Opening Up the Profession: Inclusive Messages for Pre-Service Teachers from a Pedagogy Textbook

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Textbooks are a ubiquitous part of classrooms in all levels of education. Whilst textbooks used in tertiary content subjects have been examined in several studies, research focused on textbooks used in mathematics pedagogy subjects is scarce. Using a discourse analytic framework, this paper presents data about the implicit and explicit messages sent to pre-service primary teachers by a mathematics pedagogy textbook. Results suggest the majority of messages sent are inclusionary. However, there are contradictions and ambiguities about nature and field of mathematics education within these messages that are also discussed.

Introduction

Textbooks are a ubiquitous part of classrooms, both in school mathematics and in higher education. Whilst several studies have examined textbook use in tertiary mathematics content subjects (e.g., Lithner, 2003; McCrory & Stylianides, 2014; Mesa & Griffiths, 2012; Weinberg, Wiesner, Benesh, & Boester, 2012), research surrounding textbook use with pre-service teachers in tertiary mathematics pedagogy subjects is scarce. As pre-service teachers engage in mathematics pedagogy subjects, they are learning about mathematics education whilst also being welcomed into this community. The information presented by mathematics pedagogy textbooks and the ways in which these textbooks are positioned within the subject can send explicit and implicit messages to and about prospective teachers.

In this paper, I will examine the messages sent by a popular mathematics pedagogy textbook aimed at primary pre-service teachers, *Elementary and Middle School Mathematics: Teaching Developmentally* (Van de Walle, Karp, & Bay-Williams, 2013). Using aspects of a discourse analytic framework, focussed on language and text forms, I will investigate and analyse features of the preface that introduce readers to this pedagogy textbook whilst also welcoming readers to the teaching profession.

Text Features

O'Keeffe and O'Donoghue (2015) emphasised the role of language as part of analysing mathematics textbooks. They posited that "although textbook analysis and language analysis are both standalone topics in the area of mathematics education research, they can be integrated effectively to advance research and design of mathematics textbooks" (p. 626). Similarly, Otte (1983) proposed that written materials could be examined through their objectively given structure and discourse and also through a subjective scheme focused on the interaction between the reader and the text. The objectively given structure and discourse that Otte referred to can include features such as pronoun use, modality and imperatives. Each of these features contributes to the "voice" of the textbook and the messages sent by the textbook and authors to the readers (Herbel-Eisenmann & Wagner, 2005; Herbel-Eisenmann, 2007; Love & Pimm, 1996; Morgan, 1996; Rotman, 1988). These text features are described below.

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Pronoun Use

Personal pronouns help to foster a relationship between the reader and the author of the textbook. Using first-person pronouns (e.g., I, we, our) can indicate the author's "personal involvement with activity portrayed in the text" (Morgan, 1996, p. 5). This can communicate the author's intentions (e.g., "I hope this book…"). First-person pronouns can also suggest that the author is speaking with the authority of the mathematics education community, particularly if "we" is used (e.g., "We want students to…"). Yet, the use of "we" can also be inclusive, involving the reader in mathematics education (e.g., "In the student work, we saw…").

The second-person pronoun 'you' should also be examined because it addresses the reader directly" (Herbel-Eisenmann, 2007, p. 350). An author can use second-person pronouns (e.g., you, yourself) to help establish a relatively close relationship with the reader. Yet, the use of "you" by an author can also position him or her as the authority in the relationship through the directives given to the reader (e.g., "You will…"; Morgan, 1996).

Modality

Modality features in a text are indications of degrees of certainty and obligation. These indications can be "expressed through the use of modal auxiliary verbs (must, will, could, etc.), adverbs (certainly, possibly), or adjectives (e.g., I am sure that…)" (Morgan, 1996, p. 6). Using modality can influence the authority of the author by helping the author avoid the fact that the relationship he or she is trying to establish is with an unknown reader. In the statement, "…the text can also help you…", the author does not know whether or not the reader will actually be helped by the text. The author makes an assumption about the knowledge base of the reader, a reader that the author does not personally know. The use of modality auxiliary verbs can also help establish authority with the author. Statements like "You will notice…" and "You will see…" help the author emphasise information that the reader should find important and/or interesting (Morgan, 1996).

