Identifying Thematic and Rhetorical Patterns in Research Project Abstracts of Thai EFL Engineering Undergraduates

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Abstract
The aim of this study is to identify cohesion in the research project abstracts of Thai EFL engineering undergraduate students and to determine the writing patterns of their abstracts. Thirty-nine abstracts (200-300 words in length) from the faculty of Engineering in three different disciplines of the International Program were compiled and analyzed to identify manifested writing patterns by using Paltridge's (2006) Thematic Progression classification. The findings show that Linear and Constant Thematic Progression patterns tend to be predominantly utilized. The Rhetorical Structure (as in IMRD) of these abstracts was considered in relation to Thematic Progression patterns. Analyzing the *within moves* and *across moves* of IMRD for each abstract shows that Constant and Linear Progression patterns were common. Another common feature was the omission of the Discussion section in the IMRD Rhetorical Structure. This may be in consequence of the different Rhetorical Structures employed among English and Thai writers. It is expected that Thematic Progression patterns and Rhetorical Structures could benefit teachers and students alike in abstract writing pedagogy in order to make abstract writing less difficult and more cohesive which espouses overall coherence in turn.

Keywords: Cohesion, Theme, Rheme, Thematic Progression, IMDR, abstract

Introduction

A lot of problems can occur when writing in English as a foreign language. One of the most common problems in students' writing is due to the lack of cohesion in their writings and, as Bamberg (1983) mentioned, this can lead to students getting lower scores in examinations. Thus, the study of cohesion is very important for both teachers and learners: for teachers to help students produce a cohesive text and for students to get better scores in writing.

According to Thornbury (as cited in Paltridge, 2006), cohesion is the use of grammatical and lexical means to achieve connected text, either spoken or written. It refers to the relationship between items in a text such as words, phrases and clauses and other items such as pronouns, nouns and conjunctions. There are a lot of ways to identify cohesion, for instance, by using conjunction and transition, by using referential devices and by using the Thematic Progression theory. Thematic Progression (TP) theory will be used as a framework in this study because TP, unlike most other cohesive tools, does not only look at the language at sentence level but also beyond it. It looks at the relationship of the whole text and helps create cohesiveness in the text as a whole. Cohesive texts can consequently and effectively transfer the message to the readers. This in turn may foster coherence as the ways a text is connected and makes sense to readers.

Thematic Progression theory is mostly employed to analyze texts in the academic field (Rahmawati & Kurniawan, 2015). And one of the significant texts in the academic field is the abstract. Fundamentally, an abstract is a summary of a report with limited words. The following definition of an abstract is provided by American National Standards Institute [ANSI], (1979): "[it] is an abbreviated, accurate representation of the contents of a document, preferably prepared by its author(s) for publication with it" (as cited in Bhatia, 1993, p. 78). Abstract is seen as an important component in different kinds of genera, for instance, journals, research articles, reviews, theses, and research projects.

As a part of the graduation requirement, undergraduate students at King Mongkut's University of Technology Thonburi (KMUTT) in which engineering field is the largest need to conduct a research project that contains both Thai and English abstracts. Since abstracts contain significant information, it is important for students to make their abstracts cohesive in order to make it easy for readers to follow and understand the messages that they would like to convey. However, it has been noticed by the researchers that when students write their abstracts, some of the abstracts have no clear patterns which causes unconnected ideas and some parts of the abstracts have been translated word by word. Therefore, it is hypothesized that the TP theory can possibly help identify cohesiveness in students' abstracts and help students produce even more cohesive abstracts.

The TP theory has been usually used to analyze lengthy texts, e.g., essays. The reason might be that TP patterns can clearly be seen. Even though abstracts are short by their nature, usually 200 words more or less (Rahmawati & Kurniawan, 2015), it is possible to identify cohesiveness of abstract writing through TP patterns. Rahmawati and Kurniawan studied five thesis abstracts of Indonesian EFL students by using three TP patterns: Constant Thematic Progression, Linear Thematic Progression, and Split Rheme Thematic Progression. The finding showed that all three TP patterns were found in the abstracts and of the three patterns, students preferred to use the Constant Thematic Progression pattern over the other two. Moreover, the fact that students' abstracts lacked the other two patterns showed that the ideas constructed in the abstracts do not really flow together.

The finding of Rahmawati and Kurniawan (2015) makes the researchers curious to investigate abstracts of KMUTT's undergraduates (International Program) – particularly in the engineering field – to see whether or not they constructed their ideas cohesively based on TP theory. Therefore, the objective of this study is to identify thematic and rhetorical patterns in abstracts of Thai EFL engineering undergraduates. It is hoped that the findings of this study will help raise the awareness of both teachers and students about the significance of this specific cohesive tool: Thematic Progression patterns. The concept provides not only better understanding of writing difficulty to learners but teachers can also use it as one of their teaching materials to make their writing class lessons less difficult and more interesting. The study aims to answer the research question: **"What writing patterns do Thai EFL engineering undergraduates use in order to connect ideas in writing abstracts in English?"**

Literature Review

In order to identify cohesions in abstract writing, some theoretical frameworks need to be reviewed as a ground concept for this study. The literature review includes Theme-Rheme, Thematic Progression (TP) theory, Coherence, and the Rhetorical Structure of Introduction-Methods-Results-Discussion.

