjoy mathematics are often those that do not enjoy writing. Thus, we can ask whether there are extended writing tasks that engage a new group of students yet do not disengage students who traditionally enjoy mathematics and still attains the benefits above.

The current body of research seems to strongly suggest that writing as a learning tool holds numerous benefits (Klein & Boscolo, 2016). Thus, the question shifts from "whether writing is beneficial for mathematics education" to "how can we best extrapolate benefits of extended writing in mathematics". In view of this, the key issue now revolves around implementation of writing strategies. The increased focus on problem solving on all levels of the curriculum may provide fertile ground to do investigate this problem. Whatever the best implementation methods may be, extended writing could prove to be a powerful tool to increase problem solving skills and increase engagement with the subject.

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Trainee teachers' views on democratic citizenship education: The cases of the PGCE and Teach First

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Democratic citizenship education (DCE), the process by which democratic societies teach democratic values, can be considered a key component of the education of future citizens. As significant responsibility for DCE falls to teachers, it is necessary to examine teachers' views about their role in the process. Initial teacher preparation, in any form, can be one-way trainee teachers begin to form these views. The purpose of this small-scale research is to better understand trainee teachers in two distinct programmes in England, a university-based PGCE and Teach First. The present study seeks to determine the extent to which participants in these two programmes have beliefs and philosophies of education in which DCE is a component. A semi-structured interview, using a card selection method, was devised to elicit participants' philosophies and beliefs about the purpose of education and DCE specifically. Six participants in each programme were recruited and participated in the interviews. Findings show that the PGCE participants' responses focused on the themes of community and critical thinking. The Teach First participants focused on a different conceptualisation of community, individual skills for success, and students' strengths. The study concludes that the PGCE participants held beliefs that are generally aligned with this study's conceptualisation of DCE; Teach First participants held a wide range of attitudes towards DCE, but generally did not see it as a priority of education. These findings can have implications for initial teacher training. Democratic societies and teacher education programmes must reflect on the role of education in building democracy and teachers' role to do so.

Keywords: initial teacher training; teacher beliefs; democratic education; citizenship education; qualitative research

Introduction

Teacher education in the UK has seen significant changes in the in the early years of the twenty-first century. While the university-based postgraduate certificate in education (PGCE) is still offered by many English universities, various American-style "alternate" routes (i.e. not based in a traditional, university-based course) to teacher certification have been introduced. Teach First (TF), launched in 2002, was one such initiative. Modelled on Teach for America, the programme aimed to recruit some of the highest achieving university graduates, provide intensive summer training, and place them as teachers in high-needs schools in England. Unlike the "traditional" university-based PGCE, trainee teachers are expected to develop their teaching skills on the job at their school placement.

A range of stakeholders, including politicians, teachers, school leaders, and communities, naturally use many lenses to debate the value, appropriateness, and effectiveness of Teach First and similar "alternate" school-centred teacher training. The present exploratory research serves as one such lens to understand the views and beliefs of trainee teachers in their first-year teaching with Teach First in comparison to trainee teachers in a PGCE programme. Specifically, it examines their beliefs on democratic citizenship education (DCE).

DCE is the process by which education systems prepare students to be citizens in a democratic society. Democracy is more than a system of political power, but also a set of ideals, values,

and norms held by society. For a democratic society to function, these ideals, values, and norms must be passed from generation to generation. This can happen in formal educational settings or implicitly through society.

Recently, various democratic institutions have been tested in previously unimagined ways. In the United States, the Trump administration has eschewed both formal and informal political conventions. The British exit from the European Union has the potential to reshape not just the United Kingdom's relationship with the continent, but also the tenor of British society. Western countries have seen a rise in nationalism, xenophobia, and anti-refugee sentiment, sometimes with violence ensuing (Anderson-Nathe & Gharabaghi, 2017; Jackson, 2017). If societies wish to preserve their democratic ideals whilst responding to these issues, the members of these societies must be equipped to be effective democratic citizens. While producing such a cadre of citizens is a complex task, education systems and teachers are a central component. Therefore, understanding teachers' and trainee teachers' views and beliefs on the topic of DCE is itself essential.

The larger research project addressed multiple research questions to build an understanding of trainee teachers' attitudes and beliefs relating to DCE. The present paper focuses on one pivotal question: to what extent do trainee teachers in the two groups have beliefs and philosophies of education in which democratic citizenship education is a component?

Theoretical framework

Democratic citizenship education (DCE)

Although writers such as Plato and Rousseau have alluded to DCE (Glass, 2000; Michelli, 2005), it was first most explicitly described by Dewey (1916/2004). He saw DCE as the process societies employ to prepare its future citizens to participate democratically. According to him, such participation was more than voting; "But there is a deep explanation. A democracy is more than a form of government, it is primarily a mode of associated living, of conjoint communicated experience" (1916/2004, p. 83). Dewey differed from predecessors in that his conceptualisation of democratic education was not focused on the explicit procedures of democracy or regarding obedience, but rather a sense of community. Others have built off this definition; Berkowitz, Althof, and Jones (2008) describe citizenship education as educational strategies that promote democratic participation of citizens. Much like Dewey's, this definition succinctly summarises the idea of democratic education, but neither provide a particularly specific definition that illustrates this concept.

Gutmann (1999), drawing from Dewey and others, offered her own definition of democratic education. She argues that democratic societies try to promote future citizens who are moral and active in the institutions of democracy but does so without compromising the values inherent in a liberal democracy. Therefore, she argues, "Democratic education thus appreciates the value of education as a means of creating (or re-creating) cohesive communities and of fostering deliberative choice without elevating either of these partial purposes to an absolute or overriding end" (p. 46). This view of democracy presents a paradox; cohesive communities are in constant tension with deliberative choice. Society can achieve perfect cohesion, but at a cost to individual choice. Conversely, absolute free choice can be a detriment to a perfect community. Democratic societies therefore seek a balance between these two concepts.

This conceptualisation for understanding democratic education is effective as it provides a clear definition of what democracy is, unlike Dewey's vague approach. However, the definition itself lacks a pragmatic application; trainee teachers could struggle to connect these lofty theoretical concepts to real classrooms. Therefore, while an effective overarching conceptualisation, the work of others can be used to supplement Gutmann's conceptualisation of democratic education.

Crick (1999) lists five key values in democratic education: freedom, toleration, fairness, respect for truth, and respect for reasoning. Additionally, an advisory group, chaired by Crick, issued a report on improving British democratic education in schools and offers three elements: social and moral responsibility, political literacy, and community involvement (Advisory Group on Citizenship, 1998). Halstead and Pike (2006) offer their own list of aims of citizenship education: to produce citizens who are autonomous, critically reflective, informed, committed, and active.

These sets of ideals and concepts are all very closely linked and fit within Gutmann's framework of democratic education. For example, *toleration*, *community involvement*, and *committed* are aligned with Gutmann's view of *cohesive communitie*s; *respect for reasoning* and *critically reflective* are similarly aligned with *deliberative choice*. Simultaneously, they offer a more "concrete" conceptualisation of democratic citizenship education.

Many authors either use *democratic education* or *citizenship education* to refer to the same concepts. *Citizenship education* can also be used outside of a specifically democratic context. A *democratic classroom* can also refer to set of practices to apply the ideals of democracy to classroom governance and curricular content. To avoid ambiguity, I here use the phrase *democratic citizenship education (DCE)*.

Trainee teachers' beliefs

Building an understanding of trainee teachers' philosophies, beliefs, and attitudes is a significant area of research within education (Wideen, Mayer-Smith, & Moon, 1998). These beliefs relate to a wide range of subjects within education, for example, educational research (Joram, 2007), effective teaching (Chan & Elliott, 2004), or the role of the teacher (Calderhead & Robson, 1991). Such research can inform further research about teachers' subsequent application of beliefs to their practice. Additionally, these understandings are valuable for initial teacher education programmes in considering elements, priorities, and desired outcomes of teacher education.

Initial teacher preparation can be a crucial time for trainee teachers to develop their philosophies (Brownlee, Schraw, & Berthelsen, 2011). Some researchers have shown that teachers' personal epistemology and beliefs can change significantly over the course of teacher education and early teaching years (Bendixen & Corkill, 2011; Walker, Brownlee, Exley, Woods, & Whiteford, 2011). Similarly, participants in teacher training programmes enter with sets of pre-existing beliefs about education, which they may either be reluctant to reconsider (Fives, 2011) or which may undergo significant transformation (McDiarmid, 1990).

Studies have employed a variety of methodologies and methods to understand teachers' beliefs—a concept which presents numerous difficulties. Action research (e.g. McDiarmid, 1990), case studies (e.g. Calderhead & Robson, 1991), interviews (e.g. Joram, 2007) questionnaires (e.g. Chan & Elliott, 2004), and mixed methods (e.g. Cheng, Chan, Tang, &

Cheng, 2009) have proven to be common ways for researchers to better understand trainee teachers' beliefs. The wide range of approaches and conclusions offered by these studies demonstrate the difficulty and nuance involved in initial teacher training and the beliefs of those who participate in it.

Synthesis

From this previous research on trainee teacher beliefs, we can conclude that trainee teachers hold beliefs and attitudes about a wide range of concepts, approaches, and philosophies related to teaching or education. These beliefs and attitudes can be influenced by their teacher training, their own educational experiences, or external influences. The trainee teachers could, for example, accept, reject, feel positively or negatively, towards any concept, approach, or philosophy. Naturally, they too can hold these views towards democratic citizenship education. However, previous research has examined neither attitudes and beliefs in trainee teachers nor the influences of those beliefs. This framework guides the present exploratory study as it seeks to build an understanding of those attitudes and beliefs from two different contexts.

Methodology and methods

To address the research question, this study focused on two cases. Six participants were recruited from Teach First and six from a selective PGCE programme. The primary method of data collection was through individual interviews. As part of a larger study, additional methods were employed; as they are not relevant to the present study, they are not discussed here. Throughout the study, BERA ethical guidelines were followed.

The cases

A set of participants was recruited from the 2013-14 PGCE programme at the University of Cambridge. The course was a fairly typical PGCE programme in that it had a similar structure to those offered at other English universities: it was a one-year, postgraduate course. At the start of the year, the participants' time was largely based in the faculty; over the academic year, their time shifted to primarily placements with mentor teachers in schools. Topics covered in the teacher training included professional studies, sessions in individual subjects, and seminars within placement schools.

At the time of the research, the PGCE at the University Cambridge had consistently been highly ranked in independent assessments of initial teacher education programmes. Ofsted, the British education inspection department, had awarded it a "perfect score." The programme advertised that "competition [for places in the programme] is very strong." Entrance required participants to hold an honours first-class or upper second-class degree.

Simultaneously, an additional set of participants was recruited from the first-year cohort of the Teach First programme. The programme consisted of an intensive six-week summer training course; following this, the programme participants began solo teaching in the autumn. Trainee teachers committed to a two-year position in a school in a low-income area of England. Throughout the position, programme participants continued to receive support and professional development from TF, which eventually led to qualified teacher status. The training provided to programme participants included both professional studies and subject knowledge. An expressed mission of the programme was to address the achievement gap and inequalities due

to socio-economic disadvantage.

TF, as an educational institution, is assessed by Ofsted, and at the time of the study, had received a rating of "Outstanding" with a near perfect score. To join the programme, individuals had to submit to a "rigorous selection process" and were required to possess an upper second-class ("2:1") degree. At the time, TF had been rated as a "top graduate employer" in the United Kingdom.

