Developing an Instructional Model to Teach Periphery Researchers to Write English Scientific Research Articles for Scholarly Journals

Saneh Thongrin, Thammasat University, Thailand

The Asian Conference on Language Learning 2016
Official Conference Proceedings

Abstract
Periphery researchers in sciences have been found to have problems with publications of their research articles (RAs) in scholarly journals. However, the corpus-based studies available tended to focus more on RAs' features than on the development of pedagogical practices aiming to enhance researchers' writing ability. Having witnessed these problems among Thai researchers trying to publish their works, I conducted a three-year, research-and-development study, constructing an instructional model by initially exploring problems and needs of 125 Thai research assistants and researchers in 2010. The participants revealed writing problems in sentences, paragraphs, essays, and RAs. Also, the research assistants showed stronger needs in developing their writing abilities in such discourse levels than the researchers did. These results informed the constructed model implemented in phases two and three, in 2011 and 2012, where 25 and 30 research assistants in sciences were taught to write scientific RAs. The findings revealed the effective use of the teaching model. The participants could write their scientific RAs effectively. With awareness of RAs' generic features in their fields, they could write professionally despite some Thai collectivist thought patterns hindering English writing. The findings suggest that the model rested on the participants' backgrounds is of use to educators/researchers to develop scholarly-writing abilities of periphery researchers in non-English science institutes.

Keywords: instructional model, scholarly publications, problems in English scientific writing, non-native English speaking researchers

Introduction

As the importance of globalization of science and its related fields has been accelerating, the predominant role of English as the language of research publication has been observed, and the need for sophisticated English writing ability for scholarly publication has thus been expanding (Cameron, 2007; Flowerdew, 1999a, 1999b; Tychinin & Kamnev, 2005; Wang & Bakken, 2004). However, writing by non-native writers has been found to deviate from the rhetorical conventions required in certain academic discourse communities. These writers suffer from being inexperienced in their fields and thus struggle in the schematic, rhetorical patterns of academic genres (Blicblau, McManus, & Prince, 2009; Chen, 2009; Gosden, 1995).

Such problems were consistent with those in Dudley-Evans (1995) and Martin (1999), where non-native writers were required but failed to construct research articles (RAs) that could be accepted by reviewers in their fields. With such requirements, these writers were apparently marginalized from, rather than included in, the professional communities due to their insufficient abilities to communicate their research outputs on the basis of the communicative events signified by certain communicative purposes governed and understood among such targeted communities. In addition, these researchers suffered the same problems found in Bhatia (1993) and Lavelle (2003), failing to have their research articles accepted by the English native-speaking academic community due to their lower competence in the rhetorical traditions of academic writing, although their rigorous science inquiries were of quality.

On account of these problems, theoretical perspectives by a number of scholars (e.g., Crookes, 1986; Hinkel, 2006; Miller, 1984; Moses, 1985; Pagel, Kendall, & Gibbs, 2002; Swales, 1981, 1987; Widdowson, 1983) support explicit instructions on genre structure revealing lexical, grammatical and rhetorical features. The abilities in advanced sentence constructions have been highlighted as one of the elements most needed. Also, research in applied linguistics has recommended that explicit instructions oriented to the schematic, rhetorical requirements of the English-language scientific article, regardless of their mastery of English grammar, should benefit these marginalized writers (Cameron, 2007; Flowerdew, 1999a, 1999b; Gosden, 1995; Swales, 1990; Tychinin & Kamnev, 2005; Wang & Bakken, 2004). However, in response to these recommendations, there has been a dearth of research offering formal instruction or training to those researchers/writers who exhibit problems and needs in various disciplines (Gosden, 1995; Spack, 1988). As a result, instruction in the rhetorical conventions of English scientific writing should be an integral part of the development of those non-native professionals.

In this study, I therefore constructed an instructional model used in training Thai researchers in scientific disciplines to write their scientific RAs. I conducted a three-phase study—preliminary survey, creating and testing a teaching model for in scholarly writing workshops, and retesting the model to assess its effectiveness in practice—achieved through two major research questions.