Theme-Rheme

Paltridge (2006) proposed the definition of Theme as the starting idea of a clause which is the part that the clause is about; the remainder of the clause is called Rheme. Wang (2007) mentioned that understanding the nature of Theme and Rheme can help create a cohesive text and help teach writing literacy. Witte and Faigley (1981) also stated that students who know how to use Theme and Rheme efficiently can produce better writing. This statement is in line with what Arunsirot (2013) revealed. She supported this statement by stating that using Theme Selections and Theme Progression patterns has the potential of improving students' writing skills more efficiently. The exchange of information between successive Theme and Rheme pairing in a text is called Thematic Progression (Eggins, 2004).

Thematic Progression (TP) Theory

TP theory was first studied by Danes (1974). He categorized three TP patterns: (1) Linear Thematic Progression, (2) Constant Thematic Progression and (3) Derived Thematic Progression. These three patterns may account for most of the Thematic patterns in academic texts. Nonetheless, in this study, Thematic Progression patterns which are proposed by Paltridge (2006) are used.

Thematic Progression (TP) is the way in which the Theme of the clause may pick up or repeat a meaning from a preceding Theme or Rheme. It helps give cohesion and coherence to a text (Paltridge, 2006) whereby telling readers where the information has come from and where it is going, thus creating cohesion in a written text (Wang, 2007).

Paltridge (2006) categorized three types of Thematic Progression as follows: (1) Linear Thematic Progression, (2) Constant Thematic Progression, and (3) Split Rheme. More details of each TP pattern are as follows:

1. Linear Thematic Progression pattern: The subject matter in the Rheme of one clause is engaged in the Theme of the succeeding clause (Paltridge, 2006). For instance, "*This flower grows on a mountain. **The mountains** in Thailand can be found in the North. **The North** of Thailand is very beautiful*".

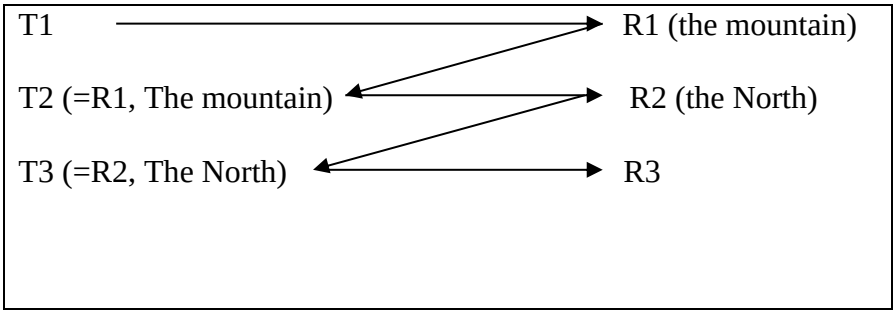

Figure 1 Linear Thematic Progression pattern

2. Constant thematic progression pattern: The T1 in one clause is repeated and taken up as the theme of the next clause, beckoning that T1 of each clause will be discussed about continuously (Paltridge, 2006). For example, "***This book** is very big. **It** is about how to use a washing machine. **It** shows you the instructions step by step".*

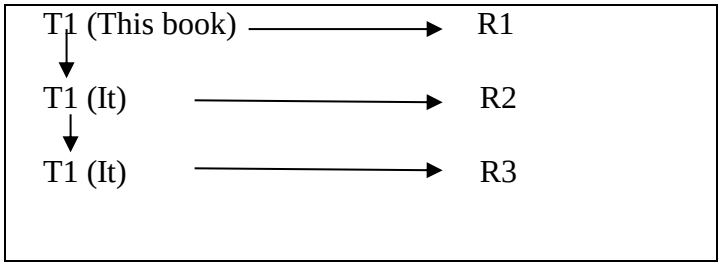

Figure 2 Constant Thematic Progression pattern

3. Split Rheme: A Rheme from a clause contains different pieces of information, and each piece of information becomes a Theme of succeeding clauses (Paltridge, 2006). For example, "*My favorite countries are* ***Thailand and France****.* ***Thailand*** *is famous for its street food.* ***France*** *has beautiful buildings".*