TF had been selected as a case for this study because of its continued central position in discussions surrounding initial teacher training in the United Kingdom. The Cambridge PGCE was selected because of similarities to TF in entrance requirements; a high-achieving graduate could have a similar chance of success in applying to either programme.

This is not to suggest that the whole population of participants of the two programmes are the same. There are various factors that could encourage an applicant to prefer one over the other. For example, TF participants receive a salary during the programme, whilst PGCE students do not. Location could be another factor; Cambridge students are largely based in Cambridgeshire and surrounding areas for their placements. Additionally, potential participants can be attracted by certain philosophical draws of either of the programmes. Teach First makes addressing educational inequality a central tenet of its mission. It also has a unique brand that is valuable for future career prospects. It has partnered with various corporations like Google and PwC to provide development for careers outside education, with some even offering benefits like the ability to "jump" stages of job applications. Conversely, the University of Cambridge offers its own brand that may have a similar appeal. Thus, the cadres of participants for these two programmes can be quite distinct before the programmes even exert any direct influence.

The participants

Permission to recruit participants was obtained from programme leadership for both Teach First and the Faculty of Education at the University of Cambridge. A general appeal was emailed to students in the final term of their PGCE. Teach First students were recruited through an online message board system and through social media groups. The criterion to participate was any individual in either programme preparing to become either a primary or secondary teacher of any subject.

The appeals stated the study was about trainee teachers' beliefs but did not specifically mention democratic citizenship education to avoid priming and biasing participants' responses. Each of these appeals yielded a small number of participants, but not the desired size. Additional participants were recruited through a snowball recruitment technique; participants, colleagues, and other contacts encouraged participation from other eligible participants. Practical restraints of time and the programmes' schedules meant that purposeful, representative, or random sampling had to be sacrificed for convenience sampling. This led to a total of twelve participants, divided evenly between the two cases.

The Teach First participants were evenly split with three men and three women. Four were in the 18-24 age bracket and two in the 25-34 age bracket; all identified their race as white. As required for the programme, all had completed an undergraduate degree. One had previous experience in a career outside education. Three were working as secondary English teachers, and one each in primary education, secondary geography, and secondary science. Thus, while the demographic breakdown percentages do not match the entire TF cohort, they did represent

a range of backgrounds. Note that for ethical reasons, the specific demographics of each participant cannot be enumerated as this could reveal individuals' identities.

The PGCE participants equally came from a range of backgrounds. Four were women and two were men; their ages split evenly, three in the 18-24 age bracket and three aged 25-34. They too all identified their race as white. In addition to all having an undergraduate degree, one had completed a master's degree in a field other than education. Three, however, had some experience working in schools as teaching assistants or a similar capacity. The distribution of their subjects was one each in primary education, secondary geography, secondary history, and secondary mathematics; two were in secondary English. They are broadly similar to the other case's participants in terms of their demographic backgrounds. Again, their individual traits are not listed to protect their anonymity. (Subsequently, individual participants will be identified by pseudonyms.)

The sample does present typical limitations from the onset. A study of this size naturally has limited generalisability. The opt-in nature of the study presents a selection bias; participants with a particular interest in or particular values about educational research may be more inclined to participate than less-interested peers. Although informed that participation was anonymous and that their programmes would not be informed, some participants may have chosen to take part with the hope of making a positive impression on their tutors or mentors. However, these limitations are viewed as admissible. Because the purpose of the research is not to understand all trainee teachers' beliefs, but to build an understanding of some sets of beliefs, the perhaps-skewed sample still holds valid beliefs themselves that ought to be examined. Furthermore, because a random sampling technique was not employed, some sampling bias must be accepted.

The sample size also raises issues of reliability. It is quite likely that a selection of twelve different participants could provide very different results. Similarly, if the same participants participated again at a later point, they could profess to hold very different attitudes and beliefs. This, however, does not negate the importance of these attitudes and beliefs at the time of participating. As exploratory research, this must be accepted; indeed, it presents opportunities for interesting further research.

The interview
The primary source of data was through an individual semi-structured interview with each participant. Interviews were held in in the final term of the school year and generally lasted about an hour. Individual interviews were chosen as a good method to allow each participant's beliefs to be highlighted, rather than potentially being influenced by others in a group interview. Furthermore, attempting to arrange the practical considerations of a group interview with trainee teachers' schedules likely could have discouraged participation. An interview also had the advantage over written questionnaires by allowing the interviewer to probe responses and encourage elaboration.

The interview's content was developed from the research focus: to understand the participants' attitudes and beliefs about democratic citizenship education (as well as associated beliefs that are not addressed in the present paper). This research is based on the framework that teachers (and trainee teachers) hold attitudes and beliefs about the purposes of education; these beliefs may or may not include DCE to varying extents. A range of influences, including teacher preparation courses, may influence these attitudes and beliefs. Therefore, the questions were structured into three major segments before a final concluding question, outlined below.

Interviews began by explaining the purpose of the study and confirming the participants' informed consent. Interviewees were assured, "There is no right or wrong answer," and that the study was interested in understanding their genuine beliefs. The first segment of the interview served to build a rapport between the interviewer and interviewee as well as to activate the interviewees' thoughts on their teacher training. Participants were asked about their reasons for becoming a teacher, how they chose their level and subject, and why they selected the programme they did (either TF or the Cambridge PGCE). They were also asked about their general reactions to their course.

The second segment discussed the participants' views on education. Trainee teachers may not have consciously considered their beliefs or philosophies of education. To aid the conversation, participants were provided ten cards with different viewpoints about the purposes of education. These served as prompts for them to consider; they were able to consider each and gauge their reaction to it individually. Nine of these statements were derived from Michelli and Keiser (2005), Crick (1999), and Halstead and Pike (2006). Collectively, their research offered a range of statements regarding the purposes of education; therefore, they were an effective array of prompts for participants. Some of these cards related closely to the Gutmann's (1999) conceptualisation of democratic citizenship education, whilst others were quite distinct. A tenth card was simply labelled "Other." The ten statements are listed below in Table 1.

All ten cards were laid out face up before the participants in a random order, with the *Other* card last. They were told the cards represented different philosophies regarding the role of education; they might agree with some or all of them. They were then asked to select one they believed should be the most important role of education and explain why. Following a discussion extrapolating their rationale and interpretation of the first card, this was repeated for a second and optional third time. If they felt their first or first and second card summarised their views, they could say they were satisfied and not asked to choose an additional card. In the final question of this segment, interviewees were questioned about a card related to the conceptualisation of democratic citizenship education that they had not selected.

In the third major segment, the questions focused on the participants' teacher training programme. They were first shown an outline of the course topics to aid their recall and asked components of the course they found most influential. Next, participants were asked to consider the cards again, but this time to select the card they felt their programme would most agree with. For each of these questions, the interviewer encouraged them to explain their choice and why they felt that way. This segment was most related to research questions that were part of the larger study not expounded upon here. This segment is discussed presently for the sake of transparency and to present a complete description of the interview process; additionally, participants' comments made during this section of the interview could have relevance to the present study.

In a minor, final segment of the interview, participants were provided a definition of democratic citizenship education adapted from Gutmann (1999). Participants were asked for their reaction to the concept. The content of this segment relates back to that of the second section, but the question was withheld until the end so as to not influence the interviewees' responses in the third segment. Finally, interviewees were given the opportunity to expound about any of the topics discussed, their teacher preparation course, or anything they felt was relevant.

As with much research exploring individuals' beliefs, it can be difficult to ascertain the validity of participants' responses. Various measures were taken to encourage open, genuine responses. Introductory statements were made about "no right or wrong answer" to combat the social desirability bias. Additionally, the card selection process presented varying (and potentially competing or unpopular) statements equally and without favouritism. Finally, the semi-structured nature of the interview allowed the interviewer to press for more elaboration and explanation, which in turn could have encouraged more valid responses.

Analysis

Interviews with the participants were recorded (with the interviewees' permission) and subsequently transcribed.

Theoretical perspectives and inductive approaches were used to develop codes. That is, Gutmann's (1999) conceptualisation of democratic citizenship education provided the initial theoretical codes. Thus, transcripts were manually coded for talk related to *cohesive communities* and for *deliberative choice*. *Alternative purpose of education* was also used when the participant presented a different purpose.

Additional codes were developed through a close reading of the transcripts and by identifying themes that were discussed by the participants. These themes were then organised into cohesive codes by collapsing related concepts and separating dissimilar concepts. Therefore, the codes used for a final round of analysis were: *community (cohesion & cooperation)*; *community (conforming & fitting in)*; *critical thinking*; and *success and survival.* Subsequently, the transcripts were re-examined with attention to the codes to be applied to relevant segments of text.

Findings

Interviewee's dialogue throughout the interview provided useful information about their beliefs. Although their beliefs and philosophies were most directly questioned during their card selection, much of the most salient and revealing information came from their explanations, rationale, and further commentary. Many of the participants had quite varied interpretations of the meanings of particular statements; conversely, some found the same interpretation in different and unrelated statements. Of the twelve participants, three were satisfied with their first two selected cards and declined to choose a third. Some interviewees reported having difficultly selecting between two statements, with one eventually being chosen as only slightly more preferred than the other. Given the small sample size and diversity of responses, the interviewees' selections were not particularly suitable for quantitative analysis. The statement selections for participants, separated by case and in total, is summarised in Table 1.

The table illustrates that the choices of the PGCE participants are rather varied and evenly distributed. The exception is the statement, *promote students' problem solving and critical thinking skills* (n = 5); no other statement was selected by more than two participants.

The table also shows that amongst Teach First participants, three statements appear in at least three participants' responses: *teach socially and morally responsible behaviour* (n = 4); *provide the skills necessary for students to become successful and contributing members of society* (n = 3); and *teach socially and morally responsible behaviour* (n = 3). These selections alone accounted for 10 of the 16 statements selected by Teach First participants.

Table 1
Card listings and selection numbers

Card statement	# PGCE	# TF	# Total
Teach socially and morally responsible behaviour	2	4	6
Promote students' problem solving and critical thinking skills	5	1	6
Provide the skills necessary for students to become successful and contributing members of society	1	3	4
Make students effective in public life through knowledge, skills, and value	2	2	4
Provide a holistic approach to education which focuses on individual students' needs and self expressions	0	3	3
Encourage students to become involved in the life and concerns of their community	2	1	3
Teach personal development through learning principles (as opposed to facts) that have relevance across time and cultures	2	1	3
Teach the methods of discovery and reason through an exposure to the world's greatest thinkers and works	2	1	3
Teach the essentials of academic knowledge in traditional basic subjects	1	0	1
Other	0	0	0
[No card selected]	1	2	3

Because of the aforementioned variance in interpretations, analysis based on the selections alone would be incomplete and a potentially invalid interpretation of the participants' views. Regardless, the card selections demonstrate some initial differences between the participants' stated beliefs in the two group. As differences are more clearly seen in analysis of the further data, the findings of participants' views on DCE are presented below; findings for the PGCE and TF are presented separately.

PGCE students

In analysing the transcripts of PGCE student interviews, two major concepts were seen in many participants' responses, each discussed below: community and critical thinking.

When examining the PGCE participants' conceptualisations about community, it is apparent many of their responses focused on actions like living in society, interacting, and working with others. This occurred even in instances where the participant chose a card seemingly unrelated to the action of community. For example, Christopher selected the *Promote students' problem*

solving and critical thinking skills card, but said,

When you live with people and work with people, and you work as teams and you try to produce things, whether they're new things or old things, you need to be able to problem solve. And that will be something we need to do as humans.

While a key component of this segment is the concept of problem solving, for Christopher, this is linked with living with others and working as teams.

