

2016-01-01

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### Recommended Citation

Zhang, Baoya and Wannaruk, Anchalee (2016) "Rhetorical Structure of Education Research Article Methods Sections," *PASAA*: Vol. 51, Article 7.

DOI: 10.58837/CHULA.PASAA.51.1.6

Available at: <https://digital.car.chula.ac.th/pasaa/vol51/iss1/7>

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## Rhetorical Structure of Education Research Article Methods Sections

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### **Abstract**

This study investigated the rhetorical move structure of the education research article genre within the framework of Swales' (1981, 1990, 2004) move analysis. A corpus of 120 systematically sampled empirical education research articles served as data input for the analysis. The results indicate that the education research article methods section is characterized by structural complexity and rich, nuanced description. Education researchers generally employ three rhetorical moves to realize the overall communication purpose of the methods section: 1) *Describing the research design*, 2) *Describing data collection procedures*, and 3) *Describing data analysis procedures*. While the first is optional and has no constituent steps, the second and the third have a series of constituent steps, with the second being obligatory and the third optional. The moves provide very detailed information on different aspects of the

methodology. This complexity and richness of information are, to a large extent, related to the qualitative aspect of much of education. Pedagogically, the results can inform ESP or EAP syllabus design and materials development and hence improve classroom instruction.

**Keywords:** education research articles, methods section, move analysis, rhetorical structure

## **Introduction**

Education research is a vital resource for improving educational policies, programs and practice (Bassey, 1999; Mosteller, Nave, & Miech, 2004). Its value consists in its immediate relevance to its consumers and is attested by the sheer bulk of research articles (RAs) published in the field every year. Nevertheless, despite the potential value of education research, how quality research can be written up and accepted by the education community remains a challenge for novice education researchers.

Non-native speakers of English (NNS) encounter significantly more difficulties than native speakers of English (NS) when trying to write research articles that comply with the requirements of the genre and the expectations of the readership (Burrough-Boenisch, 2003; Cho, 2004; Flowerdew, 1999). Specifically, insufficient knowledge of the generic rhetorical structure and the conventions regarding lexical, syntactical and pragmatic choices to realize each rhetorical move has been identified as a major problem that places NNS writers at a distinct disadvantage when competing with NS writers for publication in the English language (Curry & Lillis, 2004; Flowerdew, 2001; Martin, 1985; Swales, 1990).

Due to the vital role it plays in disseminating research, the research article has received far more attention from genre analysts than any other academic genre. With the ultimate goal of using their research findings to inform syllabus design and

materials development for students of English as a foreign or second language in different disciplines, researchers have applied Swales' (1981, 1990, 2004) move analysis in exploring the rhetorical move structure of the different sections of RAs in different disciplines, providing valuable insights into the intricate nature of the genre.

The notion of communicative purpose is central to Swales' (1981, 1990, 2004) move analysis. According to Swales (1990), a genre is primarily a category of discourses identified by shared communicative purposes that are recognized by the discourse community. Due to their common purposes, instances of a genre have a conventionalized rhetorical structure and ways of linguistic expression. Since genre is purpose-oriented, genre analysis focuses on the rhetorical moves, i.e., text segments that not only perform a specific communicative function of their own but also contribute to the overall communicative purpose of the genre.

Subsequent to Swales' (1981, 1990, 2004) CARS (Create a Research Space) model for RA introductions, rhetorical move structure models of RAs have been derived from RAs in many specific academic disciplines. These include, to name but a few, medicine (Nwogu, 1997; Salager-Meyer, 1992; Williams, 1999), biochemistry (Kanoksilapatham, 2007; D. K. Thompson, 1993), computer science (Posteguillo, 1999), sociology (Brett 1994), engineering (Kanoksilapatham, 2011, 2015), literature (Balocco, 2000), and law (Tessuto, 2015). Even within the relatively under-researched area of social sciences and humanities, a few studies have been conducted on different sections of RAs in a few specific fields of education research such as applied linguistics (Amirian, Kassaian, & Tavakoli, 2008; Lim, 2010; Pho, 2008a; Yang & Allison, 2003; Ozturk, 2007), educational psychology (Loi, 2010) and education technology (Pho, 2008a, 2010).

However, as yet, no research has been conducted on RAs in education research as a general domain that is at the interface of education and many other academic disciplines. Despite differences due to the interdisciplinary nature of education research, education researchers form a distinct discourse

community following more or less the same set of discursive conventions. Therefore, knowledge of the generic rhetorical structure shared by education RAs in specific areas can have considerable value in the ESP (English for Specific Purposes) or EAP (English for Academic Purposes) classroom.

From a practical perspective, characterizing the rhetorical structure of RAs in education as one genre is in line with the way ESP or EAP course participants are often grouped for instruction. Research article writing classes are often not homogeneous in terms of class members' academic backgrounds. Rather, they often comprise members specializing in a wide range of areas, for example, literacy education, engineering education, and health education. A rhetorical model drawn from RAs in different branches of education would be more useful to the class than one limited to a single branch of education research.

To address the gap in previous research, we conducted a study to investigate the rhetorical move structure and systematic inter-move linguistic variation of RAs in education as a general domain. The present paper reports a sub-study that specifically investigated the rhetorical move structure of the methods section of the education RA genre.