Imperatives

Grammatically, imperatives are verbs that communicate commands (e.g., "Construct a table…"). When looking at imperatives in mathematics textbooks, Rotman (1988) considered whether the imperative was inclusive or exclusive depending on what the imperative implies for the reader. Rotman posited that inclusive imperatives (e.g., "consider," "prove," etc.) help the reader to think about mathematics. These inclusive imperatives also serve as a way to foster a shared thinking space about ideas between the author and the reader according to Rotman, where "the speaker and hearer institute and inhabit a common world or that they share some specific argued conviction about an item in such a world" (p. 9).

On the other hand, exclusive imperatives (e.g., "build", "list", etc.) provide specific actions that the reader must complete. Rotman (1988) contended that these exclusive imperatives construct the reader as a "scribbler", whereas inclusive imperatives construct the reader as a "thinker". Both types of imperatives are crucial. As Herbel-Eisenmann (2007) contended, "[i]n order to do mathematics, people need to both scribble and think" (p. 350).

Drawing on the work of Herbel-Eisenmann (2007; Herbel-Eisenmann & Wagner, 2005), I analysed pronoun use, modality and imperatives as the foundational textual features of a discourse analytic framework to examine the relationship positioned between authors and readers in a mathematics pedagogy textbook specifically aimed at pre-service primary teachers. In doing so, I was interested in the messages sent to pre-service teachers about the teaching community and their roles within it.

Methodology

Textbook Selection

Whilst there are several mathematics pedagogy textbooks geared toward primary pre-service teachers, I specifically selected to analyse *Elementary and Middle School Mathematics: Teaching Developmentally* (Van de Walle et al., 2013) for several different reasons. First, a survey conducted of members of the Association of Mathematics Teacher Educators (AMTE) about the pedagogy textbooks used in their subjects revealed this to be a commonly used textbook (Brass & Harkness, 2013). In fact, of the 130 responses to the question that asked about the pedagogy textbook(s) members were using at all streams of teacher education (e.g., primary, secondary, early childhood), 43 responses specifically mentioned this textbook with eight additional responses mentioning "Van de Walle" (without a specific reference to a book title). Also, whilst published in the United States, this textbook is frequently used by primary teachers as a reference and in Australian tertiary subjects for pre-service primary teachers based on my informal conversations with Australian mathematics teacher educators. Lastly, as a convenience sample of familiarity, I have experience teaching with this textbook in subjects designed for pre-service and in-service primary teachers.

Data Collection and Analysis

To investigate the messages sent by the book about mathematics teaching and the pre-service teachers' roles within the profession, the preface of the textbook was examined to collect data. This portion of the textbook welcomed readers to the book and also to the profession of mathematics teaching. Data were collected from the "New to this Edition", "What You Will Find in this Book" and "Some Special Features of this Text" sections within the preface. These sections dealt specifically with the portions of textbook pre-service teachers would be reading and using. Within these sections, sample pages of the upcoming text were used to illustrate different features. The text within these illustrations was not examined, because it pertained to selections of the textbook outside of the preface. Also, sections of the preface detailing the supplements to the textbook were not analysed, because one cannot assume that all pre-service teachers have access to these supplemental materials.