Other PGCE participants shared similar sentiments, often focusing on the idea of working together and mutual contributions. Another participant summed up this sentiment, "Happiness comes from interacting with others." All six of these participants talked about this sense of community for its own sake and benefitting the entirety of the community.

The second theme to emerge in the PGCE students' interviews was of critical thinking and problem solving. As would be expected, much discussion on this topic stemmed from the card *Promote students' problem solving and critical thinking skills*. However, the topic still emerged organically in the one participant (Claire) who did not select this card. While the other participants were quite explicit about the importance of problem solving, Claire's sentiments were implicit:

> And learning principles that you can apply across time and cultures, they're [students] going to come across so many things in their lives, that having something—having had that sort of knowledge in their learning [that] is applicable to a huge amount of things.

While she does not use the term critical thinking, she is referencing the idea; she wants students to take learning from one situation and apply it to other contexts. The participants viewed critical thinking as an end—it had its own value.

One PGCE participant, Christine, saw the idea of critical thinking being a key component of communities. Without being prompted to connecting the concepts, she said,

That, to me, is about students' independence and empowerment. So, I think that it is really important we don't just turn out either students who just accept current cultural norms or students who simply rebel against what we tell them. I think if we can help students to identify questions and problems and give them the tools with which to think about them, properly and critically, applied broadly that can help them individually in social situations but also more broadly when they move into adulthood, to help them to deal with worldwide problems and more broad social issues.

To Christine, deliberative choice is essential—students should neither automatically accept or rebel. This is necessary for social situations and for confronting societal issues. Christine described these concepts before having been prompted about DCE specifically, or even being asked about community or societal living.

When presented with a succinct definition of democratic citizenship education, all the PGCE participants agreed it was part of their role as a teacher. They did, however, differ in the extent to which their role was explicit rather than implicit. One stated, "Yeah, I think it is quite crucial. It's not explicit, but it's definitely there." Another participant stated the opposite, "In a subject like geography, we teach it very, very explicitly because we teach things like how communities work and how communities work together." Regardless of these differences, all the PGCE participants expressed a positive attitude towards the concept.

Teach First

Analysing the transcripts of the six TF participants showed two major themes prevalent in each

of the interviews; a third minor theme was also present in some. The three themes were skills for success, community, and realising students' strengths.

The theme of individual students' skills for success is very prevalent throughout the interviews with TF participants. They reiterated that a major role of education was to ensure that students achieved success. Many participants discussed the importance of learning skills to do this; three had chosen the *provide the skills necessary for students to become successful and contributing members of society* card. One interviewee, William, put this in a very striking manner,

> But you have to give them the skills in order to be a dustbin man, working in Tescos, be a policeman, be a prime minister, you have to give them the skills that will get them there. And I'd like to spend more time talking to them and fostering these skills and, you know, really nurturing them…

In discussing individual success and skills, William used employment (in a wide range of roles) as an indicator for success. Five of the TF participants spoke about skills; four discussed them in the context of employment.

The one participant who did not use employment in a discussion about skills for success was Joanne. Interestingly, she had chosen the card *Promote students' problem solving and critical thinking skills* but spoke about it in a different way than her PGCE counterparts. Instead of speaking about the purposes or values of critical thinking itself, she discussed it as a skill that leads to success. She stated, "They [problem solving and critical thinking] are skills I'm really trying to invent in my teaching and the things that I've had to do to be successful or to be where I am." Joanne does not explicitly equate success with employment but leaves ambiguous what success itself actually is. Like other TF participants, she is clear that a key role is providing students with skills for success.

A second major theme in the TF responses is that of community, specifically with a focus on behaviour and a sense of obedience. Many of them expressed that learning acceptable behaviour was an important role of education; some linked this to the concept of success. Ben talked extensively about individuals in society and the importance of behaving appropriately:
Or, at the very least, if a school doesn't reinforce what the parents teach in terms of social and moral behaviour, it shouldn't actively detract from that. Because allowing certain behaviours or not as being as strict on them, the effect is you basically tell the kids that it's okay to be truant or run around the school. Of course, if they had any job in the world, that wouldn't be okay.

Four other interviewees expressed similar ideas about the behaviour in school being behaviour that would be valued by the "real world" of work.

For the TF participants, community was something to be conformed to. One interviewee stated, "I'd say just helping them [students] learn what sort of behaviour—what sort of skills and knowledge—is going to make them well like and valued by society is probably important for them." For him, being part of a community is about fitting with accepted behaviours; this view is largely representative of the views of other participants.

Half of the TF participants discussed a third theme: the role of helping students realise their strengths. For the three who mentioned it, the topic came up towards the end of the discussion, subsequent to prior "first choices" of the purpose of education. This purpose was often mentioned as being linked to one or both of the major themes. For example, William discussed it as a component of being part of a community:

> So rather than just saying, "This is how you behave to be a member of society"—I think you should do that—but once you do that, now say, "Think about it for yourself. How do you think you can develop to be more useful or more valuable to society, playing to your strengths" … so helping identify their strengths and decisions.

While this quote demonstrates the concept of fitting in with the community, there is also an element of individual strengths. While only two other participants mentioned this concept, it was distinct and noteworthy.

When questioned explicitly about their beliefs about democratic citizenship education, the TF participants offered very mixed reactions. Two of the six unequivocally rejected that it was a role of education. Both stated their role was helping individuals rather than society as a whole. Ben was one of these participants; in a prior discussion, he had said, "It still should be [that] a school's function at the end of the day is to release into the world people—if you don't think that people coming out of a school should be able to take part in society, then why does a school exist?" According to him, the individual people should be prepared for society. Ben also had talked about preparing students to acquire the skills necessary to survive society and gain employment (quoted above). These sentiments substantiate his statement rejecting the role of teachers in democratic citizenship education.

The remaining four said they saw DCE as a role of education, to varying extents. Two of these were not opposed to the concept of democratic citizenship education but felt it too abstract or difficult to teach. They also both cited the current demands imposed by curricula and schools, particularly in relation to tests. The final two professed a positive attitude towards the concept but were divided on the extent it should be explicit. While one felt it was something that should be implicitly modelled, the primary school participant felt it was a role that primary education should openly and actively carry out. This demonstrates vast diversity in beliefs and attitudes towards DCE; this is despite the TF participants' largely shared sentiments when questioned about the purpose of education in general.

Discussion

Given the findings presented above, this section seeks to provide a perspective on the beliefs and attitudes of trainee teachers towards democratic citizenship education and compare the two cases of this study.

The PGCE participants express ideas that are generally aligned with this study's conceptualisation of DCE. The two major themes that were present in their responses, community and critical thinking, are closely related to Gutmann's (1999) definition. Their discussion of community closely reflects the conceptualisation of "cohesive communities," that is, ones in which society and individuals work together for mutual benefits. In addition, the concept of critical thinking is similar to the idea of "deliberative choice." While Gutmann's definition focuses more on deliberations regarding societal values, Kymlicka (2008) and Martin (2005) extend this notion to wider choices and actions that affect society, such as policies or community decisions.

In addition, the participants' reactions to the presented definition of DCE were generally enthusiastic and receptive. Taken together with their earlier statements, this suggests these participants have a generally positive attitude towards DCE and recognise it as a role of education. Despite this, there is little evidence to suggest a particularly strong endorsement of it; many of their supportive statements suggest implicit approval. At no point does a participant

outright proffer DCE as a primary purpose of education.

The Teach First participants expressed an opposing view of the purpose of education. When they discussed community, it was in a very different context. Instead of societies and individuals working towards mutual benefit, individuals must work to fit into communities and ensure their behaviour conforms. This is compounded by their emphasis on skills and strengths for individual success. These views reflect the trend observed by Michelli and Keiser (2005) that educational systems are moving away from a purpose of democracy-building towards a focus on technical, economic outcomes.

When asked directly for their reaction to DCE, the TF participants offered a wider range of reactions. With some supporting and some rejecting it as a purpose of education, the key conclusion is that their views cannot be summarised into a single, shared view. However, of those who did express support when presented with a definition of DCE, none had previously offered any comments that would suggest it was a priority in their purpose of education. Others went on to say that it was too difficult to implement due to other obligations. Therefore, their attitudes and beliefs towards DCE could be described as generally varied, but generally not a priority as a purpose of education.

Comparing the two cases collectively shows a sharp difference between the two groups. They have different levels of cohesiveness of belief (with PGCE participants tending to be more cohesive). They also collectively differ in the extent to which DCE tends to figure centrally in their beliefs about education's purpose.

Conclusion

There is great difficulty in attempting to understand individuals' attitudes, beliefs, and philosophies with a strong degree of validity. This study relied on asking the interviewees directly; the social desirability bias may have influenced the participants to provide what they thought would be the "right" answer (Kvale & Brinkmann, 2009; Potter & Hepburn, 2005). This particular conceptualisation of DCE, or even consideration of the purposes of education, was possibly new or unfamiliar to the participants. The attitudes or beliefs of trainee teachers may still have been "fluid" (Fives, 2011). The design of the interview schedule attempted to mitigate these by asking for general reactions to the purpose of education before asking about DCE directly. Cards provided the participants with prompts to start the discussion, while open ended questions encouraged more detailed (and valuable) explanations.

Caution should be taken before generalising the findings from these participants to the entirety of their respective programmes. With such small sample sizes and potentially unreliable sampling methods, it is presently impossible to ascertain the extent to which the participants' views are prevalent.

Regardless, these findings are themselves meaningful. The fact that some participants in these two programmes professed these views is itself salient. The present findings raise the question of the extent that these views are prevalent in participants of these two programmes. Are they widely held, or were the participants in the present study unusual outliers? Are the suggested findings sincerely held beliefs, or are they more superficial in nature? Are the minor differences seen here endemic of teachers from each case? Do the teacher education programmes exert any influence on teachers' beliefs and attitudes towards DCE? Future research, particularly on a

larger scale, using innovative methods of eliciting individuals' beliefs, or going into greater depth can continue to contribute to these interesting questions.

Additionally, these results are significant in terms of the dozen participants in this study. Even if their respective views are not widely held, these participants do report to hold them. As they each became teachers, those beliefs may affect their practice and may influence the beliefs of their colleagues and students. The extent to which this is the case can be the focus of further research. Whether or not the beliefs they hold are widely prevalent, understanding them contributes to a wider understanding of teachers' attitudes and beliefs.

Aside from prompting questions for further research, the present study has implications for initial teacher preparation. It can serve as an indication of the attitudes towards DCE that some trainee teachers hold. Just as the participants in this study have done, teacher educators can reflect on the beliefs they and their programmes hold towards the purposes of education and DCE. They can consider whether the views expressed by the participants in this study are aligned with the beliefs they would expect their trainee teachers to hold. Such conclusions can prompt discussions about how teacher education approaches DCE, both explicitly and implicitly.

As Gutmann's conceptualisation envisaged it, democracy is a paradoxical balance between cohesive communities and individuals' deliberative choice. By its nature then, democracy will always be precariously situated. If society expects teachers to work as builders and guardians of democracy and to educate democratic citizens, their beliefs and attitudes of such an education cannot be ignored.