Table 1
Three-phase research questions

Research Phases	Research Questions
1 Problems & needs explored for model construction	1. What are the participants' major problems and needs in relation to English writing for scholarly publications?
2 & 3 Testing & retesting the model	2. What were the effects of explicit instruction on participants' competence and abilities in scholarly publications?

Research Methods

Research Elements

To explore the participants' holistic problems, I in 2010 analyzed the survey results of the participants, 125 researchers and research assistants in sciences and social sciences, randomly selected from those working in research institutes situated in Bangkok and its suburban areas. To test the model through experimentation, I conducted the second phase in 2011 with 25 research assistants in science institutes of the same areas, also randomly selecting them from those volunteering to join the project. The third phase of research was conducted in 2012 aiming to retest the model effectiveness by repeating the second with some justifications, having 30 participants sharing the same background as those in the previous phases. Accordingly, the inquiry processes included seven stages: surveying the participants' problems in scholarly writing, planning for related elements of a teaching model serving the participants' problems and needs, developing the model based on such problems and needs, testing the model in an actual workshop, initially revising the model, retesting the adjusted model in another workshop, and finalizing the model for applications. Table 2 shows elements of such processes.

Table 2
Research elements

Research Elements	Phase 1: Preliminary Survey	Phase 2: Testing the Model	Phase 3: Retesting the Model
Research Participants	125 researchers/research assistants in sciences and social sciences in Bangkok and suburb areas	25 research assistants in sciences in the same areas	30 research assistants in sciences in the same areas
Data Collection Methods *	- Initial survey - Writing samples	- Experimentation -Pretest and posttest papers -Written research papers - Interviews - Class observation - Self-reported survey	- Experimentation -Pretest and posttest papers -Written research papers - Interviews - Class observation - Self-reported survey
Research instrument	Self-reported questionnaire	- Self-reported questionnaire - Pre- & post tests - Course materials	- Self-reported questionnaire - Pre- & post tests - Course materials
Issues of Validity	Index of Congruence value (IOC) by three specialists	-Two raters (a native teacher & the researcher) validating the pretest and posttest papers - course materials and self-reported questionnaire	-Two raters (a native teacher & the researcher) validating the pretest and posttest papers - course materials and self-reported questionnaire
Research procedure	-Surveying - Analyzing data - Constructing & validating the model	1. Pre testing 2. Training the participants to write through the model 3. Self-reported questionnaire & attitude survey 4. Post testing 5. Analyzing data 6. Revising the model	1. Pre testing 2. Training the participants to write through the model revised from Phase 2 results 3. Self-reported questionnaire & attitude survey 4. Post testing 5. Analyzing data 6. Concluding the model
Units of analysis	Quantitative analysis through descriptive statistics	Mixed-method analysis	Mixed-method analysis

* To conceal the participants' identity in all data sources (e.g., test papers, RAs written, interview data, and more), I assigned each a fictitious name.

Instructional Model

The model sketched through the lens of the participants' problems and needs was validated practically and theoretically, based on the model formation in language education and in science content (Ebenezer, Chacko, Kaya, Koya, & Ebenezer, 2010). More importantly, the model constructed was driven by students' problems and needs, previous education, and language proficiencies, justified by writers' different purposes and contexts, and expected to enhance developmental learning (Christie, 1990; Cope & Kalantzis, 1993; Hyland, 2007). As such, the model started with academic literacy and moved on to skills in compositions and RAs, as shown in Table 3:

Table 3
Elements of the instructional model

Participants' problems & needs	Sequential elements of the model	Resources
Academic literacy	1. Essential patterns of essential sentences & clauses	Authentic research articles
Composing skills	2. Paragraph building	Authentic research articles
	3. Essay development	Authentic research articles
	4. Text structures	Authentic research articles
RAs writing skills	5. Research articles	- Generic feature frameworks - Authentic research articles
Discontinued thoughts	6. Language, flow & metadiscourse	- Language observation through English corpus concordancers - Authentic research articles

