Rethinking and Reassessing the Construct of Authentic Intellectual Quality in the Singapore Context

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This paper examines the lexicogrammatical realization of the construct of authentic intellectual quality (AIQ) proposed by Koh, Wong, Tan, Guo, Lee, & Lim (2004). Following Newmann and Associates (1996), and Luke et al., (2003), Koh, et al. have argued that student work be assessed on eight standards, including depth of knowledge and understanding, knowledge criticism, and knowledge manipulation. In December 2004, student work in a number of subjects collected from Singapore Primary and Secondary schools were scored by experienced school teachers. This paper draws upon systemic functional linguistics (Halliday and Matthiessen 2004) and explores how student work which has been assigned a particular set of scores on the AIQ scale is expressed through a particular cluster of lexicogrammatical features. Such analyses will identify the linguistic profiles of student work, provide a link between teacher judgement and its linguistic evidence, and hopefully enhance the capacity and accuracy of automated essay scoring.

Background to the study

This study has grown out of a particular juncture in the development and application of the scoring rubrics for the assessment of the quality of the student work and teachers' assessment tasks within the Centre for Research in Pedagogy and Practice. Following Newmann and Associates (1996), and Luke et al., (2000), Koh and colleagues (Koh, et al., 2005) have developed two sets of scoring rubrics, one set for the evaluation of the quality of student work and the other set for the evaluation of teachers' assessment practices. They argue that student work be assessed on eight standards, including depth of knowledge and understanding, knowledge criticism, knowledge manipulation, sustained writing, text types, quality of student writing/answers, weaving, and connections to the real world beyond the classroom. In December 2004, student work and teachers' assessment tasks in English, Mathematics, Social studies and Science collected from the Singapore Primary and Secondary schools were scored by experienced school teachers. The results of these analyses are reported in Koh et al. (2005). The scores that were assigned by the teachers to student work serve as indicators of 'authentic intellectual quality'.

At the same time, we have begun to explore how authentic intellectual quality work in the subject areas listed above is constructed through its language features. The following research questions were generated:

1. What particular linguistic patterns would constitute authentic intellectual work in Science, or Social Studies, for example?
2. Would these linguistic patterns vary across subject areas, grade levels, and streams? and
3. In the final analysis, what is the complete picture of the students' language work and intellectual work like and how is one related to the other?

This is indeed a challenging undertaking and will require detailed investigations over a period of time. We hope that the present paper will be a useful starting point.

The Purpose and Organization of the Present Article

To start the exploration, we have selected 82 English essays written by Primary 5 pupils. These essays were collected as part of the core research project at the research center the authors are affiliated with (see below for details). While the analysis of these essays is still under way, in this article we discuss the philosophy underlying the linguistic analysis, present the methodology for annotation and some preliminary findings, and offer a guide for the next steps to be taken.

Theoretical Framework for Linguistic Analysis

In this section we present the framework for linguistic analysis of the student writings. This work is informed by recent developments of systemic functional theory. Essentially, a text is judged to be good or appropriate because it fulfills contextual, cultural and linguistic criteria and the linguistic criteria are both categorical and probabilistic. In what follows, we briefly explain register theory, genre theory and quantitative profile as inherent in the quality of texts.

Register variables

Halliday (in Halliday & Hasan, 1989 [1985], p. 12) proposes the following conceptual framework for the description of the context of situation of a text: the field of discourse, the tenor of discourse, and the mode of discourse:

1. The FIELD OF DISCOURSE refers to what is happening, to the nature of the social action that is taking place: what is it that the participants are engaged in, in which language figures as some essential component?

2. The TENOR OF DISCOURSE refers to who is taking part, to the nature of the participants, their statuses and roles: what kinds of role relationship obtain among the participants, including permanent and temporary relationships of one kind or another, both the types of speech role that they are taking on in the dialogue and the whole cluster of socially significant relationships in which they are involved?

3. The MODE OF DISCOURSE refers to what part the language is playing, what it is that the participants are expecting the language to do for them in that situation: the symbolic organization of the text, the status that it has, and its function in the context, including the channel (is it spoken or written or some combination of the two?) and also the rhetorical mode, what is being achieved by the text in terms of such categories as persuasive, expository, didactic, and the like.

These three variables constitute the context for a variety of language, a "register". A register is a variety of language according to use, it belongs to the stratum of language, but it redounds with, or realizes, the social context. Further, there is a systematic relationship between the three metafunctions in the semantics of language and the three sets of variables in the context of situation: the ideational metafunction realizes the field of discourse, the interpersonal metafunction realizes the tenor of discourse, and the textual metafunction realizes the mode of discourse. This relationship has been called the "metafunctional hookup" (Halliday, 1996, p. 323).

Context of Culture

The context of situation is "only the immediate environment" (Halliday in Halliday & Hasan, 1989 [1985], p. 46) for the text. "There is also a broader background against which the text has to be interpreted: its CONTEXT OF CULTURE" (Halliday in Halliday and Hasan, 1989 [1985], p. 46). "[A] culture is the potential behind all the different types of situation that occur" (Halliday, 1999, pp. 8-9). The relationship between the context of situation and the context of culture is that the former is an instance of the latter, that is, a particular context of situation comes out of the system of context of situations and has to be interpreted in the whole of the context of culture.