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A Vygotskyan sociocultural perspective on the role of L1 in target language learning

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Although there have been an increasing number of empirical studies written about the use of the first language (L1) in pedagogical approaches over the past few decades (e.g. Turnbull, 2001; Lo, 2015; Lee, 2018), to date little has undressed the role of the L1 from a theoretical perspective for informing practitioners of theory-supported teaching practices. In this article, I discuss five key constructs (mediation, trans/languaging, the cognition/emotion relationship, zone of proximal development and scaffolding) that are central to a Vygotskian sociocultural theory of mind perspective on target language learning and teaching. Each discussion of a theoretical construct is followed by a review of two or more recent studies from task-based language teaching (TBLT) and content and language integrated learning (CLIL) whose findings I highlight or re-interpret with the Vygotskyan sociocultural lens. The discussion points to the multifaceted nature of L1, which I argue is dynamic per se and ought to be positioned within a wider classroom discourse. Such a re-conceptualization aims not only to (re-)acknowledge the mediating role of the L1 but also to help educators make research-informed decisions about their language use choices in classroom.

Keywords: Vygostskyan sociocultural theory of mind; L1 use in target language teaching and learning; meditation; translanguaging; cognition and emotion; zone of proximal development and scaffolding

Introduction

The recent decades have witnessed a debate over the use of first language (L1) in teaching a target language (TL). Early research (e.g. Auerbach, 1993) considered L1 use as a "problem" to be avoided in language learning classrooms, grounded by second language acquisition (SLA) theories. Although acknowledging the potential positive impacts of L1, behaviourists (e.g. Brooks, 1960) place more emphasis on negative transfer from the existing mother tongue habits, leading to Lado's (1957) proposal of Contrastive Analysis to deter L1 interference. Moving one step beyond error analysis on non-target like structures, developmentalists (e.g. Gass & Selinker, 1983) view the learner system as a whole but still believe that L1 impedes interlanguage development. Similarly, cognitive processing theorists' multicompetence model (e.g. Cummins, 1981, 2007) reconceptualizes language learners as bi-/multi-lingual users who can access more than one language repertoire, though whether positive or negative transfer arises depends on learners' effectiveness in coordinating learning strategies across languages. The role of the L1 is further downplayed in Krashen's (1982) Comprehensive Input Hypothesis, which excludes the students' native language in the classroom but concentrates on the communicative functions of the TL as in the Natural Approach and Communicative Language Teaching (CLT). Complementing these SLA theoretical perspectives, language learning classrooms have experienced a shift in pedagogical approaches from the heavily L1-reliant Grammar Translation Method to the strongly L1-prohibited Direct method and Audiolingual Method to the diminished- or in some cases unacknowledged - role of the L1 in CLT. Largely the SLA perspectives and related pedagogies discuss the L1 use in TL learning in relation to human cognition, leaving no room to elucidate the role of the L1 in processes of (co-)construction of knowledge at both social and psychological levels of the human mind. This

void can be effectively addressed through the lens of Vygotskyan sociocultural theory of mind (e.g. Lantolf, 2000; Swain & Lapkin, 2000).

Sociocultural theory provides a particularly effective framework for critically evaluating the role of the L1 in learning a TL because its chief enquiry also concerns how language mediates human activity both on the intrapsychological and interpsychological planes. To socioculturalists (e.g. Lantolf & Thorne, 2007), L1 is a crucial and often indispensible semiotic device that mediates the learning process, even when what is being learnt is a TL. This portrayal is based on the tenet that language (a cultural artefact) is the primary cognitive tool that organizes or regulates our thinking (Vygotsky, 1978). When the regulating function a language serves moves from intermental (object-/other-regulation) to intramental functioning (self-regulation), a qualitative leap happens (Lantolf & Thorne, 2006). By then language can mediate one's higher mental functions such as focusing attention and organizing. The language faculty would have been transformed qualitatively. Therefore, based on Vygotsky's (1986) ideas, it could be claimed that when learning a new language, one would not return to the immediate world of objects nor repeat past linguistic developments, but uses the internalized L1 as a mediator between the world of objects and the TL (p.161). However, such a theoretically complementary use of the L1 in TL learning conflicts with a belief that language teaching should be mostly or entirely TL-based in certain approaches such as the Direct Method (as an extreme example) and CLT (to varying extents) (though some approaches allow for an explicit role for the L1. Such distinction depends in part of whether the method is in nature deductive or inductive; for a review, see Ellis & Shintani, 2014).

The present paper will focus on two pedagogical approaches under the general umbrella of CLT, namely, task-based language teaching (TBLT) and content and language integrated learning (CLIL). TBLT aims to develop students' communicative competence by involving them in meaning-focused communication while performing tasks (Nunan, 2004). The term "communicative proficiency" denotes fluency in the communicative process, linguistic (attention to language forms) and interactional competence (use of TL to participate in discourse). These competences enable students to achieve the task goal. Thus, learning is evident as long as students can (1) construct and comprehend messages in spoken and written forms, (2) attend to the TL forms, and/or (3) fulfil the task goal. CLIL is a dual-focused approach which gives equal attention to content and language (Dalton-Puffer, 2011). Curricular content is taught through the medium of the TL, so that students can articulate the academic concepts using academic language. To claim that learning takes place, students should demonstrate development in (1) academic language and (2) content knowledge. If the use of any mediational means helps achieve these pedagogical aims in both approaches, they should not be precluded.

However, when it comes to using the L1 as a mediational tool, incongruence exists between the theories and practices of TBLT and CLIL. In theory, both, in conjunction with Krashen's (1982) Comprehensive Input Hypothesis, exclude the use of L1 and aim to maximize students' exposure to TL input to promote TL learning. TBLT and CLIL teachers are expected to use the TL more or less exclusively when performing teaching activities and classroom management. Neither is L1 use by students desirable. Ur (1996), for instance, warned teachers about the danger of learners' over-using L1 when performing communicative tasks in small group work. In practice, however, teachers and students' lapses into the L1 are not uncommon. Ellis and Shintani (2014) noted that in TBLT classrooms students often become so focused on achieving a task's goal that they frequently resort to L1 to resolve communication problems. Lo (2015) reported her observations in CLIL classrooms where teachers code-switched to L1 because TL

abstract content knowledge and academic language-imposed difficulties on learners. Both descriptions point to the same quandary: the over-application of the maximum input hypothesis makes the input incomprehensible, contradicting the ultimate rationale of any pedagogical approach: to promote learning.

It is against this backdrop that this paper reaffirms the mediating role of the L1 in TL learning with particular attention to TBLT and CLIL classrooms. This role will be illustrated with three constructs, namely cognitive, affective and interactional factors, that are central to Vygotskyan sociocultural theory perspective on TL learning and teaching. Tellingly, using L1 is not always helpful or essential in certain situations. To balance the whole discussion, promoting and, where appropriate, prohibiting effects of and mediating variables related to the L1 use will be addressed with reference to four empirical studies. These are selected either for their sociocultural orientations or isolated instances and findings appropriate for explication of the tripartite mediating role played by the L1. What follows flows from intra- to inter-psychological planes, making the role of L1 appear segmented and linear. It is in reality more dynamic because language internalization is a process subject to interactions with social and psychological variables (Leont'ev, 1981).

Cognitive mediator

This section explores the use of the L1 for cognitive mediation. This premise is based on the Vygotskyan notion that language is a "tool for thought" that mediates the human mind, that is, to focus attention of, structure and organize our thinking (Lantolf, 2000; Luria, 1982). Through language, mediation can be verbalized. The development of verbal mediation is evidenced in one using self-directed language, that is private speech, to accompany and regulate behaviour (Vygotsky, 1978). More recent forms of verbal mediation include languaging (which also includes private speech as a sub-form) (e.g. Maschler, 2009) and translanguaging (e.g. Li, 2011, 2016). The following evaluates how L1 serves as a cognitive mediator for regulating language and thought with relevance to two studies: one in terms of the translanguaging as a pedagogical approach in a CLIL classroom, and another in terms of private speech in a TBLT classroom.

Translanguaging posits that bi-/multi-lingual language users possess one linguistic repertoire from which they strategically choose features for effective communication (Li, 2017). A fuller definition in García and Li (2014) points to three connections between translanguaging and sociocultural theory. Both see language as a socially constructed symbolic artefact which individuals use in the process of cognitive transformation and that of interaction with and within the world. Both treat language as an activity. In particular, translanguaging entails dynamic bilingualism, in which language learners choose features from "a single array of disaggregated features that is always active" (p.15). Both also concern multidisciplinary.

Translanguaging as a pedagogical approach often occurs in CLIL classrooms where the medium-of-instruction tends to differ from the students' L1. Williams (1996) specified translanguaging in classrooms as the planned and systemic use of one language in input (listening/reading) and another language in the output (writing/speaking). Whether by teachers or by students, the integral and coherent use of the two languages helps manage and facilitate the mental process of learning. Expanding this, García (2009) defined translanguaging as multiple discursive practices that bi-/multilinguals are involved in so as to make sense of their

bi-/multilingual worlds (p. 45). Her emphasis is thus on engaging the audience to gain understanding and knowledge through the integration of their multiple linguistic repertories.

Although not explicitly framed within the sociocultural perspective, Lin and Lo's (2017) study aimed to understand how students and teachers co-construct content in CLIL through translanguaging in English-medium science lessons. Classroom observations were conducted in two schools in Hong Kong where the L1 of most students was Cantonese. School A had been using the TL, English, for instruction since its establishment, whereas School B had recently switched to English-medium at all levels and subjects. Another major difference lay in the years of experience of the two teachers being observed: twenty years for Mr B from School A and seven years for Miss A from School B, though they underwent similar science teacher professional training. Two of their Grade 10 lessons were analysed and presented in the article. The following extract from Mr B's lesson on the functions of protein stands out:

Table 1

An Excerpt from Lin & Lo (2017, p.36)	
1. Mr B:	Can you tell me which parts of your body are made up of protein?
2. S2:	Bones
3. Mr B:	Well, okay. Part of bones, right? I would like to say bones, bones also contain a lot of minerals. Okay? So part of bones. Anything else?
4. S2:	Hair.
5. Mr B:	Hair, okay, yes. Hair. And _____?
6. S2:	手指甲 (nails)
7. Mr B:	手指甲 (nails). Okay, actually hair, the nail. Anything else? (pause) How about animals? Animals have _____?
8. S3:	Horn
9. Mr B:	Horns, yes, horns. Actually they belong to the same class of proteins called keratin. 角,角,角,叫角質層呀 (Horns, horns, horns, (they are) called keratin). Okay? And also our skin, you know, skin. They all contain the same type of protein. So next time when you 食鹿茸 (eat antlers) [antlers as expressed in the term of Chinese medicine], you know, 鹿茸 (antlers), when you don't have the money to buy 鹿茸(antlers), what can you do? (pause) You bite your nail. Okay? Just bite your nail. It's the same protein. Okay? [Ss laughed] (pause) So anything else?

By using Cantonese phrases within the English language explanation, Mr B was integrating the two languages in a communicative unity to mediate students' understanding of the scientific concepts and language. Although being able to name the everyday examples of proteins, students grappled with finding a precise subject-specific word to generalize their answers. Mr. B supplied the term kertain. To mediate his students' understanding, he provided the L1 translation 角質層, that student might have encountered, for instance, in hair products advertisements in everyday life. He further expanded students' scientific knowledge by providing an example. This time, he mentioned the Chinese tradition of having antlers as medicine, that is, 食鹿茸 (eat antlers). This produced an "Aha!" moment among students, as

indicated by their laughter. Both students and the teacher were on the same page and the class discussion could move forward, thanks to the coherent act of translanguaging that helped clarify the complex academic language and concepts by drawing on students' L1 everyday language and knowledge. Learning, in terms of the CLIL principles (i.e. learn academic concepts and language), was taking place.