Although no uniform model comparable to the introduction section CARS model (Swales, 1981, 1990, 2004) has been proposed for the methods section, previous studies have revealed a number of textual units expressive of local communicative purposes that are labeled either moves or steps. Among them, two are shared by nearly all disciplines and are almost always categorized as moves (sometimes labeled differently): *Describing data collection procedures* and *Describing data analysis procedures* (Brett, 1994; ElMalik & Nesi, 2008; Kanoksilapatham, 2007, 2015; Li & Ge, 2009; Lim, 2006; Nwogu, 1997; Pho, 2008a; Stoller & Robinson, 2013; Tessuto, 2015). Other functional units, present in some but absent in others, are either considered independent moves or constituent steps (also by various names). They include *Describing experimental procedures* (ElMalik & Nesi, 2008; Li & Ge, 2009; Nwogu, 1997), *Describing materials* (Kanoksilapatham,

2007; Stoller & Robinson, 2013), *Detailing equipment* (Kanoksilapatham, 2007), *Introducing research methods or procedural background* (Kanoksilapatham, 2015; Lim, 2006; Tessuto, 2015), *Justifying procedures* (Kanoksilapatham, 2015; Lim, 2006), *Describing research site* (Huang & He, 2011; Kanoksilapatham, 2015; Tessuto, 2015), *Describing the sample* (Lim, 2006; Pho, 2008a; Tessuto, 2015; Wood, 1982), *Describing research instruments* (Pho, 2008a), *Describing an apparatus* (Kanoksilapatham, 2015; Wood, 1982), *Describing statistical procedures* (Kanoksilapatham, 2015; Tessuto, 2015), *Previewing results* (Lim, 2006), and *Declaring ethical statements* (Kanoksilapatham, 2015). In addition, one particular study on engineering research articles identified a *Reporting and consolidating results* move with several constituent steps to report, interpret, compare and explain results (Kanoksilapatham, 2015). As can be seen, while all pertain to empirical research, a few of these labels such as *Describing experimental procedures* and *Describing an apparatus* exclusively describe experimental studies.

The functional categories represent our knowledge of the rhetorical structures of the methods sections of RAs in many individual disciplines, but this knowledge was restricted to individual disciplines. The present study aimed at deriving a rhetorical move structure of the RA methods section in education research as a whole. The outcome would be applicable to a wide range of disciplines within the realm of education research.

The objective of this study translates into these two research questions:

- 1) What are the rhetorical moves and constituent steps employed in the methods section of education RAs as demonstrated by the Education Research Corpus (ERC)?
- 2) How are the moves and constituent steps typically sequenced in the methods section of education RAs as demonstrated by the ERC?

## **Methods**

### ***Data source***

The Education Research Corpus (ERC), especially constructed for the main project, provided data for the present study. It consisted of 120 full-length empirical education research articles systematically sampled from 12 high impact factor international journals in the field of education research (see Appendix). Among them, 96 presented research of a quantitative or a mixed design that combined qualitative and quantitative methods, whereas the other 26 were strictly qualitative. The choice of the 12 journals was based on the “Top Journals in Education Ranked by 2007 Impact Factor” list published by Thomson Reuters (2009). Together, the journals represented a broad range of areas or fields of education research: engineering education; management and business education; literacy education; health education; educational technology; learning, development and teaching; educational sociology; applied linguistics; science education; learning theory and pedagogy.

### ***Data analysis***

- ***Criteria for coding***

It was vital to have clear, operational criteria in coding the texts for moves and steps. Genre analysis distinguishes itself from other approaches to text by using communicative purpose as the primary parameter for classifying discourses. Despite the general agreement on communicative purpose (i.e., function) as determinant of genre and its constituent rhetorical moves, there seems to be no actual consensus on the extent to which the local communicative purposes should be relied on in classifying rhetorical moves. In practice, function-based (Kwan, 2006; Pho, 2008b; Zhang et al., 2012), form-based (e.g., Anderson & Maclean, 1997; Lim, 2006) and function- and form-based approaches (e.g., Kanoksilapatham, 2007; Nwogu, 1997; Swales, 1990) have existed side by side. Adhering to the notion of purpose shaping form, the

present study assigned move tags to text segments depending on communicative function only, irrespective of linguistic forms.

Identifying moves by communicative purpose will inevitably result in varying move lengths. In this study, a move was operationally defined as a chunk of text of at least one complete sentence that fulfilled a distinct communicative purpose. Any sentence or group of sentences, regardless of length, was considered an instance of a move as long as it matched the definition of any of the moves or steps in our coding scheme (see below).

Different steps of the same move were frequently found to cluster together without being interrupted by a different move or sub-heading. As such, they were considered one move. However, if a certain move recurred after an intervening one, each occurrence of that move was considered an individual instance of the move. For example, a methods section text that had a “move 1 + move 2 + move 1 + move 2” structure was considered to contain two move 1’s and two move 2’s.

- ***Coding scheme development***

Pho’s (2008a) model of the methods section of applied linguistics and education technology RAs was adopted as an initial coding scheme (see Figure 1). The decision was motivated by the model’s relevance to education research as well as its relative comprehensiveness in rhetorical structure characterization.

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**Describing data collection procedures**

Describing the sample

Describing research instruments

Elaborating on data collection procedures

Justifying data collection procedures

**Describing data analysis procedures**

Recounting data analysis procedures

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**Figure 1: Pho’s (2008a) methods section model**



The coding process was long and iterative. The initial coding scheme served only as a point of departure. Throughout the process, new categories of functional units emerged and modifications to the coding scheme were made accordingly. As a result, many texts re-coded as many times. Each revision of the coding scheme was only a closer approximation of an accurate description of the rhetorical structure of the RAs in the corpus. Yet the scheme was always open for fine-tuning until all texts had been coded and the scheme finally encompassed all functional units eligible for move or step status.

Table 1 presents the finalized coding scheme with a definition for each move and step. In comparison with the initial scheme, a new move and a few new steps were identified to categorize text segments with distinct communicative purposes not captured by the initial coding scheme. These include a *Describing research design (RD)* move, a *Describing research context (DC1)* step and a *Verifying compliance with ethical standards (DC6)* step for the *Describing data collection procedures (DC)* move; and a *Justifying data analysis procedures (DA2)* step and an *Establishing inter-coder reliability (DA3)* step for the *Describing data analysis procedures (DA)* move.