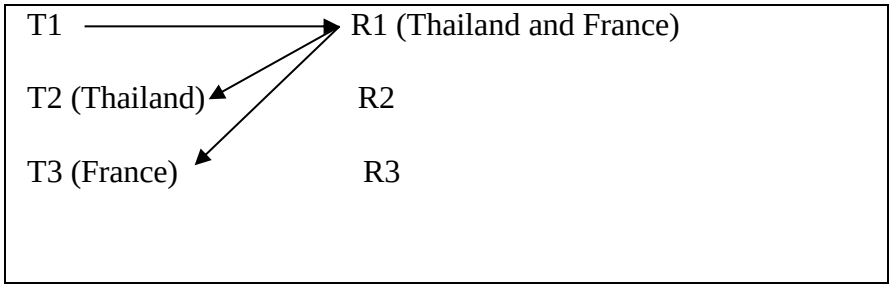

Figure 3 Split Rheme patter

Thematic Progression and Coherence

The connection between a Theme with a subsequent Theme or Rheme forms patterns of Thematic Progression which contribute to the cohesion and coherence of a text (Danes, 1974). According to Dastjerdi and Talebinezhad (as cited in Jing, 2014, p.68), the definition of coherence is referred as:

> "a text is coherent "when it hangs together, i.e., for every sentence in the text, there is a sequence of preceding and/or following sentences that provides a 'context' for it.…"

Jing (2014), in surveying research articles, brings forth RAs that show how felicitous it is to use Theme and Thematic Progression to improve the coherence in a learner's English writing. This is mainly accomplished by analyzing the problems of students' writings related to the use of Theme and Thematic Progression.

Similarly, Ma (2001) and Wang (2010) illustrated similar results of students' graded writings according to how well Theme and Thematic Progression patterns contributed to coherence. It was found that students who received a high score wrote coherent writings and used a variety of Thematic Progression patterns as in Constant and Linear Thematic Progressions.

Other researchers (Cheng, 2002; Zhang, 2004) stated that students could improve the coherence of their writings with the aid of Theme and Thematic Progression. Cheng found that one third of his (58 students) students' writing samples used infrequent use of Themes that were not linked to subsequent Themes. Zhang examined 50 English writing samples of second year university students with English majors and found that over 40 percent of the Themes were confusing, thus leading to incoherent writings.

As can be gleaned from the findings of the above-mentioned researchers, Thematic Progression can assist students in writing not only cohesive texts but also coherent ones. Therefore, although the current study does not analyze for coherence, it does allude to it as a byproduct of students' use of TP patterns in their writings.

The Rhetorical Structure of IMRD

This Introduction-Methods-Results-Discussion model (hereafter IMRD) has originally been used in examining entire research articles; but in this study, it is used with shortened texts, i.e., abstracts. The IMRD structure taken from Lorés (2004) is provided below.

Section 1 (Introduction)	This may outline the author's purpose or objective, the goals of the research or the problems that the author wishes to tackle.
Section 2 (Methods)	Here, the author indicates the way the problem has been studied or the goal set out: this might include data used and the methodology followed.
Section 3 (Results)	In this section, a summary of general findings appears.
Section 4 (Discussion)	This move might include an interpretation of the results, some implications for further research or applications of the findings.

Figure 4 The IMRD structure and explanation

As stated in the aforementioned sections, the abstracts in the current study adhere to the IMRD Rhetorical Structural model similar to that of research articles. With regard to these abstracts, many of the TP patterns and Rhetorical Structures coincide. This is evident in the *within* and *across moves*; i.e., TP patterns take place *within* and *across* the very sections that comprise the IMRD model. This will be illustrated with an example from one of the students' abstracts; the TP patterns were italicized and underlined and the sections/moves are enclosed in parentheses:

Abstract A:

(Introduction) One of polymeric biological molecules which is called *ribonucleic acid (RNA)* is involved in diverse biological roles in regulation of gene expression. Generally, secondary structures of *RNA* dictate their functional devices in living organisms. Therefore, various desired structures of synthetic *RNAs* are much desired at the present. Recently, an RNA design tool has been developed to design and optimize sequences of desired interacting RNAs based on *Genetic Algorithm (GA)*. (Methods) In an attempt to improve *the GA-based tool*, we apply *Artificial Bee Colony (ABC)* algorithm to optimize desired interacting RNAs instead of GA. This is because *ABC* has been reported as an optimization algorithm that can quickly find optimal solutions in complicated engineering problems. To achieve this goal, *we* develop an ABC-based RNA design tool using C-programming. *We* then employ this tool to design 5 different interacting PNA models and compare its performance with that of the existing GA-based tool. (Results) It is found that our tool with ABD algorithm performs better than the GA-based tool in providing optimal designs for all

5 models. Furthermore, 3 control parameters which are Employed bees (EB_Rate), Onlooker bees (OB_Rate) and failure are optimized in this study. The results show that 0.7, 0.9 and 80 are the optimal values, respectively. In term of performance, *our tool* can achieve the fitness score of 0.996 for model 5 in 32.33 seconds while GA-based tool needs 36.50 seconds. (Discussion) Thus, *our ABC-based design tool* shall be a promising tool for designing interacting RNAs in synthetic biology.