Such use of translanguaging can be expounded in cognitive terms. Kern (1994) described that L1 requires less attention than TL to decode words because it enables a synthesis of the semantic meaning that can be retained for a sufficient amount of time in the working memory. Cognitive load is lessened, facilitating processing and consolidating semantic meaning. This applies much to CLIL classrooms, where most subject-specific words and concepts in TL are too academic to have been encountered in daily life. Students need to have the unfamiliar TL knowledge translated for mapping with the equivalence in their more familiar L1 knowledge. This explains why Mr B used translation to connect the new scientific concept (external capital) to students' local funds of knowledge. Similar cognitive benefits with using L1 have been hinted at in other studies (e.g. Hilda et al., 2016), though to the best of my knowledge no research has empirically investigated the actual cognitive gains by students with the use of L1 in translanguaging in CLIL classrooms.

While translanguaging helps mediate thoughts in CLIL classrooms, a usual form of verbal mediation in TBLT classrooms as suggested by previous studies (e.g. Anton & Dicamilla, 1999) is private speech. It is an externalized verbal attempt to gain self-regulation during cognitively demanding tasks (Lantolf & Throne, 2006). While it is communicative in appearance given its genesis in social speech, the discourse created by private speech is more directed to the person who speaks rather than to the person who listens. Fernández Dobao (2014) captured episodes of how intermediate-level learners of Spanish as a foreign language at a US university used their L1, English, to language their lexical knowledge in TBLT classrooms, although the study did not aim to explicitly investigate L1 use nor associated cognitive processes.

The study, from a sociocultural perspective, aimed to investigate the opportunities that dyadic and small group work provide for peer collaboration and TL vocabulary learning. It focused on lexical language-related episodes (LREs) and compared the performance of the same collaborative writing task by students working in pairs or groups of four. Individuals were also assessed on their vocabulary learning gains from the LREs by comparing their performance in a vocabulary pre-test and an individual writing post-test. Results revealed that group interaction produced significantly more LREs and subsequently more occurrences of TL vocabulary learning compared to dyadic interaction. Of interest here is the languages used during the learning process. What follows illustrates the use of L1 to language thoughts when the group was brainstorming the Spanish word for meet.

Table 2

An Excerpt from Fernández Dobao (2014, p.509)	
1. Mary:	*deben:* meet *allí, no sé la palabra para* meet?
	(they should meet there, I don't know the word for meet?)
2. Jason:	uh like *encontrar*, no, that's to find, right?
	(to find)
3. David:	uh: es heh … *creo que es saber* um
	(it's, I think it's to know)

Jason made use of L1 private speech to regulate his misunderstanding and regain self-regulation in face of the difficult TL vocabulary. The interjection uh seemed to encode his intermental search for a Spanish equivalence of the verb meet, and thus the whole sentence served to externalize for his own sake what he was thinking. He first provided "encontrar" yet instantly realized that was not suitable for use in that discourse. The subsequent self-explanation focused his attention. The ending question "right" was rhetorical, in that Jason did not seek an answer but self-confirmation. By then, Jason appeared to have his understanding of the TL word "encontrar" crystallized and consolidated. Reinforcement of existing knowledge is also part of the learning process (Storch, 2008). Learning (in terms of the second TBLT principle: attend to the TL forms) took place, with using the L1 private speech as the medium to control and organize his thinking process when struggling to select the correct TL vocabulary. Similar use of L1 as a cognitive mediator can be found in most other episodes (p.506, 508), despite students being instructed to use only Spanish.

Although the frequent use of L1 was not addressed for it was not Fernández Dobao's (2014) focus, one plausible explanation relates to the task type. The collaborative writing task here could be categorized as a focused task (as opposed to unfocused task) because it demanded the use of a certain range of vocabulary and grammatical structures (p.502), and the coding system LREs attended exclusively to the lexes (p.501). Focus tasks tend to result in more language talk, which often involves externalization of metacognition through a stronger language (Brooks & Donato, 1994). This explains the students' resort to their L1 for mediating thinking about the language in the study. Put differently, task types determine the associated cognitive requirements and in turn affects students' language choice for overcoming the cognitive challenges. This issue of task effect has also been attested in previous studies, yet with specific attention to other categorizations, for example, task operations (e.g. problem-solving, exchanging information, creating) (e.g. Hancook, 1997) and task-modality (e.g. speaking, writing versus speaking) (e.g. Adams, 2006).

A comparison between the above two examples points to the differences in functions and relative importance of the L1 as a cognitive mediator in CLIL and TBLT classrooms in relation to the selected studies. In TBLT classrooms, L1 is used for mediating everyday language/concepts. In CLIL classrooms, L1 is more frequently used for regulating academic concepts, which are understood and expressed only in words and more abstract than everyday concepts which are both experienced and expressed in words (Vygotsky, 1986). Since most scientific concepts have parallel everyday referents, it follows logically that bi-/multilinguals capitalize and transform the contextual richness of everyday thought to comprehend and acquire academic concepts. As Cummins (2008) would agree, if language learners' prior knowledge is encoded in their L1, their L1 will unavoidably be implicated in their TL learning. After all, CLIL classrooms are about learning concepts in the TL, and concepts are in nature cognitive. Therefore, the L1 cognitive mediator seems to be more indispensible in activating students' prior knowledge and relating background knowledge to the TL learning in CLIL classrooms than in TBLT classrooms.

Affective mediator

If the L1 is a cognitive mediator, it must also be an affective mediator based on the Vygotskyan (1987) notion of "a unity of affective and intellectual processes" (p.50). Feeling and thinking are interwoven, with the volitional and affective orientation being implicated in the thinking

process itself. Emotions inform one's decision on what to think and how to behave afterwards. The behavior then generates new emotions and thoughts (e.g. anxiety/motivation). Emotion, cognition, and behavior magnify, diminish and redirect one another. Recognizing this totality of thinking-feeling-acting enables us to go beyond the language forms, and to recognize the affective functions that the chosen language serves.

One behavior that captures this unity of emotions and cognition is private speech, which is "the result of stress that can accompany the task of constructing meaning in L1 and TL" (Lantolf, 2000, p.31). The dual functions of private speech for regulating thoughts (discussed above) and emotions (discussed below) reinforce the intricate cognition/affect relationship. What follows are two examples of private speech - one each from TBLT and CLIL classrooms - to illustrate the cognition/affect unity. The focus will then be solely on affect and its co-constructing relations with the L1.

The TBLT example comes from Moore (2017). It has been chosen because of its sporadic mention of some sociocultural factors, self-identified focus on task-based instruction, and inclusion of instances of private speech during which students used their L1 to regulate feelings and thinking. The study aimed to explore the perspectives of Japanese learners of lower-intermediate English proficiency on the use of their L1 Japan during an oral presentation task in their TL English. For the task, the ten first-year undergraduates formed five pairs to share their experience and prepare a presentation on "The Great Wall of China" with reference to seven picture prompts. Their interactions were video- and audio-recorded for identifying L1 functions, and stimulated recalls were conducted for eliciting the learners' perceptions on the principled use of L1 in TL interaction and learning. Echoing previous studies (e.g. Moore, 2013) on the use of existing linguistic resources in task-based interaction, this study discovered variant uses of L1 by students for cognitive and social purposes. The focus here is on the students' emotive utterances such as:

Table 3

An Excerpt from Moore (2017, p.308)	
1. Haruka:	へ(huh) three hundred yen
2. Mika:	It's so…reasonable!
3. Haruka:	Yes! (laughs)
	......
1. Mika:	how to… あの(um) … how to access
2. Haruka:	access access

While contemplating the cognitively demanding tasks, the two learners unconsciously used a particular Japanese-styled back-channeling aizuchi to vent negative emotions so that the conversation could continue to move towards task completion. The hesitation and dashes suggested Mika and Haruka were not only talking to each other but also controlling their surprise (turn 1) and wondering (turn 5) during the thinking process. Mika and Haruka shared in the stimulated recall (p.314) that although they understood the importance of practicing the TL English, there were moments when English could not vividly convey their doubt (turn 1) and confusion (turn 5). Contrarily, these emotions could be well-captured in expressions in Japanese. Japanese became the only tool to mediate such emotional dissonance. Had Haruka and Mika not used L1, they would have stuck at those stages, let alone completing the task. Put differently, given the third TBLT guiding principle (i.e. fulfil the task goal), their use of

Japanese to regulate undesirable feelings while thinking so as to keep the English conversation going became explainable.

This study deserves praise for demonstrating the necessity of L1 when there is no direct equivalence in the TL to express the emotions being experienced. Those non-existing emotions in English are often negative or at least used to express negative emotions, which can otherwise create stress and "switch learning off" (Leont'ev, 1981). One may argue if there are any compensatory strategy, for example, using language-specific structures or other techniques in the TL to replace or avoid the use of L1 emotive words. This leads to another question as regards the teaching objectives of TBLT. TBLT seldom places emphasis on the vernacular language such as Japanese aizuchi in Moore's (2017) study, despite the fact that a task is theorized to achieve situational and interactional authenticity when the context resembles a real-life context promoting non-pedagogical conversation (Ellis, 2003). It is therefore often inevitable for students to switch back to their L1 when frustrated with the tasks because they are not taught the TL colloquialism to express their emotions. However, to date, no research has investigated into such potential correlation between the teaching focus and actual use of informal language by students to mediate feeling and thinking.

Another example where L1 is used as an affective mediator comes from a CLIL classroom recorded in Tavares (2015). The study was not anchored by a particular theoretical perspective. Instead, endeavored to "visualise, concretise, theorise classroom interactional discourse" in mathematics lessons (p.322), the study adopted a grounded case study approach and reported on the use of L1 by an experienced bilingual teacher Miss Sitt in her mathematics English-medium (EMI) classroom, whereby the Grade 9 average-ability students spoke L1 Cantonese. It was the first year that the students had mathematics lessons in the TL, English. By analyzing video-recorded class interaction and semi-structured interview data, Tavares identified a list of classroom practices for other teachers to learn from. For now, let us consider an episode of one of the lessons during which students struggled with the trigonometric identities.

Table 4

An Excerpt from Tavares (2015, p.326)	
1. Jenny:	Err … Put the Cosine θ … *[Struggling to come up with a word, she looked at Miss Sitt and said in L1]* 即係 … (That means …)
2. Teacher:	Okay, you try to speak in Chinese first.
3. Jenny:	將個 Cosine θ … 另外除 … (Use Cosine θ … Divide it by…)
4. Teacher:	Example 9.11 … Are you sure?
5. Jenny:	唔係 … 即係 … 將佢地兩個都除返 Cosine θ (No … That means … Divide both of them by Cosine θ)
6. Teacher:	Very good! Okay, can you repeat again in English? Try. *[Jenny continued to look at her book and hesitated.]*

Here the L1 functioned simultaneously as an affective and cognitive mediator. In turn 1, Jenny was so anxious to structure and organize her thinking that she unconsciously switched to L1, Cantonese. This could be explained in Nation's (2003) words: "using the TL can be a source of embarrassment particularly shy learners and those who feel they are not very proficient in the TL" (p.2). After all, it was the first year that the students had mathematics lessons in the TL, English (Tavares, 2015, p.327). Apart from being affectively uncomfortable with English, Jenny was cognitively unfamiliar with the topic. Even when using Cantonese, she needed to

answer twice. This pointed to the necessity of L1 for Jenny to regulate her thinking in face of this cognitively/affectively difficult mathematics question. In her second attempt, she could finally formulate the correct solution in Cantonese. In fact, Tavares (2015) noted that after a few more interactional exchanges, Jenny could translate completely and correctly her L1 understanding into the TL, though the transcript was no provided. In this sense, with reference to both CLIL principles (i.e. learn both academic concepts and language), the use of L1 mediated both language and language anxiety and enabled learning.