**Table 1: Coding scheme**

| Code      | Move   | Definition   |
|-----------|--|--|
| <b>RD</b> | <b>Describing research design</b>            | Outlines the vital aspects of the research design                                      |
| <b>DC</b> | <b>Describing data collection procedures</b> | Details the important aspects of data collection                                       |
| DC1       | Describing research context                  | Provides relevant background information as the general context for the research       |
| DC2       | Describing the sample                        | Describes in detail the sampling procedure and the major characteristics of the sample |

| <b>Code</b> | <b>Move</b>                                 | <b>Definition</b>  |
|-------------|---|--|
| DC3         | Describing instruments                      | Describes in detail the instruments, e.g., questionnaires, interviews, or tests, for collecting data needed to measure the variables |
| DC4         | Elaborating on data collection procedures   | Narrates the procedures of applying the instruments to the participants  |
| DC5         | Justifying data collection procedures       | Establishes the appropriateness of the data collection procedures  |
| DC6         | Verifying compliance with ethical standards | Indicates that the research was designed and conducted in no way harmful to the participants   |
| <b>DA</b>   | <b>Describing data analysis procedures</b>  | Details important aspects of data analysis   |
| DA1         | Recounting data analysis procedures         | Narrates the particulars of the analytical treatment of data   |
| DA2         | Justifying data analysis procedures         | Establishes the appropriateness and rigor of the analytical procedures   |
| DA3         | Establishing inter-coder reliability        | Explains how other coders were employed in data analysis for more accurate and reliable results                                      |

- ***Inter-coder reliability***

To enhance the reliability of the study, an experienced internationally published education researcher was enlisted as inter-coder. After an extensive hands-on training session, one of

us researchers and the inter-coder each independently coded 36 texts randomly drawn from the corpus. Inter-coder agreement on move boundaries and labels assigned was 89.3%, indicating a satisfactory level of inter-coder reliability. Subsequent discussions were held to resolve the discrepancies.

- ***Deriving a prototypical move structure***

The coding process addressed Research Question 1 by identifying all moves and steps employed in the ERC corpus. To answer Research Question 2, first, we fed the .txt files of the move labels in their original order into AntConc (Anthony, 2014) and obtained the frequencies of the moves and steps and their distribution information in the articles. Then, to determine each move's position in relation to other moves, we examined multi-move sequences in the articles (Feng, 2006; Chang & Kuo 2011). In using AntConc (Anthony, 2014) to extract the most salient multi-move sequences widely distributed across the articles, both minimum frequency and minimum range were set at 35.

Then the moves and steps were categorized according to their frequencies per hundred articles, that is, their percentages. Most previous studies adopted a dichotomous criterion labeling moves and steps either as obligatory or optional based on an arbitrary cut-off. For example, while a cut-off percentage of 50% was used in Nwogu (1997) and Loi (2010), a higher percentage of 60% was used in Kanoksilapatham (2005, 2011). Swales (2004), however, had three categories: obligatory, optional and PISF (probable in some fields, but unlikely in others). While "obligatory" is understood to be 100%, there was no clear cut-off point between the latter two. In the present study, we combined Swales' (2004) and Kanoksilapatham's (2005, 2011) criteria classifying moves and steps into three categories: obligatory ( $x = 100\%$ ), conventional ( $60\% \leq x < 100\%$ ), optional ( $x < 60\%$ ). We deemed that a model with three categories rather than two would be subtler and therefore more useful for novice NNS writers.

## Results

Table 2 below summarizes the findings of the study. Three moves were observed in the methods sections of the ERC articles, including *Describing research design (RD)*, *Describing data collection procedures (DC)*, and *Describing data analysis procedures (DA)*. While RD was not sub-categorized into steps, the other two moves had specific steps to perform specific communicative functions.

Findings with reference to each move are separately presented in detail subsequently.

**Table 2: Rhetorical move structure of the methods section**

| Code      | Move   | f          | n          | %           | Status              |
|-----------|--|------------|------------|-------------|---------------------|
| <b>RD</b> | <b>Describing research design</b>            | <b>69</b>  | <b>62</b>  | <b>52</b>   | <b>Optional</b>     |
| <b>DC</b> | <b>Describing data collection procedures</b> | <b>625</b> | <b>120</b> | <b>100</b>  | <b>Obligatory</b>   |
| DC1       | Describing research context                  | 75         | 44         | 36.7        | Optional            |
| DC2       | Describing the sample                        | 140        | 79         | 65.8        | Conventional        |
| DC3       | Describing instruments                       | 199        | 56         | 46.7        | Optional            |
| DC4       | Elaborating on data collection procedures    | 162        | 57         | 47.5        | Optional            |
| DC5       | Justifying data collection procedures        | 30         | 9          | 7.5         | Optional            |
| DC6       | Verifying compliance with ethical standards  | 19         | 17         | 14.2        | Optional            |
| <b>DA</b> | <b>Describing data analysis procedures</b>   | <b>176</b> | <b>93</b>  | <b>77.5</b> | <b>Conventional</b> |
| DA1       | Recounting data analysis procedures          | 125        | 64         | 53.3        | Optional            |
| DA2       | Justifying data analysis procedures          | 17         | 14         | 11.7        | Optional            |
| DA3       | Establishing inter-coder reliability         | 34         | 26         | 21.7        | Optional            |

Note. n = number of articles in which a move/step appears; f = frequency of a move/step in all RAs; % = percentage of a move/step in all RAs

***Describing research design***

As seen in Table 2, *Describing research design (RD)* was an optional move (52%;  $f = 69$ ;  $n = 62$ ). This move outlined some vital aspects of the research design—research objectives, type of research design, hypotheses, and/or variables involved. If present, it was always found to precede the other two moves.

1) *This study employed a quasi-experimental design for cross-sectional data in which the high school mathematics curriculum (Group) a student completed was the independent variable of most interest. Difficulty of students' first university-level mathematics course and the grade earned in that course served as dependent variables.* (AER\_02)

Excerpt 1) is a succinct description of a research design, with its type identified as quasi-experimental; high school mathematics curriculum as the independent variable; and difficulty of the first college mathematics course and grade earned as dependent variables.