TP & IMRD Regarding Cohesion

Lorés' (2004) study reveals that students writing research abstract in the IMRD tend to use Linear and Constant Thematic Progression patterns. She concludes that the two patterns are consistent in the rhetorical structure of IMRD. Lorés adds that her findings have pedagogical applications. Therefore, if a teacher knows the structural layout of a piece of writing be it an abstract or an essay, for example, then he/she can draw attention to these feature in order to improve his/her students' writings of that genre.

Research Methodology

Data Collection

Research project abstracts of KMUTT undergraduate students were collected to find out the cohesive patterns of students' writings in order to observe how they constructed their ideas in writing abstracts. Thirty-nine abstracts (13 from each department) written by Thai students were collected from three different departments of Faculty of Engineering in the International Program: Computer Engineering, Civil Engineering, and Chemical Engineering. These three disciplines were selected since the International Program has been established in their department for over 12 years and there was a reasonable number of students in these 3 departments. In addition, students of the International Program who regularly use English as a medium of study would gain more exposure and use English more realistically than students in a regular program. Therefore, it is possible that they have a better command of English when writing an original abstract without relying much on translating tools from the Internet.

The abstracts were extracted both from the university's online library system and directly from the respective departments. The abstracts were chosen under three criteria: 1) the year of publication was from the academic years 2010-2015, in which the researchers can sufficiently obtain the most recent abstracts available; 2) the length of the abstracts was between 200-300 words, for the ability to see the TP patterns clearly when analyzed; and 3) all abstracts were written by students who enrolled in the International Program, and they were required to write an original abstract in English.

It is worth noting that an underline assumption in the current study is that these subjects would produce better pieces of writing if they had been taught, inter alia, the generic features of abstract. This assumption, however, will be dealt with in the pedagogical implication section.

Data Analysis

There are four main steps of analyzing the collected abstracts: 1) the texts were broken down into T-units to separate Themes and Rhemes into clauses; 2) the separated clauses were analyzed according to the Thematic Progression Theory proposed by Paltridge (2006); 3) a Rhetorical Structure was employed to highlight the TP patterns used in each part

of the abstracts; and 4) frequencies of TP patterns detected were counted and converted into percentages to display the result of each associated area.

For the first stage, all thirty-nine of the collected abstracts were separated into T-units to break down Themes and Rhemes into clauses to make it easier to identify the patterns. The level of analysis is the clause (i.e. the independent clause, including hypotactics but excluding paratactic clauses). An example of an abstract followed by the clauses being separated is shown below:

Abstract B:

The purpose of this study is to study the behavior and stability of Rockfill dam under the seismic due to vary shape of canyon, height and type of rockfill dam. Rockfill Dam is classify from the location of impervious material membrane on the upstream face such as concrete (CFRD) and impervious zone at central core (CCRD) to satisfy for various purposes such as irrigation, flood protection and to be energy resources.

The purpose of this study (T1)	(R1) is to study the behavior and stability of rockfill dam under the seismic due to vary shape of canyon, height and type of rockfill dam.
Rockfill Dam (T2)	(R2) is classify from the location of impervious material membrane on the upstream face such as concrete (CFRD) and impervious zone at central core (CCRD) to satisfy for various purposes such as irrigation, flood protection and to be energy resources.

The next step was to employ the Thematic Progression theory in analyzing the data. The three TP patterns (i.e., Constant, Linear, and Split Rheme) were included for each abstract, and the frequency of each pattern used was calculated.

Furthermore, the Rhetorical Structure IMRD model was employed. In analyzing the IMRD Rhetorical Structure, an abstract that employed at least two of the four parts of the structure was included in the current study. To illustrate this point, when the Introduction and Method parts of the abstract were discovered, that abstract would be counted. Moreover, in counting the TP patterns used in each part of the IMRD structure, the researchers considered TP patterns used from *moves*, both *within moves* and *across moves.*

Lorés (2004) describes *moves* as a "functional term that refers to a defined and bounded communicative act that is designed to contribute to one main communicative objective… of the whole text" (p. 282). *Within moves* are when the TP patterns are spotted within the same section, for example, there are five Linear TP patterns found in the Introduction section; this is called *within moves.* The number of sentences for *within moves* can be different in length; some can be short (i.e., one sentence long) and some can be long (i.e., more than one sentence long). An example of TP patterns analyzed *within moves* is demonstrated below; the TP pattern is underlined:

Abstract C: Linear TP in *within moves*, within Methods section

(Methods) [In this study, the formaldehyde gaseous was removed by using noble metal such as gold (Au), silver (Ag) and platinum (Pt) doped on CeO_2 supporter as the catalysts in oxidation process. The synthesized CeO_2 and dope 1%wt for each type of noble metal by using Colloidal Emulsion Aphrons (CEAs) was studied. For removal of formaldehyde gaseous, all catalyst was reacted with 40000 ppmV of

HCHO in vial tube for 1 hr. The amount of mass loading of each catalyst from CEAs method were 1.24%wt for Ag, 1.17%wt for Au and 1.05%wt for Pt. The final concentrations of HCHO were analyzed by using Gas Chromatography].