A close examination exclusively on the aspect of affect yields more insights into the L1 functions. At a micro level, the use of the L1 as an affective mediator alleviated Jenny's pressure when encountering that particular mathematics question. At a macro level, allowing the use of L1 created a supportive atmosphere. To establish this, Miss Sitt deliberately built in the use of L1 during peer talks so that students felt less stressful and could first focus on the concept before attending to the language. She also made it clear that she did not expect students to use English entirely considering that English was a new medium of instruction. Her students appreciated the permission of using their L1. They believed that "otherwise, it would be really difficult to adapt [to the sudden shift in medium of instruction (MOI)]" (p.324). Although it may be an overstatement for Tavares (2015) to urge teachers "to hold a firm belief that the use of L1 will have a positive impact on student learning" since he did not provide statistical evidence to quantify the actual learning gains across subjects and levels due to the L1 (p.332), it appears that allowing the use of this L1 affective mediator can to a certain extent help students relieve pressure especially at early stages of using a TL as the MOI in CLIL classrooms.

A question remains as to the actual use of the L1 to create positive affect to mediate students' understanding of complex concepts. Tavares provided no examples, but one can be found when revisiting Lin and Lo (2017). In the latter half of the lesson discussed above, Mr B continued to expand students' conceptual understanding of the functions of proteins by hinting on the prevalent work-out phenomenon in Hong Kong, with which most students would have heard of in daily life.

Table 5

An Excerpt from Lin & Lo (2017, p.36)	
1. Mr B:	Muscles, exactly, muscles. So people who want to build their body, they actually
	have to take in extra protein, like kind of, er, like milk powder.有無見過呀? (Have you seen that?) 嗰啲,嗰啲,食嗰啲補充劑. (Those, those, eat those supplements.) 有無呀? (Have you?) (…) (a student's name), you have the potential. [Ss laugh] Can you show us your muscles?
2. S6:	我無呀(I don't (have any muscle)) (…)

That Mr B used the L1 to involve students in developing scientific knowledge created rapport. Rapport is a form of attending to emotions and can build confidence (Mahn & John-Steiner, 2002, p.49). Before these verbal exchanges, students were still puzzled with the concepts of proteins, as evident by their pauses and hesitations when being asked questions by Mr B (p.36). Only when Mr B shifted to the L1 and created a humorous atmosphere as in this example, students laughed and had their stress relieved. More importantly, this "aha!" moment and their laughter implied that they now had a clearer idea of the actual daily use of proteins. Having

their scientific repertoire expanded and extended to everyday situations is part of learning (as regards the second CLIL principle: learn academic concepts). Only after having grasped concepts could students subsequently translate their content knowledge into the TL. Put differently, learning was aided by the positive classroom atmosphere, and the atmosphere was established by using the L1 for "getting personal [with students]" - a tactic that aids CLIL learning (Lemke, 1990).

The above three examples show that the L1 as an affective mediator can not only reduce language anxiety but also create affect. Normalized or positive emotionality enables one to engage in "externalization", that is, to be able to translate challenging task ideas or abstract thoughts in one's mind into a manageable form with the mediation of a cultural artefact - in this case, the L1 (Imai, 2010). Such an affective mechanism applies to both CLIL and TBLT classrooms, with slight differences. The creation of an emotional tone may be on the classroom level in CLIL classrooms, and on the student level in TBLT classrooms. Also, in task-based instruction, positive affect is often created in off-task talk when students are over-extending the topic to discuss something personal yet irrelevant to the task (e.g. Leeming, 2011). In fact, similar situations may arise in CLIL classrooms, if the teacher is building affect for the sake of, for example, simply getting personal. Put differently, while the L1 has the potential for mediating affect, be it negative or positive, this function may not necessarily promote but hinder learning. Whether the effect generated by the use of the L1 is conducive to TL learning largely depends on the ways teachers use the L1 in their own classrooms.

Interactional mediator

This section portrays L1 as an interactional mediator. The word "interactional" is chosen over "interpersonal" because the latter implies a dichotomy between interpersonal and intrapersonal (affect/cognition) or the mind-body dualism which Vygotsky (1978) argued against. Indeed, interaction enables intersubjectivity, an area within which interlocutors experience affective or cognitive transactions (Wertsch, 1985). For instance, in Mr B-led interaction (Tavares, 2015), all the use of the L1 Cantonese cultural-specific examples created "an emotional intersubjectivity". Within that, Mr B and his students were "feeling in common", allowing Mr B to mediate his students' emotions and cognition. Cognition, affect and interaction interlocked.

This notion that learning happens through intersubjectivity encounters are linked to two constructs about interaction, namely, zone of proximal development (ZPD) and scaffolding. These two will be presented below, followed by an illustration of how the L1 serves as an international mediator with two examples: one concerns peer scaffolding in a TBLT classroom and another regards teacher scaffolding in a CLIL classroom.

Originated from Vygotsky (1978), ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p.86). ZPD is not simply a place but an activity during which an individual can achieve through mediation rather than working alone (Swain et al., 2015). Such an activity may take two forms: learner-learner interactions in pairs or groups, for instance Jason and his peers talked in L1 English to collaboratively work out the target Spanish word (Fernández Dodao, 2014); and, teacher-led interactions, for example Mr B used L1 to quote a shared experience to

extend students' conceptual thematic pattern about proteins (Tavares, 2015). During these ZPDs, affect and cognition formed a unified whole to mediate and subsequently drove learning.

An associated construct is scaffolding, a process that enables a novice to perform a task, solve a problem or achieve a goal which would otherwise exceed his own competence (Wood, Bruner & Ross, 1976). Scaffolding can occur between teacher-and-student or student-and-student, as long as there exists an inter-mental zone (ZPD) in which one scaffolds another leading to incremental improvements of the original state. Scaffolds can be tangible resources, gestures, or verbal interaction. It is the last form, particularly the L1, that this paper is focuses on. As Swain et al. (2015) suggested, ZPD and scaffolding support each other conceptually and syntactically. Thus, no distinction is made below.

The use of L1 for peer scaffolding during the ZPD often happens in TBLT classrooms. It is probably because tasks are designed to be slightly beyond an individual's unassisted efforts so that there exist communicative needs and purposes between individuals in groups, that is, to collaborate efforts to achieve the assigned goal. Therefore, studies on TBLT classrooms framed within sociocultural theory often zoom into learner-learner interactions for analysis. An example comes from Fernández Dodao (2014).

While working on the collaborative writing task, a group of students of same intermediate proficiency of TL, Spanish, encountered a lexical problem and could only use their L1, English, to scaffold entry into Spanish:

Table 6

An Excerpt from Fernández Dodao (2014, p.508)	
1.Pat:	um … cómo se dice take the train?
	(how do you say take the train?)
2.Alice:	andar en tren?
	(to walk by train?)
3.Chris:	Toma
	(he takes)
4.Pat:	Toma
	(he takes)
5.Pat:	to:maron un … un tren
	(they took a train)

The entire interaction here was initiated by Pat's use of L1. Alice's answer was modelled on the English phrase take the train and got the noun correct. Chris changed the verb but its form was not appropriate for describing the past events that happened in the pictures. In this way, the learners co-created a ZPD during which the three students scaffolded each other. Building on the noun and verb provided by her peers, Pat was able to generate the correct phrase. She even conjugated the verb, demonstrating her understanding of the grammatical rules behind. Evidently, learning (the first TBLT principle: construe messages) was achieved among these same-level learners. Put this consideration of TL language proficiency forth, the use of the L1 interactional mediator helped transcend the traditional definition of novice-expert relationship in peer scaffolding. With a certain amount of L1, even same-level learners can, as a group, achieve a performance level beyond each individual learner's competence level - a finding also corroborated in previous studies in the sociocultural line of research (e.g. Storch & Aldosari, 2010).

While this study did not aim to investigate the role of L1 but the influence of number of participants on group interactions, this notion of grouping leads to a potential question as to whether there is a correlation between the L1 use and number of participants. Fernández Dodao (2014) suggested, from a sociocultural perspective, that the more participants, the more linguistic resources to be shared in the group since no two individuals share the same strengths and knowledge (p.514). Applying this claim to the above example may explain why the students of the same intermediate Spanish proficiency could still construe their messages entirely in Spanish with only three English words (but not more) as the trigger. It may not be that the three L1 words were sufficient alone, but that the three people (compared to two) pooled more individual knowledge together. In other words, one has reason to believe that although same-level peer scaffolding may still hold, the amount of L1 for negotiating language may increase as the number of participants decreases.

While most research on TBLT classes focus on peer interactions, studies on CLIL classes (e.g. Milne & Garcia, 2008) often focus primarily on teacher-student interactions. Although those studies seldom reason their partial research focus, one plausible explanation is that the typical challenges in CLIL classrooms are related to academic aspects of language and knowledge. To draw on multiple resources in the communicative repertoires (L1 everyday/ L1 academic/ L2 academic) easily exceeds student's cognitive and affective capacities. Thus, resolutions to these require assistance from a more capable other, and that person is often the teacher in the classroom. Interestingly, CLIL teachers often use one typical means to bridge the knowledge gap between every day and academic knowledge: the L1 (e.g. Lin, 2015). Teacher scaffolding with using this interactional mediator is therefore well-documented. Another episode from Tavares (2015) may exemplify this:

Table 7

An Excerpt from Tavares (2015, p.331)	
1. Teacher:	…replace Tangent θ by 2. Look at the board. replace Tangent θ by 2. *[writing 'replace by' on the blackboard and repeating the phrase]* *[looking at the class]* replace by 代替咗佢 (replace by), okay?
2. Teacher:	What about the second way? *[pausing for 2 seconds]* For this second way, what have they done here, Alice?
3. Alice:	At first he use the Sine θ over Cosine θ … err … equals Tangent θ
4. Teacher:	And then?
5. Alice:	And then … err … *[Alice's gestures suggesting uncertainty]*
6. Alice:	6 S3: That means change the Tangent θ equals Sino θ over Cosine θ
7. Teacher:	7 T: What happens on the third line?
8. Alice:	*[open-mouthed, remaining silent, looking at the teacher]*
9. Teacher:	The third line. Alternative solution. The third line. What have they done here?
10. Alice:	*[looking back at her book]* Err … he put the Cosine θ on the right. *[gestures to the right]*
11. Teacher:	Right! Put the Cosine θ on the right hand side. It becomes like that. How about the fourth line? What have they done?

12. Alice:	Err…Put the…Because Cosine θ equals 2.5 metre, so the 2.5 metre… *[inaudible] [her hand gesture suggesting that she was trying to come up with the word]*
13. Teacher:	to replace the…
14. Alice:	to replace the Sine θ
15. Teacher:	Very good! Okay? Now, therefore, afterwards …

Here the use of L1 served as a linguistic scaffold, foregrounding subsequent learning of academic language and higher-order concepts. In that lesson, being able to operate replacement in trigonometric questions was the major teaching objective. To ensure students understand the meaning of replacement, Miss Sitt provided parallel translation to the target verb replace with its Cantonese equivalence. This linguistic scaffolding was essential in that this activated Alice's subsequent higher-order thinking (turn 3) and formation of more academic English syntax with using replace (turn 14). Although by the end of the interaction, Alice could provide only partial explanations to the mathematics question, her language was more sophisticated moving towards the mathematics register. Seemingly, learning (both CLIL principles: learn academic language and concepts) was in progress, thanks to the ZPD enacted by Miss Sitt with using a tiny amount of L1 to scaffold Alice through the internalization of the academic vocabulary.