Stratifying the Context: Genre

Martin (e.g. 2001 [1984], p. 155) proposes stratifying the context into register comprising field, tenor and mode, and genre, an instance of which is defined as "a staged, goal-oriented, purposeful activity in which speakers engage as members of our culture. Examples of genres are staged activities such as making a dental appointment, buying vegetables, telling a story, writing an essay, applying for a job, writing a letter to the editor, inviting someone to dinner, and so on". Genre "makes meanings by shaping register – by conditioning the way in which field, mode and tenor are recurrently mapped onto one another in a given culture" (Martin 2001 [1984], pp. 160-161).

Quantitative profiles as inherent in quality of texts

At the same time that a successful text fulfils its contextual requirement, it has to display, or be realized by, distinctive lexicogrammatical features. That is to say, a register is defined both semantically by reference to the context of situation and formally by reference to the lexicogrammatical characteristics. The lexicogrammatical characteristics of a text include two aspects: firstly, what semantic features of the system network are selected? For instance, does the author select out of the MOOD system an imperative, a declarative, or interrogative? Secondly, how frequently does the author make such selections? The frequency analysis of the grammatical features dates from Huddleston et al.'s (1968) first corpus study of selected scientific English texts and has developed in SFL into probability study of terms in a system (Halliday, 1991, 1992; Halliday & James, 1993; Matthiessen, 1999; and Nesbitt & Plum 1988). Halliday (1991) (p. 42) notes that "[f]requency in text is the instantiation of probability in the system. A linguistic system is inherently probabilistic in nature". More recently, Halliday (2003) (pp. 23-24) elaborates,

> …these quantitative features are not empty curiosities. They are an inherent part of the meaning potential of a language. An important aspect of the meaning of negative is that it is significantly less likely than positive; it takes up considerably more grammatical energy, so to speak. The frequencies that we observe in a large corpus represent the systemic probabilities of the language; and the full representation of a system network ought to include the probability attached to each option in each of the principal systems (…). We have not yet got the evidence to do this; but until it can be done, grammars will not have come of age.

Methodology for the Annotation and Analysis

Eighty-two Primary 5 students' essays from seven primary schools in Singapore have been annotated and analyzed following the principles of Halliday and Matthiessen's (2004) systemic functional grammar. All these artifacts are students' written work for their English lessons. They cover all the three major text types specified in the English Language Syllabus 2001, namely, narratives, descriptions, and personal recounts. Out of the eighty-two pieces of student work, forty are narratives, nine-teen are descriptions (in fact, they are in the form of journal entries), and the rest twenty-three are personal recounts.
Each piece of student work has been divided into clauses and each clause has been annotated in terms of its textual, interpersonal, and experiential metafunctions. For the textual metafunction, the focus has been on the themes (i.e. topical theme, interpersonal theme, and textual theme) students selected in their writing. The reason why the theme selection is analyzed is that the Theme is 'the starting-point for the message: it is what the clause is going to be about' (Halliday & Mattheissen, 2004, p. 64). Through the analysis of the student's Theme choice, we can get to know how students are actually organizing their writing, and by observing how themes (mainly topical and structural themes) progress over the course of students' written work, we can identify the differences between texts in their methods of development. We believe that students at this level of schooling should be aware that there are different ways of arranging their texts for different purposes.

Another aspect of the theme system which has also been annotated is the markedness of topical themes. The normative nature of the topical theme of a clause is its unmarkedness. The use of marked, or atypical theme is often the result of deliberate choice.

For the interpersonal metafunction, the features regarding mood structures and the tense system have been marked up. The mood structure of a clause realizes its speech function (e.g., whether it is giving or demanding information). Tense choice is relevant here because it is related to different genres (or text types). For instance, past tense is typically associated with narrative writing. The choice of mood structures and tenses reflects students' knowledge in the genre features and information about students' acquisition of the tense system in the English language.

For the experiential metafunction, the focus is on transitivity which is displayed in the process types which students chose in expressing their thoughts. The transitivity system employed in a piece of written

discourse reveals what is happening, who or what are involved, where and when it is taking place, and so forth. In other words, it is concerned with what knowledge is constructed in the author's mind.

The annotated features were categorized and quantified so that comparisons can be made both among the students artifacts within the same school/class and between student artifacts from different schools but falling into the same text types. Cross-text-type comparison is also possible if we want to find out whether student work displays different linguistic features when they are writing different types of texts.

Preliminary Results of Analysis

As space limitation precludes a detailed analysis of the results, we compare below the linguistic features of two student texts, one marked by school teachers during our scoring exercise as good (4 out of 4 points), and the other poor (1 out of 4 points), in the standard of 'quality of student writing/answers' (Koh, et al., 2004). The two texts are reproduced below (segmented into clauses for easy reference; students' spelling errors unchanged).