In this model, linguistics is an effective, fundamental tool eliciting how distinctive patterns of vocabulary, grammar, and cohesive markers structure the texts written into stages based on the purpose of the genre (Hyland, 2007). Many L2-instruction scholars (e.g., Celce-Murcia, 2001; Christie, 1998; Martin, 1992) believe L2 writers attending to general instructions are at a disadvantage in both academic performance and their career paths. Language quality of L2 writing, as viewed by these scholars, is of importance to these writers as grammatical and lexical competence cannot be separated from the meaning of the written discourse. Also, the quality of language and the written texts normally contributes to the text evaluation. I found that such academic literacy was needed for the participants to gain the minimal but essential skills like sentence construction. Their linguistic skills were then used in the paragraphs and essays designed for them to practice argument making necessary for the discussions in RAs, where the genre models by Kanoksilapatham (2005), Swales and Feak (2012), and Weissberg and Buker (1990) were introduced as the generic features of RA parts as they are closely related to the participants' working disciplines. Then, they could transfer these skills in these abilities when working ethnographically by analyzing text features of the RAs in their discipline and across others. Equally important, the participants were introduced to (a) a synopsis of text

structures helping them understand relationships of those sentences and clauses in a higher discourse level, (b) the observations of how language was used through English corpus concordancers, a corpus-based learning tool that facilitates self-correction of locally occurring mistakes, in addition to my feedback always given in earlier drafts of their work, and (c) metadiscourse and flow of coherent, connected thoughts throughout the workshop.

Also, the model was validated through three experts in the field of applied linguistics, L2 writing, and scientific writing. The first two were Thai EFL teachers with applied linguistics and corpus studies backgrounds validating the theoretical, sense making and actual use for instruction of English specific purposes. The third specialist is a senior researcher working as a scientist in the Ministry of Science whose role was to consider the effective use of the model to be implemented in real world practice of scientific writing. The validated model then led us to Research Phases 2 and 3, but I, with limited space, discussed only the participants' writing abilities as a result of learning through the model in Phase 3, which confirmed the previous phase.

Results and Discussions

1. What Are the Participants' Major Problems and Needs in Relation to English Writing for Scholarly Publications?

1.1 Participants' Writing Problems

Problems in English writing for scholarly publications were analyzed through the participants'self evaluation divided into groups based on their job positions. The data are illustrated in Table 4.

Table 4
Participants' level of self-evaluated ability

Item	Areas of evaluation	Weak (%)	Fair (%)	Good (%)	Excellent (%)	Mean	S.D.
1	knowledge of argument appeals	8.80	71.20	16.00	4.00	1.15	0.62
2	abilities in argument appeals	81.60	17.60	0.80	0.00	1.19	0.41
3	knowledge of sentence types	92.00	8.00	0.00	0.00	1.08	0.27
4	abilities in writing various types of sentence	26.70	72.30	1.00	0.00	1.74	0.46
5	awareness or knowledge of English text structures	53.60	29.60	9.60	7.20	1.70	0.91
6	knowledge in paragraph writing	28.80	52.80	12.00	6.40	1.96	0.81
7	skills or abilities in paragraph writing	38.6	54.50	6.90	0.00	1.68	0.60

8	knowledge in essay writing	70.40	11.20	13.60	4.80	1.53	0.90
9	Abilities in essay writing	72.80	9.60	13.60	4.00	1.49	0.87
10	Link between development of essays and RAs	80.00	17.60	1.60	0.80	1.23	0.51
11	knowledge in writing English research papers with generic features	75.20	3.20	17.60	4.00	1.50	0.92
12	abilities in writing English RAs with generic features	74.40	7.20	12.80	5.60	1.50	0.92
13	confidence in writing English RAs with coherent development	80.00	12.00	8.00	0.00	1.28	0.60
14	confidence in writing English RAs with flow of thoughts	75.20	18.40	4.00	2.40	1.34	0.67
15	confidence in writing English RAS with science rhetorical style	80.80	14.40	3.20	1.60	1.26	0.59
16	confidence in content organization in English RAs with generic features	70.4	11.20	14.40	4.00	1.52	0.88
17	stress or anxiety in writing English RAs	14.4	54.4	23.20	8.00	2.25	0.80
Grand mean						1.57	0.53