***Describing data collection procedures***

As Table 2 shows, *Describing data collection procedures (DC)* was present in all methods texts (100%;  $f = 625$ ;  $n = 120$ ). In cases where RD was absent, this move was almost always the first in the methods sections. The data collection move was usually realized by a combination of some of these constituent steps: *Describing research context (DC1)*, *Describing the sample (DC2)*, *Describing instruments (DC3)*, *Elaborating on data collection procedures (DC4)*, *Justifying data collection procedures (DC5)*, and *Verifying compliance with ethical standards (DC6)*.

- ***Describing research context***

*Describing research context (DC1)*, an optional step (36.7%;  $f = 75$ ;  $n = 44$ ), performed the function of providing relevant background information for the research. DC1 texts varied in length, ranging from one single sentence to extensive paragraphs depending on the number of topics covered.

2) *The Crystal Springs School District is a large elementary school district in Southern California. In 2003-2004, the district had 40 elementary schools and over 1000 teachers, with over 90% holding full teaching credentials. The district serves a diverse student population including more than 25, 000 students. In 2003-2004, the student population was 64.3% Latino or Hispanic, 17.0% White (not Hispanic), 8.5% Filipino, 4.9% African American, 3.6% Asian, 0.9% Pacific Islander, and 0.4% American Indian or Alaskan Native. Additionally, about half of the students in the district were eligible for free or reduced-price lunch, and more than one third of the students were English language learners. (AER\_07)*

In considerable detail, Excerpt 2) provides a broader context in which the study took place, including the geographical location of the research site, the school system, teacher certification, an ethnically diverse student population with a low socio-economic status. Other types of information were also noted in the corpus, for example, educational policies, on-going intervention programs, and public attitudes.

- ***Describing the sample***

As Table 2 shows, *Describing the sample (DC2)* occurred quite frequently (65.8%;  $f = 140$ ;  $n = 79$ ), qualifying itself as a conventional step. Unlike *Describing research context (DC1)*, which described the general context of a study, DC2 provided an adequate description of the sampling procedure and the major characteristics of the sample often called participants in education research.

3) *Participants in the study included children and their families. In 1991 NICHD researchers recruited mothers with newborns from hospitals located at 10 different geographic sites across the United States. Out of the 8, 986 mothers whom the researchers initially contacted, 5,416 met eligibility criteria and agreed to be contacted after they had left the hospital. Of these, a randomly selected subgroup was chosen with procedures to ensure ethnic, economic, and educational diversity, resulting in 1,364 families with healthy newborns originally enrolled in the study.*

*Although there was attrition over the years, researchers followed the remaining participants through adolescence.....(ESJ\_04)*

As a rule, as the above excerpt demonstrates, DC2s described the sample and the sampling method as specifically as possible, focusing on characteristics that might have some bearing on the interpretation of results. Often, besides sample size, other relevant information might also be provided about age, gender, ethnicity, academic achievement, socio-economic status, disability status, etc.

- ***Describing instruments***

Another step found common in the corpus was *Describing instruments (DC3)* (46.7%; f = 199; n = 56). As the excerpt shows, by this optional step, the writers described in great detail the instruments, e.g., questionnaires, interviews, or tests, for collecting data needed to measure the variables included in the research design.

*4) The focus interviews focused on a number of themes, namely: (1) what position ICT and media had in the teachers' subjects, (2) how they thought that the use of media and ICT influenced the working method in the classroom, (3) the relations to the pupils, (4) the subject content itself and finally (5) the role of the teacher. ....(CAE\_04)*

- ***Elaborating on data collection procedures***

*Elaborating on data collection procedures (DC4)* was another optional step (47.5%; f = 162; n = 57), almost as important as DC3. DC4 gave a step-by-step description of the delivery of instruments to the participants. As to its position, it appeared either before or after an instrument description step.

*5) All participants were administered the experimental spoken and written word learning procedure first. Following this administration, other language and literacy tasks were conducted in randomized order. Children were tested across 2 days, typically within 1 week's time. Each session lasted approximately 45 min. All tasks were administered by undergraduate or graduate students*

*trained in all procedures used in the study by the author. (SSR\_08)*

Excerpt 5) provides a chronological narrative of the procedures of applying the instruments to the participants with details on what instruments were applied, who administered them, how the participants were grouped, and how much time was allocated.

- ***Justifying data collection procedures***

In comparison, *Justifying data collection procedures (DC5)* was observed significantly less frequently in the corpus (7.5%;  $f = 30$ ;  $n = 9$ ). The writers took this step to establish the appropriateness of the data collection procedures. The purpose was to defend the study against any doubt regarding validity and reliability.

*6) We opted for a group size of nine, since research of Schellens and Valcke (2006, p. 349) showed that groups of this size perform better than larger groups and that "discussion in small groups reflects larger proportions of higher levels of knowledge construction". .....(LAI\_05)*

Excerpt 6) cites previous research to support the researcher's decision on group size when group discussions were held for data collection. Besides sample size, other instances of this step in the corpus justified decisions on instruments, timing of activities, and other aspects of data collection.

- ***Verifying compliance with ethical standards***

Interestingly, a *Verifying compliance with ethical standards (DC6)* step was observed in a considerable number of methods texts (14.2%;  $f = 19$ ;  $n = 17$ ). As the excerpt illustrates, the authors might need to indicate that their research was designed and conducted in no way harmful to the participants.