Text 1 (good quality text)
1. One morning, my aunt was cooking breakfast.
2. She opened the window
3. and she placed a plate of chicken on the dining table.
4. My aunt saw a few black crows on a tree branch just outside the window.
5. The black crows saw the plate of chicken in the house.
6. They were very happy
7. because they saw the food.
8. 'Hmm, this looks delicious,'
9. the crows said to one another.
10. The crows flew into the house.
11. They pecked greedily on the chicken.
12. The crows carried away pieces of the chicken.
13. They flew to and fro outsaid the house.
14. One of the crows yelled,
15. 'Wait for me!'
16. My aunt was sad and angry.
17. She was very tired of cooking the chicken.
18. Now most of it was all gone.

Text 2 (poor quality text)
1. It was sunny morning.
2. My mother had just cook a plate of chicken.
3. It look delicious.
4. Suddenly there were four black crows.
5. The four black crows were looking very hungry.
6. The crow asked,
7. 'Can we have a piece of chicken please?'
8. My greedy mother said,
9. 'No!'
10. The crows did not give up.
11. They flew to and fro Of
12. There was no the chicken left.
13. Suddly they was my mother was comeing
14. they the last piece of the chicken
15. and flew awaly.
16. My mother was shocked to was not at there.
17. She was very sad to see the was not there
18. luckyly I had (I had) bought a piece of chicken.

Tables 1, 2 and 3 present the choices the pupils make in the experiential meanings, interpersonal meanings and textual meanings, respectively, with brief commentaries on their relative effectiveness.

Table 1. *Process types*

Process type	Text 1		Text 2	
	Number	%	Number	%
Material	7	39	7	39
Relational	5	28	5	28
Verbal	2	11	2	11
Mental	3	17	2	11
Existential	0	0	2	11
Behavioural	1	5	0	0
Total	18	100	18	100

Commentary:

If Existential process is taken as one type of Relational process, then Text 2 is poorer than Text 1 due to the relative prominence of Relational processes. Clause 4 of Text 2 'Suddenly there were four black crows' is not as effective as a Material process to the effect of 'There flew four black crows'. Otherwise, however, the quantitative profiles of the two texts are very similar in terms of process types. It could not have been the case that overall the scorer penalized Text 2 for the types of processes selected.

Table 2. *Interpersonal choices*

Mood type	Text 1		Text 2	
	Number	%	Number	%
Full declarative	17	94	16	89
Elliptical declarative	0	0	1	5.5
Interrogative	0	0	1	5.5
Imperative	1	6	0	0
Total	18	100	18	100

Commentary:

Again the interpersonal selections for Texts 1 and 2 are nearly identical. If these two texts are different in quality, it cannot be due to their selections of mood types.

Table 3. *Themes*

Theme type	Text 1		Text 2	
	Number	%	Number	%
Marked Theme	2	11	0	0
Unmarked Theme	16	89	18	100
Total	18	100	18	100
Textual Theme	1	-	2	-

Commentary:

Texts 1 and 2 differ in the Theme selections. First, Text 1 uses Marked Themes ('One morning' in Clause 1 and 'Now' in Clause 18) whereas Text 2 contains no Marked Themes. The 'One morning' in Text 1 effectively orientates the reader into what is going to be talked about and 'Now' at the end of the text helps to bring into relief the feeling of frustration. Second, Text 1 employs a larger variety of Textual Themes ('and' in Clause 3 and 'because' in Clause 7) while Text 2 only has one ('and' in Clause 15). Third, many of the Themes in Text 1 are carried over from previous Themes, orientating the reader toward what is to be expected. For instance, the Themes for Clauses 2, 3, and 4 are respectively 'she', 'she' and 'my aunt'. The Themes in Text 2 on the other hand undergo frequent unmotivated shifts, thus disorienting the reader. For example, the Themes for the first five clauses of Text 2 ('It' in Clause 1, 'My mother' in Clause 2, 'It' in Clause 3, 'there' in Clause 4 and 'The four black crows 'in Clause 5) do not follow from each other, although 'It' in Clause 3 relates to the Theme in Clause 2. That is to say, the writer of Text 2 is having difficulty in getting his or her ideas organized as well as in getting his or her spellings correct.

Looking ahead: Some Concluding Remarks

In this study, we have proposed analyzing student work in a number of disciplines within the systemic functional linguistic framework and illustrated its potential as a tool complementary to Koh et al.'s (2004) authentic intellectual quality scores through the analysis of two short student essays. We suggest that student texts differ in their AIQ scores because of the lexicogrammatical choices made by the students. Looking ahead, we will be able to explicate the complex relationships between simultaneous tripartite functioning of language systems on the one hand and the multi-dimensional AIQ score on the other, if we sufficient paired data on both measures and if we experiment with various multivariate data analysis methods to examine the relationships between the two. The comprehensive findings from this research endeavor will also contribute to CRPP's technical development of the corpus linguistic analytic software to 'automate' the marking or scoring of student written work, mainly in the language art subjects.

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