N=125

1.00-1.74 = weak 1.75-2.49 = fair 2.50-3.24 = good 3.25-4.00 = excellent

The participants revealed strong problems in three major areas. A primary one is related to the notion of appeals, where they stated a weak level in knowledge and abilities in argument appeals (mean = 1.15 & 1.19). The second group of problems was of a similar pattern. They felt that their knowledge of and abilities in sentence construction and text patterns were quite low. Most participants stated their perceived knowledge and abilities in paragraph writing at a fair level (means = 1.96, 1.68), and a weak level in knowledge and skills in essay writing (means = 1.53, 1.49). At the third level, they expressed weak abilities in all elements of scholarly writing, a higher order of writing skills. Their knowledge in and abilities of RAs generic structures were quite deficient (a 1.50 mean each). Their confidence in writing English RAs with coherent development, flow of ideas expressed, science rhetorical style and content organization in English RAs with generic features was quite low (means = 1.28, 1.34, 1.26, & 1.52). They also demonstrated a moderate level of stress or anxiety in writing English RAs.

To gain more specific results revealing such problems, I examined the same aspects of such areas of evaluation in three groups of the participants based on their job positions and areas of work—research assistants in social sciences and in sciences, and researchers in sciences.

Table 5
Three specific groups' levels of evaluation ability

Groups of Participants	Grand Mean	S.D.	Interpreted Results
1 (30 research assistants in social sciences)	1.24	0.13	Weak
2 (74 research assistants in sciences)	1.45	0.37	Weak
3 (21 researchers in sciences)	2.44	0.45	Fair

The results showed a greater grand mean in researchers in sciences (2.44) than that in research assistants in science (1.45) and in social science (1.24). Then I compared the difference of perception in their ability between the research assistants in sciences and social sciences due to their shared positions as research assistants, and between the researchers and the research assistants in sciences due to their shared areas of work. There was no statistical difference in self perceived abilities among the research assistants in both areas. Both perceived their ability in scholarly writing as weak. However, when comparing the science researchers' grand mean (2.44) to that of the research assistants (grand mean = 1.45) in the same areas, the difference was significant, indicating the very low perceived ability in the research assistants in sciences.

What explains these results could be the education background of each group—the researchers' Doctorates earned from English speaking countries, lending them more opportunities to use English naturally in authentic contexts, and the research assistants' Masters obtained from non-English-speaking study programs in Thailand not giving them these opportunities. What confirms the importance of educational background is the result showing that the research assistants in social sciences were only exposed to English writing while in college, thus resulting in their limited English abilities, as these data obtained from interviews show:

> English is not official language in Thailand, so it's not easy to write English publications well. Thai people are not skill to speak, write in English language when compare with neighbor country. Thai people who not graduated foreign country gave a little practice to learn writing/speaking in English language. I think if I have many training, my writing publication English will be development. I expect that teacher will correct it; then, I become confident to do it. (Original interview transcription, Piy)

> I felt that it was quite difficult for me to write in English—to write as I actually thought, to write grammatically correctly, and to write for communicating ideas with an audience successfully. (Translated interview transcription, Sur)

Also, the problem severity the research assistants perceived could be on account of their little exposure to academic English literacy as a result of the absence of

academic writing in their education. This could cause them not to fully acquire writing abilities sufficient for their text production. To put it another way, their lower exposure to English could result in the same pattern of their awareness in how language is used in certain purposes like research publications. With such a lower level of language awareness, they could resort to the writing convention of their mother tongue. This was witnessed in this research and several studies indicating wiring problems and sociopolitical issues in the process of knowledge production in researchers in science in periphery countries like Poland (Duszak & Lewkowicz, 2008), Venezuela (Salager-Meyer, 2008), Sudann (ElMalik & Nesi, 2008) and Italy (Giannoni, 2008).