This example leads to questions as regards when and how much teachers should use the L1 interactional mediator in teacher-led interactions. Miss Sitt offered some ideas in her stimulated recall (p.327). She deliberately controlled herself to be using a little L1 only "at the beginning of class" when introducing concepts that students may have encountered in other subjects in L1. The "beginning" refers to the "initiation stage" in the three-move teacher-initiated Initiation-Response-Follow-up (IRF) model commonly found in CLIL lessons (for a discussion on the IRF model, see Sinclair & Coulthard, 1975). One may doubt if this is the best time to use the L1 - a question which has yet been answered in any quantitative or qualitative studies. However, Miss Sitt's teaching philosophy is worth mention here: "TL language use is the focus of output", and the use of L1 is only for eliciting students' prior knowledge foregrounding the progressive input in the TL (p.328). Largely what she was suggesting was that while the use of L1 can initiate and scaffold interaction, this interactional mediator is solely the means and should not be the ends in TL learning. As Lo (2015) suggested, there is no one-size-fits-all when it comes to the time and amount of L1 use. Whether it is used in initial or middle stages does not matter, as long as input in the TL increase gradually. After all, being able to operate concepts in the TL is the key learning objective in CLIL classrooms.

Although the two distinct forms of scaffolding in the above examples (TBLT: peer scaffolding; CLIL: teacher scaffolding) disallows a direct comparison between the two pedagogical approaches in terms of the use of L1 as an international mediator, the two examples point to one commonality. The concern ought not solely on the L1 per se, but the influence on this interactional mediating quality from factors in relation to the interlocutors (either peers or teachers) who are engaged in scaffolding during the ZPD. In task-based interactions, the level of language proficiency and number of participants may determine the amount and effectiveness of the L1 use. In CLIL teacher-led instructions, the strategic planning of the interactions and teacher's beliefs may impact the use and usefulness of the L1. Put differently, whether this L1 interactional mediator can realize its full potentials depends on variables in real practice. If used strategically, even a small amount of L1 can enact unexpectedly effective scaffolding functions during one's ZPD.

Conclusion

From a sociocultural perspective, L1 serves as a cognitive, affective and interactional mediator in TL learning as illustrated in the above examples from TBLT and CLIL classrooms. The sociocultural lens allows us to redress the use of L1 not merely as an easier route to take but more importantly as a means for students and teachers to mediate language and thought, vent emotions and perform scaffolding in face of cognitively/emotionally challenging tasks, complex academic languages and abstract concepts.

These tradic dimensions are not as segmented as the way they are presented above. Rather, they interact and enhance each other to amplify the mediating function of L1 to the fullest than any one of them alone. As discussed above, in Lin and Lo (2017), Mr B used translanguaging as a pedagogical approach to scaffold students' understanding of the protein properties. This activity also established an emotional intersubjectivity, during which students had their emotional attachment aroused by the use of the cultural specific Chinese examples. Eventually, students moved through the ZPD and appropriated the scientific concepts. In other words, learning was achieved only through combining the cognitive, affective and interactional functions of L1. This multidimensional way of thinking may be captured as follows:
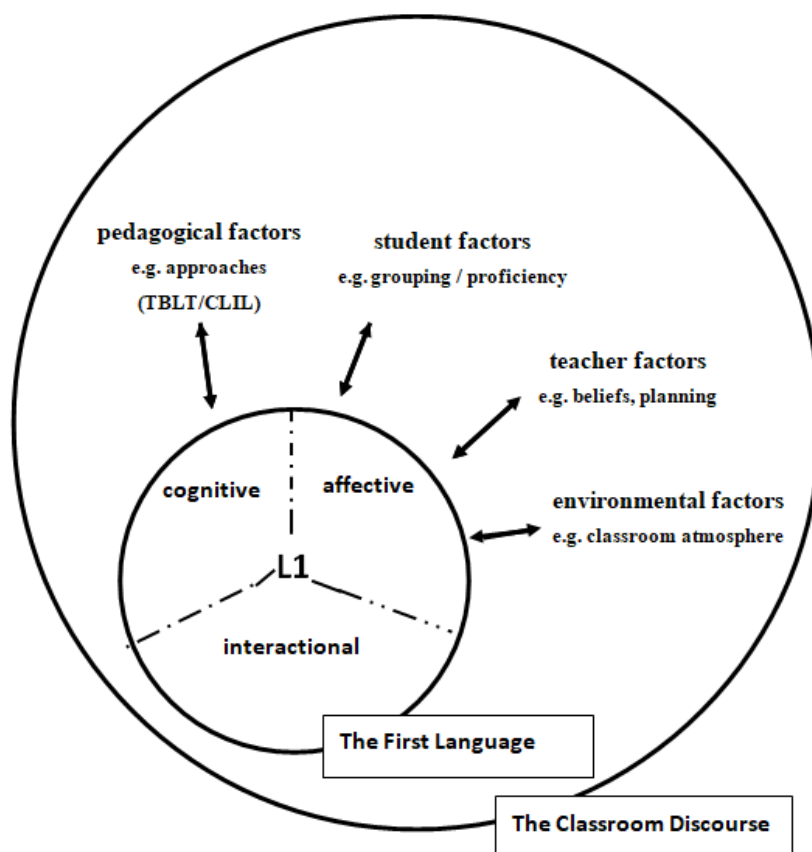
Figure 1. Conceptualization of the L1 as a mediational tool in the classroom

The role of the L1 needs to be considered in relation to a wider classroom context. A range of factors can determine, or in some cases pre-determine, the effects and effectiveness of the L1 as a mediational tool. These include teacher's beliefs, students' levels and features of pedagogical approaches. These factors may interact with the L1, as we have seen in Tavares's (2015) example that the L1 use changed the classroom atmosphere, mediating students cognitive and affective pressure during the new shift in MOI. In some cases, the use of L1 may

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cause negative consequences, for example too much L1 may hamper the development of TL fluency in TBLT classrooms, leading to teachers' stigmatization of the L1 use or students' guilt when lapsing into their L1. While such bidirectional relationship between L1 and other factors appears intricate, this has remained an underexplored area to date.

Although focusing the discussion exclusively on L1, my intention is not to dichotomize L1 and TL but to identity a tool conducive to language learning. Learning a new language needs not be unlearning an existing language. Li's (2017) argument merits attention:
The actual purpose of learning new languages - to become bilingual and multilingual rather than to replace the learner's L1 to become another monolingual - often gets forgotten or neglected, and the bilingual, rather than monolingual, speaker is rarely used as the model for teaching and learning (p.8)

The intimate relationship between L1 and TL should therefore be acknowledged. Indeed, if the teacher and students can appropriately interweave the two together, L1 can yield many benefits in the language learning process. I end by hoping that the mediating value of L1 on TL learning at cognitive, affective and interactional levels discussed above respond to this call appropriately, providing teachers an integrated lens to recognize the facilitative role that L1 can play toward real multilingual language learning in classrooms.

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Special Paper

Social media for Academics and Early Career Researchers: An Interview with Dr Mark Carrigan

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Social media is becoming an integral part of academic life and more academics utilise platforms such us Twitter to communicate about their work. But how can social media platforms be used most effectively and what are some of the common pitfalls? How can early career researchers develop an academic narrative through social media? In this special paper, Dr Mark Carrigan, author of Social Media for Academics, will outline how academics and early career researchers can use social media to create an academic identity, promote their work, generate impact, and engage the public with their research.

Mark Carrigan is a digital sociologist at the University of Cambridge and The Sociological Review Foundation. His research explores how the proliferation of platforms is reshaping social life, particularly in relation to the social sciences and their role within and beyond the university. He is internationally recognised as a leading expert on the role of social media within higher education. He is social media editor of the International Journal of Social Research Methodology and associate editor of Civic Sociology. He is a member of the editorial boards of Discover Society, Applied Social Theory and Social Research Practice. He is a trustee of the Social Research Association, a research associate at the LSE's Public Policy Group and a member of the Centre for Social Ontology.

INTRODUCTION TO SOCIAL MEDIA
In this section Mark introduces the audience to social media, gives examples of commercial and non-commercial social media platforms designed for academics and talks about their rapidly evolving role in academic life.

Given your experience in social media and the second edition release of your book Social Media for Academics, how would you define social media?
It is one of those phrases that everyone uses, and most people know what is meant when they encounter its use, yet it's quite a difficult term to define. If media are something which mediates between people in some way, then how could media be anything other than social? It is also often used in a way that loses sight of predecessors to what we now call "social media" such as bulletin boards and mailing lists which are still popular and prominent within the academy. I would like to define social media in a way that can encompass all that. However, in terms of how 'social media' tends to be used, it is typically restricted to a certain cluster of commercial platforms which all intend to facilitate the transmission, circulation and reception of content. There are some non-commercial alternatives, such as Mastodon and Humanities Commons, which have been developed in part and in response to these mass commercial platforms. But the commercial platforms largely define the common understanding of social media.

What are the current main social media platforms that academia can use?
There are the popular platforms which are intended for a general audience and many academics might use in a private capacity. For instance, Twitter, Facebook, YouTube, Pinterest or Instagram. When they use them in a more professional way, it tends to be a specific use of a

service designed to be used in different ways by different kinds of people. There are also specifically academic social networking platforms like academia.edu, and Research Gate, Mendeley to a lesser extent and, as mentioned, Humanities Commons, a non-commercial social media platform. There are three subtypes of social media platforms: (i) non-commercial platforms designed specifically for academics; (ii) commercial platforms designed for academics; and (iii) commercial platforms designed for everyone.

What is the evolving role of social media in higher education?
The evolving role of social media is very interesting because when I started a PhD in 2008, it was still in its infancy and was largely invisible within universities, beyond interaction in peer networks. Now it is increasingly prominent. I am very interested in how we utilize it at events such as conferences where there are numerous ways in which we see social media in a room, even if indirectly. Increasingly, particularly in in some fields and disciplines in UK universities and more widely, people feel expected to engage on social media and that is an interesting change from when it was something people had to advocate for in the face of mass scepticism. Increasingly it is coming to be seen as, if not something that everyone does, the kind of thing that scholars *should* do.

WHY SHOULD ACADEMICS USE SOCIAL MEDIA?
In this section Mark outlines how social media can be used by academics to publicise their work, build networks, manage information and demonstrate impact.

How can social media be beneficial for academics?
There are lots of ways in which social media can be beneficial for academics. It can help increase your visibility within your field, encourage people to read your publications, keep up to date with developments, build wider professional networks and collaborate with groups outside the academy. But it also makes a more open, collaborative and interdisciplinary form of scholarship possible by empowering scholarly networks and leaving them less dependent on the traditional gatekeepers of academic life. Therefore, I think we need to strike a balance between focusing on how individual academics might benefit from using these channels and how it might enhance scholarly culture as a whole.

How can academics use social media to promote their work?
The most obvious way to use social media to promote your work is simply to use it to *tell* people about your work. The problem is this often is not very interesting. For instance, when more senior academics take to social media for the first time – this is very common with Twitter, for instance – you will see people announcing events which they are going to be keynoting at or loudly informing people about their new book which is coming out. There is nothing wrong with that, but it misses something significant about the character of the conversations on these platforms, which is that they reward substance. If you are talking solely about something you have already done, it doesn't have that substance. Social media can certainly be used by academics as a way of increasing the flow of information. You are helping ensure that people know that you have done this thing they might be interested in. However, there is a huge layer of potential activity beyond that, which is much more interesting and involves sharing what you are doing, putting it in context, sharing the evolving story of the work you are engaged in and why it matters to you. Rather than simply saying, "I have done this, you should look at it".