Across moves is when TP patterns are linked from one section to another. For instance, a Linear TP that links a clause of the Introduction section to another clause in the Methods section is considered an *across move*. An example of TP pattern analyzed *across moves* is demonstrated below:

Abstract D: Linear TP in *across moves*, from Introduction to Methods

(Introduction) [The purpose of this project was to separate water, ethanol, and isobutyl alcohol from amyl alcohols in synthetic fuel oil by pervaporation using carbon membranes. (**Methods**) [Carbonization of an unmodified membrane was done by heating commercial polyimide precursor known as Kapton® under a nitrogen atmosphere 50°C –stepwise from a room temperature to 600°C. A modified membrane was prepared by rapidly increasing the heating temperature from 100°C to 600°C].

In order to ensure the reliability of the data analyzed, all of the data were cross-checked by an experienced inter-rater who is an English native speaker and holds an MA in Applied Linguistics. His specialty is discourse analysis, and he has published academic research articles regarding cohesion. Both TP patterns and IMRD Rhetorical Structure were double-checked when analyzing all of the abstracts. As a result, out of the thirty-nine abstracts analyzed, only one disagreement was found due to the confusion of a technical term. This is because a lack of knowledge of engineering terms made it difficult for the researchers to identify the TP patterns. However, upon looking at the context, the researchers finally agreed on a TP pattern. The result of the analysis will be displayed in the following section.

Data Presentation and Discussion

Thematic analysis: TP patterns

In order to see what pattern(s) emerged in the thirty-nine abstracts, the three TP patterns were used to analyze the data. The overall frequency of each TP pattern used by the three different disciplines of Engineering is presented along with the percentage of each frequency in Table 1.

Table 1

The frequency of Thematic Progression patterns used in the abstracts and the percentage

TP Patterns	Total TP Patterns	Percentage
Constant TP	139	50.92%
Linear TP	132	48.35%
Split Rheme	2	0.73%
Total	273	100%

Table 1 reveals that, out of the three patterns, Constant TP (50.92%) and Linear TP (48.35%) were the dominant patterns employed in the students' abstract writing. Split Rheme was used the least. The finding supports the research of Rahmawati and Kurniawan (2015). They conducted a similar study with Indonesian EFL university students and found that Split Rheme occurred only once while Constant TP and Linear TP occurred regularly. In contrast to both studies mentioned, a study of Chinese EFL university students revealed completely different findings. The main pattern used by the Chinese students was Split Rheme which was 77% (Soepriatmadji, 2009).

In contrast to the current study, Lockhart and Na-on (2016) conducted a similar research with KMUTT undergraduate students who enrolled in one of the regular programs, and it was found that when assembling their abstracts, a majority of students preferred Constant TP to Linear TP with an 8:2 ratio. According to Arunsirot (2013), this ratio would be considered as an overuse of Constant TP by the KMUTT students of the regular program. Consequently, students tended not to advance their ideas by not developing the Rhemes in their sentences; instead they offered a deeper explanation within their Themes. The overuse of Constant TP can cause writing to be unconnected and incomprehensible; it can impede the development of ideas and therefore reads like a list of disjointed statements instead of a coherent piece of writing.

TP patterns were claimed to be suitable cohesion patterns mostly employed in analyzing texts in academic writing (Rahmawati & Kurniawan, 2015), which the result of the present study supports. From the current study, it is shown that KMUTT Engineering students who enrolled in the International Program utilized TP patterns in writing their abstracts; therefore, it is evident that TP patterns do contribute to cohesive writing in a positive manner. Examples of TP pattern used in students' writings are demonstrated in the Appendix.

In addition, the frequency of TP patterns used by each department was shown in Tables 2 to 4 below to illustrate the similarities and/or differences across disciplines.