*7) Since this research took place in a naturalistic setting, depriving students completely of tutor support was considered unethical, so a condition in which students never received peer tutor support was not included. .... (LAI\_05)*



***Describing data analysis procedures***

Table 2 shows that *Describing data analysis procedures (DA)* was a conventional move (77.5%;  $f = 176$ ;  $n = 93$ ). Almost always following *Describing data collection procedures (DC)*, this move described in varying degrees of detail how data were analyzed for results in answer to the research questions, one of the fundamental aspects of the conduct of research. This communicative purpose was realized by one or a combination of three steps, viz., *Recounting data analysis procedures (DA1)*, *Justifying data analysis procedures (DA2)* and *Establishing inter-coder reliability (DA3)*. Details of the steps are presented below.

- ***Recounting data analysis procedures***

*Recounting data analysis procedures (DA1)* was found to be the most frequent step (53.3%;  $f = 125$ ;  $n = 64$ ). Over half of the authors took this optional step to narrate the particulars of the analytical treatment of data, be it quantitative or qualitative.

8) *In order to examine whether or not public and private schools differ in terms of classroom characteristics and processes we used one-way ANOVA tests. We did not apply the Bonferroni correction, purposefully opening up the possibility of introducing Type I error in an effort to avoid prematurely embracing the null hypothesis of no differences. ....(ESJ\_04)*

9) *Our data analysis started with the semi-structured interviews... We followed an analysis approach similar to the methods described by Miles and Huberman (Citation). First, the interviews were grouped by case... Then, each case was analyzed separately before looking across cases for themes and patterns. Our analysis included a combination of coding output from Atlas Ti and pictorial and graphical data representations (Citation). Miles and Huberman (Citation) describe three categories of data analysis strategies including: a) case-oriented... b) variable-oriented... and c) mixed strategies... This study incorporated a mixed strategy where the eleven individual cases and the four STV categories (value constructs) were equally important. Results are presented as variable-oriented assertions such that they are organized around*

*the four STV categories including attainment, cost, interest, and utility. (Abbreviated) ..... (JEE\_06)*

Excerpt 8), excerpted from a quantitative study, explains which analytical method was used to answer which specific research question. In addition, it explains why another procedure was not applied. Excerpt 9), taken from a qualitative study, reviews how interview transcripts were thematically coded. Details include what coding scheme was used, how data were grouped, what software programs were used, what analytical strategy was employed, and how results were presented.

Citation use in the two excerpts reveals two different types of DA1. Excerpt 8) is without citations, indicating the author's assumption that the statistical methods mentioned are part of the basic professional knowledge of the discourse community. In contrast, Excerpt 9) is heavily loaded with citations because the author does not presume that the readership all have prior knowledge of the coding scheme, the software programs, and the analytical strategy mentioned.

- ***Justifying data analysis procedures***

Another optional step, *Justifying data analysis procedures* (DA2), was observed (11.7%;  $f = 17$ ;  $n = 14$ ). This step established the appropriateness and rigor of the analytical procedures. It contributed to the validity and reliability of research results as did the *Justifying data collection procedures* (DC5) step. As anticipated, this step usually followed *Recounting data analysis procedures* (DA1). The following excerpt exemplifies this step.

*10) Due to the large sample size, nearly all differences, even minute and meaningless differences, would have statistical significance at  $p < 0.05$ . Therefore, we used the eta-squared test of significance (Citation). Eta-Square is a measure of strength of association between variables. It represents the proportion of dependent variable variance accounted for by any factor of interest. It is independent of sample size and ranges from 0 to 1 (Citation). The eta-square is conventionally defined as a small effect is 0.01, a medium effect is 0.06, and a large effect is 0.14 (Citation). (JEE\_07)*

Excerpt 10) not only explains why a large sample necessitates the use of the eta-squared test of significance but also introduces this analysis in terms of effectiveness.

• ***Establishing inter-coder reliability***

Different from previous research findings, the corpus revealed an optional *Establishing inter-coder reliability (DA3)* step (21.7%;  $f = 34$ ;  $n = 26$ ). Taking this step, the authors demonstrated that their analyses were satisfactorily accurate and reliable, hence the trustworthiness of the results.

11) *In the course of developing our coding scheme, we continuously monitored inter-coder reliability. Reliability was not a major problem, since our coding scheme was straightforward and factual in character and called for little difficult interpretation. (SOE\_04)*

The author of the above excerpt tries to convince the reader that his or her analysis was not problematic as multiple coders analyzed the same data and a high level of agreement was reached.

**Move cyclicity and generic rhetorical structure**

As Table 2 indicates, the *Describing data collection procedures (DC)* move tended to appear repeatedly after being interrupted by a different move. So did the *Describing data analysis procedures (DA)* move. The former appeared 625 times in 120 articles and the latter 176 times in 93 articles. On average, the two moves recurred 5.28 and 1.89 times per article, respectively. The other move, *Describing research design (RD)*, hardly recycled.

**Table 3: Multi-move Sequences in Methods**

| Rank | Freq | Range | Prob  | Multi-move sequence |
|------|------|-------|-------|---------------------|
| 1    | 99   | 89    | 0.469 | DC DA               |
| 2    | 60   | 52    | 0.42  | RD DC               |
| 3    | 40   | 39    | 0.28  | RD DC DA            |

Note. Rank = rank of multi-move sequences by frequency;  
 Freq = frequency of multi-move sequences; Range =  
 number of articles in which a multi-move sequence  
 appears; Prob = probability of the first move to co-occur  
 with the rest of the moves in a sequence

Table 3 above displays three salient multi-move sequences in the methods sections. The DC-DA pattern was the most prominent, appearing at least once in 89 out of 120 articles. The RD-DC pattern was observed in 52 articles. Even the more involved pattern RD-DC-DA appeared in one third of the articles.

The results also indicate that if *Describing research design* (RD) was present, it was always the opening move. If not, except for one that began with a DA move, all results sections began with a DC move and ended with a DA move.

It should be noted that the constituent steps were found to be mostly in a linear order. Only DA1 and DA2 were recycled in a very limited number of methods section texts.