Relevant sections of the preface were carefully studied using both hard and electronic copies. Each version of the preface was analysed word-by-word, sentence-by-sentence and paragraph-by-paragraph for the specific text features previously discussed and the context surrounding the use of these features. All pronouns were coded for type (first-person or second-person) as well as for how their usage sent inclusive messages related to the mathematics education community. The frequency of each type of pronoun was also noted. Modal auxiliary verbs were coded for the specific modal auxiliary verb used (e.g., may, can, will) as well as the specific verb that followed it (e.g., "You will *notice*…"). The specific verbs used throughout the preface and the imperatives were coded for inclusion or

exclusion. In addition to the coding for these textual features, the use of any phrase that explicitly or implicitly referenced pre-service teachers as part (or not part) of the mathematics education community was noted and examined.

Findings and Discussion

Data from the analysed sections of the preface – "New to this Edition", "What You Will Find in this Book" and "Some Special Features of this Text" – are described below. Within these sections, use of different pronouns indicated different audiences and different messages sent to and about pre-service teachers. Table 1 shows the frequency of first-person and second-person pronouns within each section of the preface that was analysed.

Table 1
Frequency of Pronouns by Section of Preface

Section of Preface	First-person pronouns	Second-person pronouns
New to This Edition	1	0
What You will Find in This Book	1	10
Some Special Features of This Text	2	19

The specific textual features of discourse analysis are discussed in conjunction with these pronouns to describe the context in which messages were sent about pre-service teachers and to pre-service teachers about their roles within the mathematics education community.

Messages about Pre-Service Teachers

The "New to this Edition" section of the preface addressed people already familiar this particular textbook. Consider this statement: "The increased emphasis on diversity will be obvious to those who have used the book in the past" (Van de Walle et al., 2013, p. xix). People who have used this particular textbook before in a previous version are not likely tertiary students but instead instructors, members of the mathematics education community and/or publishers. Additionally, the lack of second-person pronouns signal that the authors are not addressing the readers directly. As such, this section was analysed to see what messages were sent about pre-service teachers to these audience members.

Within the "New to this Edition" section, the authors detailed changes made to the text that "better prepare teachers to teach mathematics to all learners" (Van de Walle et al., 2013, p. xix). Here, the authors are referring to the main audience of the textbook as teachers, emphasising the future role of many tertiary students reading the book. This inclusionary statement embraces pre-service teachers as part of the mathematics education community through reference to their future careers. This statement is also inclusionary in the fact that it acknowledges that in-service teachers may use this textbook. In fact, the seven acknowledgements of teachers as the audience of the textbook in the "New to this Edition" section mention how this text can be used to *prepare* teachers and to *support* teachers. This further emphasises the inclusionary aspect of the text in respect to prospective teachers.

This section also acknowledged the inclusionary nature of the instructors, members of the mathematics education community and publishers whilst also positioning the authors as

voices of authority within these communities through the use of a first-person pronoun (our). In the statement, "…increasing teachers' awareness of how rich [school] students' mathematical thinking can be – and how high *our* expectations should be" (Van de Walle et al., 2013, p. xix, emphasis added), the authors suggest that the community shares a vision and similar standards for expectations of student thinking.

This statement also serves to include pre-service teachers and in-service teachers as part of the mathematics education community, if prospective teachers' expectations related to student thinking were high enough. This suggests that a certain criterion must be met in order to gain membership to the mathematics education community. Wills (as cited in Pimm, 1987) contends, "*We* seems to have the greatest imprecision of referent of all English pronouns, and therefore is the most frequently exploited for strategic ends" (pp. 66-67, emphasis in original), and Pimm continues by positing that the cause for this imprecision is the "ambiguity concerning who *we* is" (p. 67, emphasis in original). Perhaps, this ambiguity also exists with *our*, another plural first-person pronoun.

This ambiguity raises several questions to consider as mathematics teacher educators. Who is included in *our* mathematics education community and how is this inclusion determined? How can *we* position prospective teachers in our subjects in ways that include them in the mathematics education community?