Table 2
The frequency of the Thematic Progression patterns from the Computer Engineering department

TP Patterns	Total TP Patterns	Percentage
Constant TP	53	51.96%
Linear TP	48	47.06%
Split Rheme	1	0.98%
Total	102	100%

Table 3
The frequency of Thematic Progression patterns from the Chemical Engineering department

TP Patterns	Total TP Patterns	Percentage
Constant TP	46	47.92%
Linear TP	49	51.04%
Split Rheme	1	1.04%
Total	96	100%

Table 4
The frequency of Thematic Progression patterns from the Civil Engineering department

TP Patterns	Total TP Patterns	Percentage
Constant TP	40	53.33%
Linear TP	35	46.67%
Total	75	100%

Comparing TP patterns used across disciplines, the Computer and Civil Engineering departments employed Constant TP the most frequently (whereas Chemical Engineering used the pattern the least often). Among the three, only Civil Engineering did not employ any Split Rheme pattern in their writing. The Split Rheme pattern, however, was detected only one time each from Computer Engineering and Chemical Engineering students. Regardless of the sub-field of Engineering, the TP patterns that students employed in their abstract writing were more or less the same. However, students need to be made aware of how ideas should be connected in order for their writing to be coherent.

As seen from Tables 2 to 4, based on the 13 abstracts extracted from each of the three departments, the total number of TP patterns used of each department was also varied: 102 for Computer Engineering, 96 for Chemical Engineering, and 75 for Civil Engineering. According to the current study, the differences in number of TP patterns depend on the number of clauses that students provided in their writing; the more clauses there were, the more TP patterns were likely to be detected. As can be seen regarding the patterns among these subfields, students need to be aware of the Rhetorical differences or the TP patterns associated with them. This is borne out in Table 1.

Rhetorical Structure Analysis

To have a better understanding of the results, Rhetorical Structure was studied. The Structure that has undergone analysis in this article is the Introduction-Methods-Results-Discussion model. All of the abstracts were identified for their IMRD structure followed by

the analysis of their TP patterns. The frequency of the IMRD structure used in all thirty-nine abstracts is presented in Table 5 below.

Table 5
A distribution of the Rhetorical Structure used by each department

Department	Total abstracts studied	IMRD used per department	Percentage
Computer Engineering	13	9	69.23%
Chemical Engineering	13	13	100%
Civil Engineering	13	11	84.62%
Total	39	33	84.62%

Table 5 shows that IMRD Rhetorical Structure was adhered to by most of the students when composing their abstracts. This finding is similar to the finding of Lorés (2004) in analyzing RA abstracts which showed that 60% of the abstracts comply with the IMRD structure. This finding has confirmed the statement of Lorés (2004, p.283) that IMRD is considered to be the representative of Rhetorical Structures. This finding is also supported by other scholars as in Bhatia (1993), Nwogu (as cited in Lorés, 2004), and Swales (1990).

When comparing among the three departments, Computer Engineering is the only department that followed the IMRD structure the least with only 69.23%. Additionally, each part of the IMRD structures was further analyzed to discover the TP patterns employed by students. Below are the findings from *within moves* of all four sections: Introduction, Methods, Results, and Discussion. The result is illustrated in Table 6.

Table 6
A distribution of the TP patterns analyzed within moves in IMRD Rhetorical Structure

TP patterns	IMRD Rhetorical Structure (Within moves)				Total
	I	M	R	D	
Constant TP	40	31	32	1	104
Linear TP	29	36	33	-	98
Split Rheme	-	2	-	-	2

Note: *I* stands for Introduction, *M* for Methods, *R* for Results and *D* for Discussion.

Starting from the Introduction section, the only two patterns that appeared in this section are Constant TP and Linear TP with the ratio of 40:29, illustrating the students' ability to perform long moves. Similarly, Lockhart and Na-on (2016) conducted a comparable research on KMUTT students who enrolled in the regular program, and their findings showed that students performed long moves in the Introduction section. In contrast, Lorés' (2004) results (of analyzed research articles) showed that moves could not be analyzed in her

subjects' Introduction section since the writers produced moves that were too short for TP patterns to be distinguished.

Moving to the Methods section, all three patterns, unsurprisingly, were found. The frequency of Constant TP and Linear TP was not significantly different. The finding of the current study is in accordance with findings of other researchers; for instance, previous studies by Nwogu and Nwogu and Bloor (as cited in Lorés, 2004) revealed that Constant TP and Linear TP were the two patterns mostly discovered in research abstracts. The Split Rheme pattern, however, was found the least. It is worth noting that even the Split Rheme that was found only twice in 39 abstracts was discovered in the Methods section. Since Split Rheme is the pattern used to explain and distribute certain figures/points, this section seems to be the most suitable part to use the pattern thereby the steps of operations are to be explained by researchers.

As for the Results section, Constant TP and Linear TP were the only two patterns that appeared with almost the same frequencies: 33 and 32, respectively. The result concurs with Lorés (2004) whose findings on the research abstracts also revealed a similar tendency for the Linear TP patterns in the Results section.

The Discussion section is the segment that majority of students omitted in their writing; hence, this is the reason why there was only one pattern found in this section which is Constant TP.