Related to this are the deviating texts found in various aspects. Primarily, language mistakes in non-native writers' texts are considered 'commonly consistent mistakes occurring in the areas of general grammar, composing incompetence, academic citations, strategies of academic voice and knowledge claims, strategies for metadiscourse/promotional discourse like hedges, and cultural barriers interfering with writing processes (Adams-Smith, 1984; Bazerman, 1988; Dudley-Evans, 1994; Johns, 1993; Mauranen, 1993; Swales, 1990). Surprisingly, the problems in such basic literacy were even commonly found in the participants holding doctorates from English speaking countries, who also revealed language difficulty in publication (e.g., Cho, 2004; Tardy, 2004), although they felt more confident than those pursuing the degree in non-English environments.

1.2 Participants' Needs in Writing for Scholarly Publications

The participants' needs in scholarly writing were then investigated through the self-reported survey in three specific groups, as shown in the following result.

Table 6
Three groups' level of need for scholarly-writing improvement

Item	Need of improvement	Social science RA (Group1)		Science RA (Group 2)		Science R (Group 3)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
1	academic English grammar	3.07	0.69	3.36	0.73	3.29	0.71
2	vocabulary, right, effective words	3.13	0.62	3.20	0.75	3.29	0.78
3	academic expression	3.30	0.75	3.32	0.77	3.57	0.67
4	sentence patterns	3.53	0.62	3.69	0.68	3.90	0.30
5	advanced sentence patterns	3.97	0.18	3.80	0.49	3.86	0.35
6	skills in paragraph writing	3.73	0.58	3.73	0.62	3.90	0.30
7	skills in essay writing	3.77	0.56	3.74	0.62	3.86	0.35
8	skills in English RA writing	3.97	0.18	3.74	0.62	3.95	0.21
9	transitions used in writing	3.57	0.62	3.68	0.64	3.81	0.40
10	thoughts spontaneously expressed through writing	3.90	0.30	3.85	0.35	3.86	0.35
11	writing without direct-translation mistakes	4.00	0.00	3.85	0.35	3.90	0.30
12	writing strategies for academic purposes	4.00	0.00	3.88	0.32	3.90	0.30

13	practical models of effective writing	4.00	0.00	3.88	0.32	3.76	0.43
14	good examples of professional writing needed	4.00	0.00	3.82	0.38	3.86	0.35
15	writing effectively based on norms of native speakers	4.00	0.00	3.95	0.22	3.95	0.21
Grand Mean		3.73	0.25	3.70	0.41	3.05	0.65
Interpreted results		Strongly need		Strongly need		Moderately need	

Group 1 (N= 30), Group 2 (N= 74), Group 3 (N= 21**)**

Like the results revealing the participants' problems related to scholarly writing, the research assistants in social sciences and sciences showed strong levels of such needs with high grand means, 3.73 and 3.70. This could relate to the quite low levels of English writing abilities shown in the participants' felt problems discussed earlier. However, the researchers in sciences needed to improve their scholarly writing skills moderately (grand mean = 3.05). This is sensible as these researchers used academic scientific English as a result of their overseas graduate studies. This could have contributed to their abilities at work, where they could write their research works for conferences and publications.

To help solve some extent such problems our Thai researchers have encountered, I indeed needed to fabricate a teaching model to strengthen the participants' skills of writing in all related levels.

Research Question 2

What were the effects of explicit instruction on the participants' writing competence?

In Phases Two and Three, the effectiveness of the invented model was tested and retested. After some adjustments of the model implemented in Phase Two, the participants of Phase Three (N = 30) were trained to write for scientific publication, and their writing gains would be inferred as the effectiveness of the model was retested in the third phase. To achieve this, I examined the participants' pre-and post tests, and RAs written during the workshop, both functioning as triangulation of this finding.

2.1 Pre-and-Post-Test Results

The pre-and-post tests were used as the primary data source to examine the extent of writing competence the participants gained after the instruction. Validation of the scoring process was conducted by two raters.