Messages to Pre-Service Teachers

Whilst the "New to this Edition" section was written primarily for people familiar with previous versions of this textbook, the "What You Will Find in this Book" and the "Some Special Features of this Text" sections both address prospective teachers. Within these sections of the preface, there were three uses of first-person pronouns (we, our) and 19 uses of second-person pronouns (you, your, yourself). The increased use of second-person pronouns over first-person pronouns signifies an attempt by the authors to establish a relatively close relationship with the readers. Commonly, the use of you helps to address the reader personally. It can also help to establish the authority of the authors by directing the reader's attention and suggesting 'the reader ought to be interested in the details… presented in the text" (Morgan, 1996, p. 6). Examining the structure of how 'you' is used within the text can help interpret roles and relationships between the authors and the reader. Using Herbel-Eisenmann's (2007) organisation as a framework, you-form categories were investigated. Three categories of you-forms were found in these sections of the preface (see Table 2).

Table 2
You-Forms in the Preface

Form	Examples from preface	Number of instances
You + verb	"You read," "you teach,"	12
You + modal verb	"You will," "you can"	11
Inanimate object (as subject) + animate verb + you (as direct object)	"These questions ask you"	4

When using the you + verb structure, the authors "defined what they thought the reader was doing" (Herbel-Eisenmann, 2007, p. 356). These definitions of reader actions led to

instructions for reading the textbook and suggestions for what the reader should attend to whilst reading in almost half of these instances (n=5). These statements would start with "As you read…" or "If you look…" Phrases such as these emphasise the authority of the authors, because these phrases are directing the reader's attention to certain aspects of the text. The other seven instances of the you + verb structure were coded as inclusionary references to the pre-service teacher, because they spoke to future teacher actions the reader would be taking such as planning lessons, diagnosing students' difficulties, teaching students, etc. Because the majority of times the you + verb structure was used indicated definitions of teacher actions, these sections of the preface were coded as sending inclusionary messages to pre-service teachers.

The second you-form that was investigated in the preface was the use of the you + modal verb structure. The uses of modal auxiliary verbs (e.g., will, can) with the second-person pronoun seemingly contradict each other. One use suggests the authority of the authors. For example, when the authors use a statement prefaced by "You will…" the authors are providing the reader direction for what should happen as a result of reading the text in the prescribed manner. This direction from the authors occurs in approximately 73% (n=8) of the instances where modal auxiliary verbs are used in these sections of the preface. This is congruent with the intention of the preface, which is to guide readers about the purpose and scope of the text.

Whist this use of modal auxiliary verbs emphasises the authority of the authors, modal auxiliary verbs are also used in a way that de-emphasises this authority. When the authors are unsure about their relationship with the reader, modal auxiliary verbs are often used; this occurred in four instances in these sections of the preface. The authors made statements like, "Reflecting on the activities as you read *can help you* think…" (Van de Walle et al., 2013, p. xxi, emphasis added). The authors do not know the readers closely enough to know for a fact that the reflecting *will* help readers to think, only that reflecting *can* help them think. Yet, the use of "can" indicates a strong certainty, and can was used in each of these four instances as the modal auxiliary verb. So even though this use of modal auxiliary verbs can de-emphasise the authority of the authors, we can assume that the authors have confidence underlying these statements.

In the you + verb structure and the you + modal verb structure, the relationship between the authors of the textbook and the readers can be assumed. The authors used the second-person pronoun to address the reader personally and to give suggestions to the reader about things to pay attention to whilst reading. In the third category of you-forms (inanimate object + animate verb + you), the human agency is removed from the text (Herbel-Eisenmann, 2007). In contrast to the previous uses, this you-form depicts thinking about mathematics education as a system instead of a human endeavor. Notice in the following examples from the preface, the lack of human presence:

- "These lists are offered to help you …" (Van de Walle et al., 2013, p. xxii)
- "The main purpose of this feature is to acquaint you…" (p. xxiii)
- "Questions are provided that help you…" (p. xxiv)
- "These questions ask you…" (p. xxiv)

In each of these examples, the reader is being directed by objects (e.g., lists, a feature or questions). The authors and the community of mathematics educators are absent from the creation of these objects, which masks human agency.