Comparing among IMRD structures, it can be found that TP patterns were detected regularly among all sections with the exception of the Discussion section. It seems like students were weak in writing the discussion part; therefore, TP patterns could not be analyzed in the Discussion section of the Rhetorical Structure. It is important to try to comprehend the reason why students omitted the Discussion section in their abstracts. The researchers believe that students might not be aware of the notion of Rhetorical Structure in abstract writing. They might not realize that, when writing for different genera, Thai and English have different Rhetorical patterns. In other words, Thai writers do not realize the difference between Thai and English Rhetorical patterns as supported by a study of Thep-Ackrapong (2005). As a result, some parts of the Rhetorical Structures were uncompleted and that might have caused difficulties in understanding the text as a whole.

Apart from the *within moves* of the IMRD structure that were scrutinized, the *across moves* of the structures were also investigated for their TP patterns. The finding is revealed below in Table 7.

Table 7
A distribution of the across moves TP patterns analyzed in IMRD Rhetorical Structure.

TP patterns	IMRD Rhetorical Structure (Across moves)				Total
	I-M	M-R	R-D	M-D	
Constant TP	6	4	2	-	12
Linear TP	11	5	-	1	17
Split Rheme	-	-	-	-	

Note: *I* stands for Introduction, *M* for Methods, *R* for Results, *D* for Discussion.

As revealed in Table 7, the only two patterns appearing in *across moves* are Linear TP and Constant TP, seventeen and twelve times, respectively. Students seemed to favor Linear TP over Constant TP. The employment of these two TPs, the researchers believe, is a good sign since TP theory is mostly employed to analyze texts in academic fields, and abstract is one of the significant texts in this field (Rahmawati & Kurniawan, 2015). Additionally, TP patterns are the tools that help tie texts together cohesively and they create cohesion in a written text (Wang, 2007). Because TP patterns were found in International Students' writings, it shows that students were aware of how to link their ideas cohesively from one section to another. By employing the patterns into their writings, these students made it easier for readers to follow and in most instances better understand their writings.

Pedagogical Implications and Conclusion

The result of this study can be put forth pedagogically by teachers introducing the concept of TP theory to learners. Teachers should familiarize their learners gradually with the concept of cohesion, Theme, and Rheme and eventually the Thematic Progression theory. This way, learners will have a better understanding of their own writing along with its generic processes. Instructors will also have less difficulty motivating their learners to write in English, and they will be able to help guide their learners in the right direction. Thai students tend to write abstracts in accordance with the abstracts from previous years or from the Internet, which could lead to various mistakes, for example, lack of cohesion. Therefore, it is extremely important for students to familiarize themselves with the Rhetorical Structures of an abstract since an abstract is a genre that contains its own Rhetorical Structures. As shown from the findings, the majority of the students followed a Rhetorical Structure which is called IMRD. However, most of the students left out the D (Discussion) section which led to having an incomplete abstract structure. It is important to make students aware of generic features of abstracts since understanding a genre-based approach analysis can help improve students' abstract writing. This idea is supported by the findings of Changpueng's (2013) study. It was revealed that the writings of Thai undergraduate students of Engineering were improved by applying a genre-based approach analysis. Furthermore, some of the students especially from the Computer Engineering department preferred another Rhetorical Structure which is called *Create a Research Space*. Since students employed this structure which is not included in this study, it would be useful for future research to explore this structure along with other generic structures of the abstract.

Limitations of the Study

The data collected for this current study was only from an international program of one faculty, Engineering; therefore, the results can only be generalized for this particular discipline. Moreover, the numbers of abstracts analyzed in this study were limited; thus, more abstracts need to be investigated in order to substantiate the above findings.

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Appendix

Examples of TP Pattern Used in Students' Abstract Writing

Abstract E:

Formaldehyde (HCHO) was the colorless and toxic gas when dissolved in water it was called formalin. Normally, formalin is used in many factories such as chemical, plastic and fabric. Many people were sick from the toxicity of formaldehyde. In this study, the formaldehyde gaseous was removed by using noble metal such as gold (Au), silver (Ag) and platinum (Pt) doped on CeO_2 supporter as the catalysts in oxidation process. The synthesized CeO_2 and dope 1%wt for each type of noble metal by using Colloidal Emulsion Aphrons (CEAs) was studied. For removal of formaldehyde gaseous, all catalyst was reacted with 40000 ppmV of HCHO in vial tube for 1 hr. The amount of mass loading of each catalyst from CEAs method were 1.24%wt for Ag, 1.17%wt for Au and 1.05%wt for Pt. The final concentrations of HCHO were analyzed by using Gas Chromatography. According to the characterization, it was found that Au/ CeO_2 particle achieved the highest HCHO removal that related to the highest surface area. The conversions of HCHO after reacted with catalyst were 66.7%, 48.84%, 39.21% and 28.72% for Au/ CeO_2, Ag/ CeO_2, Pt/ CeO_2 and pure CeO_2 respectively. So, the best catalyst for the reaction was Au/ CeO_2. On the other hand, the effects of different operated temperatures at 35°C, 40°C and 45°C were determinded by using Au/ CeO_2. From the results, the conversions of HCHO were 66.7%, 67.86% and 68.68% for 35°C, 40°C, 45°C, respectively. All conversions were in the range of % standard error. The performance for the removal of HCHO was not ignificantly different within the range of low temperature.