From these results, an optimal generic move structure of the methods section was derived (see Table 3). Accordingly, education research writers may begin a methods section by describing research design (RD). Then they must describe procedures of data collection (DC), providing details of the research context (DC1), the sample (DC2), the instruments (DC3), the actual procedures (DC4), justifications for the procedures (DC5) and proof of compliance with ethical standards (DC6). Then, they usually describe procedures of data analysis (DA), explaining how they analyzed data (DA1) and why they analyzed the data the way they did (DA2). Occasionally they may need to indicate inter-coder reliability if the data were analyzed manually (DA3).

## Discussion

The results show that all ERC articles used the *Describing data collection procedures* (DC) move and the great majority employed *Describing data analysis procedures* (DA) move as predicted by the initial coding scheme. However, half of the

articles began the methods section with an additional *Describing research design (RD)* move, which is rarely documented in previous research.

Regarding the *Describing data collection procedures (DC)* move, the most remarkable is the *Describing research context (DC1)* step present in over one third of the articles. Although other studies identified similar textual chunks describing the research context, the DC1s in the ERC corpus were different in that they situated the research in a much broader, more general context rather than limiting the information to the geographical location of the sample site as in, for instance, Lim (2006) and Huang and He (2011). In addition, unlike in other studies, they were independent of the *Describing the sample (DC2)* step.

A *Justifying data collection procedures (DC5)* step was also observed in a few ERC articles. It is rather difficult to compare this finding with those of previous research. In her comparative study of applied linguistics and education technology RAs, Pho (2008a) found it present in the former discipline but not in the latter. Lim (2006) observed it in management RAs, which was narrower in scope as it only concerned sampling, as indicated by its two sub-steps: *Highlighting advantages of using the sample* and *Showing representativity of the sample*. DC5's presence in the few articles in the ERC seems to be accountable by data collection procedures that were not well established.

Interestingly, an optional *Verifying compliance with ethical standards (DC6)* was found in a considerable number of methods sections. This finding suggests that it is important for education researchers to indicate conformity with established ethical requirements. In education research, human subject protection is of supreme importance. Precautions must be taken to ensure that harms and risks are minimized, benefits maximized; and human dignity, privacy and autonomy respected. Normally, when submitting a manuscript, authors have already included a verification statement in the cover letter, as required by the APA style manual (American Psychological Association, 2010). To find out why such verification statements were present in some articles

but absent in others, the researcher subsequently examined the authors' bio and affiliation information and found that of all 17 articles with a verification statement, nine were authored by researchers affiliated with U.S. institutions and the other eight by researchers institutions in eight different countries. Interestingly, nine of the articles were concentrated in the journal *Health Education Research*, another four were published in the *Journal of Engineering Education* and the rest in four other journals. This finding appears to suggest inter-journal variations, but we would be more confident to link the finding with a strong desire to get a manuscript accepted by the review panel and as well as the readership. Whether it is required by the journals or not, as long as the study is potentially threatening to human subjects, it pays to play it safe by including a verification statement.

Concerning the *Describing data analysis procedures (DA)* move, the present study found it employed in two-thirds of the ERC articles, in support of Pho's (2008a) findings about RAs in applied linguistics and education technology. Nevertheless, whereas Pho's data analysis move had only one *Recounting data analysis* step, the complexity of the DA moves in the ERC corpus called for two additional labels: *Justifying data analysis procedures (DA2)* and *Establishing inter-coder reliability (DA3)*. Both the addition of these steps itself and the nuanced step-by-step descriptions of the data analysis procedures suggest a keenly felt need of the authors to provide sufficient details. For example, although found in only a small portion of the ERC corpus, DA3 was typical of research where coding is frequently performed on qualitative data like transcripts of interviews. In fact, all the 26 articles containing DA3 in the ERC corpus were qualitative in nature. This is not surprising since it is a conventional practice to involve multiple coders or raters so as to reduce the degree of subjectivity of results. It should be noted that the data analysis move was absent in nearly one-third of the methods sections in the ERC corpus. Nevertheless, this by no means indicates that the authors did not describe their data analysis procedures. As findings on the results section suggest (to be reported in a

separate paper), some writers postponed describing data analysis till the results section. This is particularly true of quantitative studies that involved established, standard statistical procedures.

With respect to move cyclicity, the methods sections in the ERC articles were found to be the least active in recycling, in comparison with the other sections (as found in the larger study). This is because authors, irrespective of their disciplines, do not tend to juggle describing data collection procedures and data analysis procedures, as these activities naturally occur one after the other.

In sum, a marked characteristic of the methods section of the education research articles, particularly of the data collection and analysis moves, is thorough and highly detailed description. This is related to the fact that a considerable proportion of the ERC articles described used a mixed design of qualitative and quantitative methods. Qualitative research, largely concerned with understanding complex issues, embraces an interpretivist research paradigm and relies on such methods as interview, observation, ethnography, content analysis, etc. which are highly context sensitive and flexible. In the conduct of qualitative research, researchers often rely on an audit trail that documents in great detail all aspects of the research – context, sampling, the roles of different research team members, the roles of different data sources, data analysis procedures, etc. With regards to reporting data analysis procedures, Malterud (2001) states that “the reader needs to know the principles and choices underlying pattern recognition and category foundation” (p. 486). Lincoln and Guba (1985) emphasize the need for “thick” descriptions of the context, sample and procedures of data collection and analysis. Detailed information can help the reader evaluate the extent to which the research findings are transferable to other times, settings, situations, and populations. For example, it would be difficult for the reader to understand research results without sufficient information about a broad context of the research setting in terms of the geographical location of the research site and important demographics of the general population such as

age, sex, ethnicity, socio-economic status, educational level, political stance, etc. Indeed, the methods section of the education research article is situated at the “elaborated” extreme of Swales’ (2004) clipped-elaborated cline of variations of the methods section.