How can social media be utilised to build networks and get in touch with colleagues or people who are interested in your work?
Many academics have a distaste for self-publicising, in the same way they do for the notion of networking. I understand this, and I share it. One of the exciting things about social media is that it allows you to 'network' without being creepy or inauthentic. The term 'networking' often has the connotation of seeking out people who are *useful* to you, standing at a party while looking over the shoulder of the people you are talking to in case someone more useful to you walks into the room. For all the problems there are about how social media platforms are designed, one valuable feature is the way in which it encourages convergence between people who share similar interests. I have always found that the best way to build an audience on social media is to talk in whatever format fits the platform (style, tone, length etc) about what you are doing and why it matters to you. If you are talking through social media about what matters to you, all other things being equal, you will start to find other people to whom these things also matter. Certainly, there are many issues about the attention economy which condition who gets heard and by how many people, but I maintain the underlying trend is nonetheless real. This is really interesting because I think it quite easily opens up a kind of networking that is based on shared concerns and commitments rather than reciprocal usefulness. In a very instrumentalised and metricised academy this can be a powerful bulwark against competitive individualism. It helps foreground the things that we share, the reason we get up in the morning, and the reason we do our research. In some ways, it is the opposite of networking in the aforementioned sense of self-interested manipulation.

Do you think social media can also be used by teachers and educators to engage the public?
The potential is there, and this is one of the reasons why social media is being encouraged in many universities. There is the necessity of being seen to produce societal impact through research, and then quantify and demonstrate that impact. Many people see that social media has some role to play there but the question is what is that role? It is often overstated, and I am concerned that people have excessive expectations that will inevitably be dashed by the mundane reality of using social media as an academic. Social media can be used effectively to engage with publics if you have a very concretely defined audience, with a clear sense of why they would be interested, and what you are trying to do with them. It's necessary to have a strategic plan about the way in which you are using it to build a connection with them over time. Crucially, it will likely be more powerful when used to support face-to-face engagement rather than being an end in itself. I worry that some people see themselves as using social media to be a public intellectual; using social media to write a blog post or send out tweets and imagining themselves to be talking to the public at large. That is problematic because it is inaccurate – you are not talking to the public at large, you are talking to a subset of a subset of the people you are connected to on a given platform. It also inculcates a certain way of approaching social media, that we are intellectuals offering opinions from on high. It is rarely an effective strategy for building a following on a platform because it is often not very interesting to see people do this.

WHAT TO BE CAUTIOUS OF WHEN USING SOCIAL MEDIA PLATFORMS
In this section Mark illustrates the common risks and pitfalls associated with the use of social media by academics including pressure to use them, lack of commonly agreed standards for their use, potential lack of public engagement and navigating their professional identity and busy schedules.

Have you identified any pitfalls or risks when using social media platforms?
The one that I was preoccupied by for a long time was simply that people are overly enthusiastic and have expectations of what they will get out of it which are unlikely to be met; or, conversely, that people feel pressured into doing it thinking that this is what everyone is doing. Social media platforms are often presented as vast, fast-moving, vibrant spaces and this helps construct them as something which academics need to do in order to keep up to date. Over-enthusiasm is a problem but so is a false sense of digital engagement as something necessary and unavoidable. The way we talk about social media is important for these reasons, as it often contributes to these unhelpful understandings of how academics should approach them. We also need scholarly standards, and this will help address the second pitfall, which is a sense of normlessness. We often oscillate between assuming there is a right and a wrong way to use these platforms and that everyone knows it other than us. There is a recognition of chaos that emerges when we see that actually there are not any commonly agreed upon standards, whereas there is almost a universal consensus on something like peer review within the academy. There is nothing akin to that although there are competing views about what is appropriate for social media.

That ties into the third pitfall which is the risk that as academics embrace social media, particularly with a view to public engagement, they may find that actually the public not only might not be interested in what they are doing, but actually might be actively hostile to it. This might be a response to *who* academics are rather than what they are doing. The risks here are faced much more by some than others; as a middle-class white male, I very rarely get trolled online. Women and people of colour engaging online are much more likely to, at the very least, have to deal with a barrage of implicit requests to justify their status and attempts to explain to them things which they already know. This can escalate into really obscene forms of abuse, which are in some cases, straightforwardly criminal. If we see social media in an individualised way, then individual academics bear these risks themselves. We need scaffolding to support and surround this kind of activity. The way in which social media tends to be talked about isn't helpful for this at all.

How do academics maintain their professional identity if they use social media? Is it an easy thing to navigate?
I have never found it easy to navigate simply because the dichotomy between personal and professional has never completely made sense to me. I have always tended to see it more as a case of different zones of my life. There are some I'm inclined to talk about online, there are some I am willing to talk about if it is relevant and there are some that just are not things I want to share. In some ways this cuts *across* the boundary between public and private. When people do try to enforce that distinction, they often do it by using different platforms with different purposes. A platform like Facebook is often seen as obviously private, whereas Twitter is regarded as more public-facing. The danger in this is that it multiplies the platforms that we try to engage on and diminishes the time we have available for it. It is also quite tricky in practice and this points to an interesting sociological shift in how personal life works. As personal networks become more diffuse, particularly as we work in different contexts and we move around a lot, the boundary between someone who is a colleague or a friend, for instance, can be tricky to maintain in practice. It is not that it cannot be enforced, it is that it takes work to enforce it and if you want to do it, you have to think from the outset about the categories, who fits in them, under what conditions will you allow someone to follow you or not. The more prepared you are to answer these questions, the easier it is to enforce this distinction.

Given time constraints, how can social media be built into an academic's professional schedule?

If it becomes something you to add to a to do list, you are unlikely to enjoy using it and you are unlikely to sustain it. The more it can be part of what it is you do, the more it can be built into activities themselves, the easier it is use it in a sustainable way and it can often save your time. Two of my favourite examples are organising events, and the kind of prewriting processes that involves reflecting on things that you are reading. For organising events, if you build a social media following with plenty of people who are interested in the topic of the events you are organising, it can save enormous amount of time. For pre-writing, reflective writing through blogging that precedes more formal writing, I find that the more immediately I do this the quicker it becomes. This is often the most enjoyable writing I do. It is really quick, because when you have that idea in your mind, you can often just knock it out, externalise your thoughts onto the page in an almost automatic fashion. It lays the groundwork for longer form writing and gives concrete form to what would otherwise be a diffuse process of thinking things through.

In both cases, social media has saved me time rather than taken it up. This is a combination of the properties of the platforms and how they've become routine parts of my working life. Nonetheless I became very interested in the question of when in the day academics use social media because I often find it intrusive when writing. The fact that it is there, and it is accessible means you can always find yourself drifting towards it. It can be something that encourages distraction and procrastination and a lot depends on how you control the use of it. The more you can ensure you use it at times that work for you and you do not fall into using it at time that are getting in the way of what you are trying to do, the more likely is that you will enjoy it over time and it will not cause problems. That is a difficult balance to strike particularly because these platforms were designed to encourage us to use them more. They are intended to be rewarding, they are measuring the extent of our engagement, the ups and downs over time, and in many ways, we are working against the system if we are trying to be cautious about the time we spend on these platforms. Tools like Freedom and Moment can be exceptionally helpful if you're struggling with this. But unless you understand your own habits, it's hard to use them effectively.

ADVICE FOR YOUNG RESEARCHERS

This section is dedicated to graduate students and early career researchers who want to start utilising social media to promote their academic identity. Mark gives practical advice on how to cultivate an online presence by building a personal website.

Let us think about young researchers now and imagine someone who wants to start using social media as an outlet for academic scholarship. What are the first steps or which platform would you recommend early researchers start with?

It is easy to forget the importance of university webpages in this kind of discussions. One of the powerful features of university websites is that it has a very high Google ranking. This could be a base where you lay out something about yourself and you link to social media profiles. This is an important way to ensure that if someone searched for your name, they will be able to find you. However, there are problems with university websites because they are often very restrictive. In some places you cannot do the updates yourself, so it is good to have your own website as well. In the creative industries, this has been common practise for a long time. You know any aspiring artist, photographer, film maker will have their own website and it is strange that the practice is still relatively rare amongst early career researchers in academia.

To have your own website with your own domain name can be very powerful. There are a whole range of ways of doing this. Google Sites is something straightforward but aesthetically not so pleasing. Services such as Squarespace or Wix allow you to quickly build your own website that can be very attractive. Wordpress is an immensely flexible option, even if you don't want to use the site as a blog.

What content would you include in a personal website of an early career researcher who may not have many publications?
You can talk about what you are doing, why you are working on this topic rather than others. You have to create a narrative about yourself that works for you. It can be a trial and error process to do this. Have a go at telling a story about your research for the first time and you'll get a sense of whether this story feels right to you. Does it feel inauthentic to you? If so, you can have another go until you construct a narrative which feels like it conveys something of what motivates you as a researcher. This kind of writing often feels new to people who do it but it's not. Your CV is a kind of a biography, as is the publications list you build up, albeit an alienated one conveying *what* you have done but not *why* you have done it. What's key to developing a sense of professional identity is how you locate yourself in relation to disciplines and fields, in relation to intellectual movements, in relation to objects of research. It is going to change over time but the more you can practise writing this kind of narrative, the better. It can be the bedrock of a website which you supplement over time with things you do publicly that you can point to as you do them. If you are a senior professor, it might make sense for the website to be full of content. For instance, if someone was looking at the sociologist Jeffrey Alexander's website, they would find an enormous list of publications and links to downloadable PDFs for almost all of them. If you're going to Jeffrey Alexander's site, you likely already know who he is, and you are looking because you want something from it so that focus on the content is very useful. The more junior you are, the more important the narrative becomes, and the narrative becomes the context in which you can add in this content as you produce it.

CONCLUDING REMARKS
In this section Mark offers the final pieces of advice to academics about how they can incorporate social media in their research and find further resources, as well as stresses the importance of reflecting on their aims of using social media.

What other resources can academics consult should they want to develop their social media presence and learn more about it?
There is a small literature opening up in this area. My former colleagues at the London School of Economics and Political Science (LSE), Amy Mollett, Cheryl Brumley, Chris Gilson, and Sierra Williams wrote a book called Communicating your Research for Social Media, which has a particular focus on research communication. Arlene Stein and Jessie Daniels wrote a book called Going Public for Social Scientists which extends beyond social media. I also recommend a book called The Public Professor: How to Use Your Research to Change the World by Mary Virginia Lee Badgett. There are also other books that offer a lot of insight in this area. The Ideas Industry by Daniel W. Drezner refers to how what the author terms the 'marketplace of ideas' is being transformed and throughout the book there are some very useful insights that are applicable to academics using social media. The Research Impact Handbook by Mark S. Reed is specifically about research impact, with a useful section on social media. As well as books, the LSE Impact Blog has many resources that are new and interesting. There are two blogs called ProfHacker and GradHacker that have a lot of useful ideas. Conditionally

Accepted is a blog about inequality in higher education, and regularly has some really important information about social media. Two more blogs that have a more doctoral focus and extends beyond social media would be Pat Thomson's blog Patter, and The Thesis Whisperer edited by Inger Mewburn. In both blogs social media is not the main focus but they often have wonderful insights into social media and sometimes write directly about the topic.

If you had to give one and only one piece of advice to academics about their use of social media, what would you say?
Reflect on what you are doing. If you are not clear about why you are doing what you are doing, then the risk is it will be a waste of your time. This is quite significant and the clearer you can be about what it is you want to achieve, the more likely it is you're going to achieve it. The most mundane risk of social media for academics is simply getting drawn into activity which does not really help you in any way and which you do not get much out of. In other words, it might all prove to be a waste of your time if you're not careful.