This is in direct opposition to a viewpoint expressed by the authors earlier in the preface when they stated, "…understanding constructivist and sociocultural perspectives on learning mathematics and how that is applied to teaching through problem solving

provides a foundation and rationale for how to teach…" (Van de Walle et al., 2013, p. xxi). If learning and teaching mathematics are based on constructivist and sociocultural perspectives, then consideration for the human decisions behind the inclusion of these objects should be explicit within the text. This would help reveal the human agency behind these objects and provide prospective teachers with an explicit model for pedagogical decision-making, which in turn would increase the inclusionary messages to prospective teachers within this textbook.

To further advance the inclusionary messages we send to pre-service teachers through our use of the textbook and through our subject, we also need to consider what we are asking prospective teachers to do. One way to do this with a textbook is to look at the imperatives that are used. Within the analysed sections of the preface, there were only two imperatives present. Readers of the textbook were directed to "…*take out* pencil and paper and *try* the problems…" (Van de Walle et al., 2013, p. xxi, emphasis added). These are both exclusive imperatives according to Rotman's (1988) classification of imperatives, because they provide specific actions for the pre-service teachers to complete. Because both imperatives were exclusive, constructing the reader as a "scribbler" (Rotman), all of the specific verbs used with the you + verb and the you + modal verb structures were analysed to see if these verbs could send any implicit messages to prospective teachers.

Whilst Rotman (1988) considered only imperatives to be inclusive (i.e., used to help the reader think about mathematics and constructs the reader as a "thinker") or exclusive (i.e., used to give the reader specific actions to complete and constructs the reader as a "scribbler"), I contend that the verbs used within mathematics pedagogy textbooks can be considered inclusive or exclusive in relation to mathematics education by positioning prospective teachers as "students" (exclusive) or as "future teachers" (inclusive). Verbs that were coded to position pre-service teachers as "students" (e.g., look, see, notice, find) are used to engage the readers in actions typically taken by students and/or actions that require a specific outcome, whereas "future teacher" verbs (e.g., plan, diagnose, teach) are used to refer to actions prospective teachers will be taking in a classroom. Because it is important for prospective teachers to be positioned as both "students" and "future teachers" as they learn about mathematics education, there were also "learner" verbs that were coded in this overlap (e.g. learn, think, explore). These verbs are ones that could be used by both "students" and "future teachers" to develop an understanding of mathematics education.

Whilst both types of verbs and the verbs representing the overlap of these categories are important, we expect to see the actions of prospective teachers balanced between "student" verbs and "future teacher" verbs. Likewise, we may hope that "future teacher" actions outnumber "student" actions as we prepare pre-service teachers for their future classrooms. Within the preface, the majority of verbs (n=11) were coded as exclusive, "student" verbs. There were five verbs coded as inclusive, "future teacher" verbs and seven verbs that were coded for their overlapping nature between "student" and "future teacher". As mathematics teacher educators, it is crucial that we provide experiences for the pre-service teachers in our subjects with opportunities to engage in "future teacher" actions. This is crucial as we open up the mathematics teaching profession to these prospective teachers and include them in the mathematics education community.

Conclusion

Because of the pervasiveness of textbooks at all levels of education, we need to consider how mathematics pedagogy textbooks are used in our subjects with pre-service teachers. Whilst most of the messages sent by this particular mathematics pedagogy

textbook were inclusive, there were ambiguities and inconsistencies that we need to consider as mathematics teacher educators. Our definition of the mathematics education community needs to be considered in conjunction with the ways we use textbooks and the ways that we structure mathematics pedagogy subjects. As we position pre-service teachers in ways that include them within this community, we need to emphasise and make explicit the actions prospective teachers engage in during mathematics pedagogy subjects, to further include them in the mathematics education community and to demonstrate the human aspect of mathematics education.

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