## **Conclusions**

### ***Pedagogical implications***

The strongest motive for move analysis is the central role it plays in ESP/EAP. The pedagogical implications of this study are found in the potential value of the results informing syllabus design and materials development for courses aimed at helping novice NNS education researchers, pre-service or in-service, to write research articles for publication. In particular, since idiosyncrasies often arise from the qualitative aspect characteristic of much of education research, it is imperative to give them focal attention along with explanations in relation to qualitative research.

In light of Lave and Wenger’s (1991) notion of “legitimate peripheral participation,” Kanoksilapatham (2011) argues that novice NNS writers should be encouraged to strike a balance between conforming to norms of the discourse community and maintaining their “primary ownership” of their manuscripts by retaining some of their idiosyncratic features. This, she adds, would contribute to research quality enhancement. However, to avoid the disastrous fate of their articles being rejected, we believe that novice writers should be discouraged from flouting any generic convention. Teachers should always keep in mind that the primary goal of ESP or EAP courses is to help learners acquire what Bhatia (2004) called “generic competence,” that is, “the ability to identify, construct, interpret, and successfully exploit a specific repertoire of professional disciplinary or workplace genres to participate in the daily activities and to achieve the goals of a specific academic/professional community” (p.145).



***Limitations of the study***

One major drawback related to the analysis of rhetorical moves is the limited generalizability inherent in all qualitative inquiries. First, the representativity of the corpus of 120 education research articles is not indisputable although it is the largest among the corpora used so far in similar studies. Second, the results are inevitably tinted with some degree of subjectivity despite the efforts made to keep it at a minimum, for example, by involving a member of the relevant discourse community as inter-coder who, besides coding a quarter of the texts for reliability, provided much insight into the community's discursive practices and contributed immensely to the rigor of the research. Third, because it was impossible to get into close contact with the authors of the articles, no informant interview was conducted for more insights into their discursive practices.

Another limitation was that the scope of the study did not allow for separate treatment of quantitative and qualitative research articles. Though many of the empirical education research articles in the ERC corpus were both quantitative and qualitative, a considerable portion was strictly qualitative. As a consequence, the relatively low frequencies of a few moves and steps unique to qualitative research might have obscured their importance.

***Recommendations for further research***

This study has identified an additional move and a few additional steps employed by education researchers that are accountable by the qualitative aspect of much of education research. Yet, to date, none of the previous studies has investigated the qualitative research article genre in its own right. The vital role that qualitative methods and mixed methods play in social sciences and humanities research calls for investigations into the rhetorical move structure of the qualitative research article. Perhaps, besides investigations into qualitative research articles in general, a series of studies are needed to capture the

rhetorical organizations of qualitative research articles in different disciplines.

### **Acknowledgements**

This study is sponsored by a doctoral research grant from Suranaree University of Technology, Thailand.

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### **References**

- American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington DC: American Psychological Association.
- Amirian, Z., Kassaian, Z., & Tavakoli, M. (2008). Genre analysis: An investigation of the discussion sections of applied linguistics research articles. *The Asian ESP Journal*, 4(1), 39-63.
- Anderson, K., & Maclean, J. (1997). A genre analysis study of 80 medical abstracts. *Edinburgh working papers in applied linguistics*, 8, 1-23.
- Anthony, L. (2014). AntConc (Version 3.4.3) [Computer Software]. Tokyo, Japan: Waseda University. Retrieved from <http://www.laurenceanthony.net/>
- Balocco, A. E. A. (2000). Who's afraid of literature? Rhetorical routines in literary research articles. *Especialist*, 21(2), 207-223.

- Bassey, M. (1999). *Case studies in educational settings*. Buckingham: Open University Press.
- Bhatia, V. (2004). *Worlds of written discourse: A genre-based view*. London: Continuum.
- Brett, P. (1994). A genre analysis of the results section of sociology articles. *English for Specific Purposes*, 13(1), 47-59.
- Burrough-Boenisch, J. (2003). Shapers of published NNS research articles. *Journal of Second Language Writing*, 12(3), 223-243.
- Chang, C.-F., & Kuo, C.-H. (2011). A corpus-based approach to online materials development for writing research articles. *English for Specific Purposes*, 30(3), 222-234.
- Cho, S. (2004). Challenges of entering discourse communities through publishing in English: Perspectives of nonnative-speaking doctoral students in the United States of America. *Journal of Language Identity and Education*, 3(1), 47-72.
- Curry, M. J., & Lillis, T. (2004). Multilingual scholars and the imperative to publish in English: Negotiating interests, demands, and rewards. *TESOL Quarterly*, 38(4), 663-688.
- ElMalik, A. T., & Nesi, H. (2008). Publishing research in a second language: The case of Sudanese contributors to international medical journals. *Journal of English for Academic Purposes*, 7(2), 87-96.
- Feng, H. (2006). A corpus-based study of research grant proposal abstracts. *Perspectives: Working Papers in English and Communication*, 17(1), 1-24.
- Flowerdew, J. (1999). Problems in writing for scholarly publication in English: The case of Hong Kong. *Journal of Second Language Writing*, 8(3), 243-264.
- Flowerdew, J. (2001). Attitudes of journal editors to nonnative speaker contributions. *TESOL Quarterly*, 35(1), 121-150.
- Huang, P., & He, L. (2011). Comparative genre analysis of research methods in English and Chinese experimental research articles. *Chinese Journal of ESP*, 2(1), 22-27.
- Kanoksilapatham, B. (2005). Rhetorical structure of biochemistry research articles. *English for Specific Purposes*, 24(3), 269-

292.