Formaldehyde (HCHO) (T1)	(R1) was the colorless and toxic gas when dissolved in water it was called formalin.
Normally, formalin (T2)	(R2) is used in many factories such as chemical, plastic and fabric.
Many people (T3)	(R3) were sick from the toxicity of formaldehyde.
In this study, the formaldehyde gaseous (T4)	(R5) was removed by using noble metal such as gold (Au), silver (Ag) and platinum (Pt) doped on CeO_2 supporter as the catalysts in oxidation process.
The synthesized CeO_2 and dope 1%wt for each type of noble metal by using Colloidal Emulsion Aphrons (CEAs) (T5)	(R5) was studied.
For removal of formaldehyde gaseous, all catalyst (T6)	(R6) was reacted with 40000 ppmV of HCHO in vial tube for 1 hr.
The amount of mass loading of each catalyst from CEAs method (T7)	(R7) were 1.24%wt for Ag, 1.17%wt for Au and 1.05%wt for Pt.
The final concentrations of HCHO (T8)	(R8) were analyzed by using Gas Chromatography.
According to the characterization, it was found that Au/ CeO_2 particle (T9)	(R9) achieved the highest HCHO removal that related to the highest surface area.
The conversions of HCHO after reacted with catalyst (T10)	(R10) were 66.7%, 48.84%, 39.21% and 28.72% for Au/ CeO_2, Ag/ CeO_2, Pt/ CeO_2 and pure CeO_2 respectively.
So, the best catalyst for the reaction (T11)	(R11) was Au/ CeO_2.
On the other hand, the effects of different operated temperatures at 35°C, 40°C and 45°C (T12)	(R12) were determinded by using Au/ CeO_2.

From the results, the conversions of HCHO (T13) ↓	(R13) were 66.7%, 67.86% and 68.68% for 35°C, 40°C, 45°C, respectively.
All conversions (T14)	(R14) were in the range of % standard error.
The performance for the removal of HCHO (T15)	(R15) was not ignificantly different within the range of low temperature.

Abstract F:

Abstract

The aim of this research is to develop the analysis and design charts for the roof truss of factory by using the commercial software, SAP2000. Purpose of our research is to reduce the analysis and design times. These developed charts can be used as the reference data for design engineer. Charts developed consist of 6 analysis and 6 design charts. The analysis charts present the relationship between internal forces and span length while the design charts present the relationship between cross-sectional area and span length, respectively.

The research procedures consist of three main parts. First part is analysis and design phrase, this step includes the review of design theory based on ASD-89, setting the limitation and assumption of research, and investigation the design and analysis procedures by using SAP2000. Second part is the verification process, which compare the manual results with numerical results of SAP2000 including the internal forces and cross-sectional area. As regard, we found that most of internal forces gave the percent differences which are less than 1% indicating the accuracy of manual and SAP2000 calculation. In case of design chart, we found that the percent differences are less than 10%. Third part is developing design charts, this step is to collect all results including with internal forces and cross-sectional area of steel and then present as analysis and design charts. These results obtained from our research can be supported design engineers in order to reduce the working time.

The aim of this research (T1)	(R1) is to develop the analysis and design charts for the roof truss of factory by using the commercial software, SAP2000.
Purpose of our research (T2)	(R2) is to reduce the analysis and design times.
These developed charts (T3)	(R3) can be used as the reference data for design engineer.
Charts developed (T4)	(R4) consist of 6 analysis and 6 design charts.
The analysis charts (T5)	(R5) present the relationship between internal forces and span length while the design charts present the relationship between cross-sectional area and span length, respectively.
The research procedures (T6)	(R6) consist of three main parts.
First part (T7)	(R7) is analysis and design phrase, this step includes the review of design theory based on ASD-89, setting the limitation and assumption of research, and investigation the design and analysis procedures by using SAP2000.
Second part (T8)	(R8) is the verification process, which compare the manual results with numerical results of SAP2000 including the internal forces and cross-sectional area.
As regard, we (T9)	(R9) found that most of internal forces gave the percent differences which are less than 1% indicating the accuracy of manual and SAP2000 calculation.
In case of design chart, we (T10)	(R10) found that the percent differences are less than 10%.
Third part (T11)	(R11) is developing design charts, this step is to collect all results including with internal forces and cross-sectional area of steel and then present as analysis and design charts.
These results obtained from our research (T12)	(R12) can be supported design engineers in order to reduce the working time.