- Kanoksilapatham, B. (2007). Rhetorical moves in biochemistry research articles. In D. Biber, U. Connor & T. A. Upton (Eds.), *Discourse on the move: Using corpus analysis to describe discourse structure* (pp. 73-119). Amsterdam: John Benjamins.
- Kanoksilapatham, B. (2011). Civil engineering research article Introductions: Textual structure and linguistic characterization. *The Asian ESP Journal*, 7(2), 55-84.
- Kanoksilapatham, B. (2015). Distinguishing textual features characterizing structural variation in research articles across three engineering sub-discipline corpora. *English for Specific Purposes*, 37(0), 74-86.
- Kwan, B. S. C. (2006). The schematic structure of literature reviews in doctoral theses of applied linguistics. *English for Specific Purposes*, 25, 30-55.
- Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Li, L.-J., & Ge, G.-C. (2009). Genre analysis: Structural and linguistic evolution of the English-medium medical research article (1985-2004). *English for Specific Purposes*, 28(2), 93-104.
- Lim, J. M.-H. (2006). Method sections of management research articles: A pedagogically motivated qualitative study. *English for Specific Purposes*, 25(3), 282-309.
- Lim, J. M.-H. (2010). Commenting on research results in applied linguistics and education: A comparative genre-based investigation. *Journal of English for Academic Purposes*, 9(4), 280-294.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Loi, C. K. (2010). Research article introductions in Chinese and English: A comparative genre-based study. *Journal of English for Academic Purposes*, 9(4), 267-279.
- Loi, C. K., & Evans, M. S. (2010). Cultural differences in the

- organization of research article introductions from the field of educational psychology: English and Chinese. *Journal of Pragmatics*, 42(10), 2814-2825.
- Malterud, K. (2001). Qualitative research: Standards, challenges, and guidelines. *The Lancet*, 358(9280), 483-488.
- Martin, J. R. (1985). Process and text: Two aspects of human semiosis. *Systemic perspectives on discourse*, 1, 248-274.
- Mosteller, F., Nave, B., & Miech, E. J. (2004). Why we need a structured abstract in education research. *Educational Researcher*, 33(1), 29-34.
- Nwogu, K. N. (1997). The medical research paper: Structure and functions. *English for Specific Purposes*, 16(2), 119-138.
- Ozturk, I. (2007). The textual organisation of research article introductions in applied linguistics: Variability within a single discipline. *English for Specific Purposes*, 26(1), 25-38.
- Pho, P. D. (2008a). How can learning about the structure of research articles help international students? In T. McGrath (Ed.), *Conference Proceedings of the 19th ISANA International Education Conference, 2-5 December 2008, paper 14*.
- Pho, P. D. (2008b). Research article abstracts in applied linguistics and educational technology: A study of linguistic realizations of rhetorical structure and authorial stance. *Discourse Studies*, 10(2), 231-250.
- Pho, P. D. (2010). Linguistic realizations of rhetorical structure: A corpus-based study of research article abstracts and introductions in applied linguistics and educational technology. In S. T. Gries, S. Wulff & M. Davies (Eds.), *Corpus-linguistic applications: Current studies, new directions* (pp. 135-152). Amsterdam: Editions Rodopi B.V.
- Posteguillo, S. (1999). The schematic structure of computer science research articles. *English for Specific Purposes*, 18(2), 139-160.
- Salager-Meyer, F. (1992). A text-type and move analysis study of verb tense and modality distribution in medical English abstracts. *English for Specific Purposes*, 11(2), 93-113.

- Stoller, F. L., & Robinson, M. S. (2013). Chemistry journal articles: An interdisciplinary approach to move analysis with pedagogical aims. *English for Specific Purposes*, 32(1), 45-57.
- Swales, J. M. (1981). Aspects of article introductions. Birmingham, UK: The University of Aston, Language Studies Unit.
- Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge: Cambridge University Press.
- Swales, J. M. (2004). *Research Genres: Exploration and applications*. Cambridge, UK: Cambridge University Press.
- Tessuto, G. (2015). Generic structure and rhetorical moves in English-language empirical law research articles: Sites of interdisciplinary and interdiscursive cross-over. *English for Specific Purposes*, 37, 13-26.
- Thomson Reuters. (2009). Top journals in education: Ranked by 2007 impact factor. Retrieved June 30, 2011, from [http://sciencewatch.com/dr/sci/09/mar15-09\\_1D](http://sciencewatch.com/dr/sci/09/mar15-09_1D)
- Williams, I. A. (1999). Results sections of medical research articles: Analysis of rhetorical categories for pedagogical purposes. *English for Specific Purposes*, 18(4), 347-366.
- Wood, A. (1982). An examination of the rhetorical structures of authentic chemistry texts. *Applied Linguistics*, 3(2), 121-143.
- Yang, R., & Allison, D. (2003). Research articles in applied linguistics: Moving from results to conclusions. *English for Specific Purposes*, 22(4), 365-385.
- Zhang, B., Thuc, Q. B. T., & Pramoolsook, I. (2012). Moves and linguistic realizations: English RA abstracts by Vietnamese agricultural researchers. *The Asian ESP Journal*, 8(3), 126-149.

**Appendix****List of Journals for ERC**

| <b>Journal</b>                              | <b>Code</b> | <b>IF</b> | <b>Rank</b> |
|---|-------------|-----------|-------------|
| Journal of Engineering Education            | JEE         | 3.000     | 1           |
| Academy of Management: Learning & Education | LAE         | 2.796     | 2           |
| Scientific Studies of Reading               | SSR         | 2.676     | 3           |
| American Educational Research Journal       | AER         | 1.930     | 6           |
| Health Education Research                   | HER         | 1.786     | 7           |
| Computers & Education                       | CAE         | 1.602     | 8           |
| Journal of the Learning Sciences            | JLS         | 1.571     | 9           |
| Sociology of Education                      | SOE         | 1.290     | 13          |
| Language Learning & Technology              | LLT         | 1.222     | 14          |
| Journal of Research in Science Teaching     | RST         | 1.148     | 15          |
| Elementary School Journal                   | ESJ         | 1.062     | 18          |
| Learning and Instruction                    | LAI         | 1.029     | 19          |