Table 7

A comparison of the participants' pre- and post-test scores evaluated by two raters

Test	Rater	Mean	S.D.	t	Sig. *
pretest	researcher	4.60	0.77	-0.34	0.74
	Co-rater	4.67	0.76		
posttest	researcher	7.57	1.38	0.40	0.69
	Co-rater	7.43	1.19		

N = 30 ; * $p > 0.05$

The pre-and-post-test papers were assessed through rubric assessment used in the paragraph writing course of my university, where quality of ideas, organization and language are taken into account. The data by the two raters illustrate the consistent scores in the pretest and the post test, indicated by the significance levels of the two tests assessed by two raters as greater than 0.05. This process was treated as the reliability of the scoring procedure performed in the second and third phases of this research. Indicated by the data from the pretest and the posttest papers, the participants became more advantaged as they were trained to write paragraphs as a fundamental builder for writing in a more advanced level like RAs, shown in the following samples.

Pre-test sample

Problems of Thai Researchers Writing in English, it is quite hard for me. In writing journals, I know and understand what I will write, but I don't know how to write it in English. Even I could write those sentences in English, but it lose the meaning when it be translate to English. Sometime I am going to write paper, but I can't remember the word in English that I have known before. All the problems happen because I am Thai, and I think, speak and write in Thai language all times. The problems have still existed, but I am going to fix it by directly learn how to write journal in English. (Tri)

Post-test sample

Problems of Thai Researchers Writing in English is quite hard for me. First, in writing journals, in the past I did not know how write although I knew what I wanted to write. However, I learn many things from the workshop. I know how to write good paragraph, essay and journal although my writing is not good enough now. Second, I still cannot write sentences that have the same meaning that I want to say 100%. However, I know the patterns of sentence and clause that I saw a lot in journal but did not know it in the past. Although I am not good enough now, but I feel better. Because I know what you call 'rhetorical convention, generic feature of research article. Now I think being Thai is not problems because I learn how to write all type from paragraph to be journal. (Tri)

Also, the interview data pointed out some improved aspects, especially in the flow of ideas expressed through the paragraphs written in the pre-and-post-test papers. The writer reflected on his problems and, through his work sample, told us how he needed help, as can be seen by his voice here.

> Writing in English, it is quite hard for me. In writing journals, I know and understand what I will write, but I don't know how to write it in English. Even I could write those sentences in English, but it lose the meaning when it be translate to English. Sometime I am going to write paper, but I can't remember the word in English that I have known before. After workshop, I feel happy. Because I can write better. I have fixed moves in the paper parts and I know what we are expected by the editors as you said in teaching. Thank you for your help. (interview data, Tri)

These test samples, as well as others, explained well how the participants had improved over time. As the workshop was aimed to coach the participants to write

professionally, I also investigated how well they could write RAs, the later component of the model.

2.2 Research Articles

To triangulate the data mentioned earlier, I analyzed the participants' RAs written during the research participation. For practicality on account of their time constraints, I opened more room for their selected papers. The RAs analyzed included those they wrote while in the workshop, those available as their lab reports, and those rejected elsewhere, all of which were treated as their first draft for this study. Although these were not equal in terms of how each arrived with his or her first draft, the disparity did not affect my analysis as the participants had to revise all their papers after they were taught to write each part of the RA, where the gap between draft 1 and their revision was considered for their competence in scholarly writing.

After being trained to write essential sentences and clauses, paragraphs and essays in the earlier phase of the workshop, the participants were then trained to write scientific RAs through three leading genre-based frameworks (Kanoksilapatham , 2005; Swales & Feak, 2012; Weissberg & Buker, 1990) I used as generic features. Their practice started with Materials and Methods, and Results, and moving on to Introduction, Discussion, and Abstract, according to the complexity levels of each part and the nature of their lab research where they normally performed lab tests before writing them up. The RAs were evaluated in terms of the moves and steps required in the genres of each article section. Successive drafts of complete RAs were once again assessed by two raters, and there was no statistically significant difference between the scores by the raters ($p > 0.05$), indicating the reliable assessment of the data identifying the participants' improved abilities in scholarly writing, as shown here:

Table 8
A comparison of the participants' RAs first and final drafts

RA Parts	Drafts	Mean	S.D.	t	Sig. (p)
Abstract	draft 1	3.90	0.71	-10.88	< 0.05
	revision	6.53	0.90		
Introduction	draft 1	4.13	0.86	-14.52	< 0.05
	revision	7.03	0.72		
Method	draft 1	4.63	0.77	-13.40	< 0.05
	revision	7.10	0.80		
Result	draft 1	4.57	0.77	-18.06	< 0.05
	revision	7.57	0.50		
Discussion	draft 1	4.03	0.77	-18.02	< 0.05
	revision	7.57	0.50		
Complete paper	draft 1	21.40	3.02	33.85	< 0.05
	revision	43.18	3.36		

N= 30

The participants' score average of the revised RAs was greater than that of their first drafts significantly ($p < 0.05$). The same statistical pattern occurred in all RA parts and the whole paper. This indicates that the participants could improve their abilities

in scholarly writing demonstrated in the whole RAs as a result of their participation in the instruction conducted for this research.

Below is an RAs' excerpt, where the writer stated ideas written in Thai and translated into English later.

> Methodology of Management to Increase R&D Projects in Thai SMEs
>
> Introduction
>
> Science and technology (S&T) is one of the main important factors for driving bussiness to the global economy. S&T comes from doing the dynamic research and development (R&D), creating the innovation, and improving. Then R&D supporting in the Thai Industrial sector or SMEs is the contineous mission and policy of Thai government. However, R&D is ignored by SMEs except multination companies.
>
> Industrial Technology Assistant Program (ITAP) is under the National Science and Technology Development Agency (NSTDA), Ministy of Science and Technology. Almost 20 years, ITAP support R&D projects for Thai SMEs to do problem solving, increase productivity and develop new products, which focus on the product differentiation or creat value-added products. However, the portion of R&D projects was done in SMEs compare with the number of factories is very low. (translated text)

As appearing in the excerpt, the content drafted in Thai was quite logical and coherent, and this resulted in the same pattern in its English translated version with some problems in flow of connected ideas, regardless of simple grammatical mistakes sporadically occurring throughout the RA and its excerpt. However, this was not considered unfavorable although the translation could indicate the writers' lower competence in writing. Learning in the workshop, the writer, though still resorting to translation, could in the first place have spelled out her intended meaning into English better, and subsequently revised the draft with three moves as required in the introductions section, as in her revision shown here:

> Management Methods to Increase R&D Projects in Thai SMEs
> Introduction
>
> To highlight the significant role of R&D, Industrial Technology Assistant Program (ITAP), an agency under the National Science and Technology Development Agency (NSTDA), Ministy of Science and Technology, supports R&D to achieve its mission on SMEs. Over 20 years, ITAP has supported financial and experts for Thai SMEs to solve problems, increase productivity and develop new products, all of which focus on the product differentiation or create value-added products. However, the portion of R&D projects, compared to a number of Thai factories, has been investigated in SMEs in a low degree. More seriously, invitations of SMEs to increase R&D projects are still problematic.
>
> Therefore, the main purpose of this paper is to offer suitable methods of management to increase R&D projects in SMEs via two approaches, support individual companies and industrial sectors. We believe the findings will provide the greatest solution on

how ITAP helps industries and subsequently produces practical, influential research and development for Thai SMEs.

Despite some ungrammatical mistakes, this revision appeared to be accepted more by the generic features of the Introduction section, where the writer clearly indicated the central ideas in the opening sentence, the gap indicating the need for the current research, and the main objective of the study, all of which were quite a bit more coherent, compared to her first draft.

The participants' competence in scholarly writing can be explained by the elements forming the instructional model. First, the model encouraged the participants' linguistics knowledge, writing skills in discourse levels including paragraphs, essays and RAs, and assisted them to gain cognitive competence in all elements of writing. The excerpts below showed their problems in lower skills of sentence writing and confusing thoughts:

> (1) The study of graphic symbols in AAC has primarily focused on an analysis of symbol learnability and complexity and grouped in terms of iconicity. Researchers studying symbols frequently refer to the iconicity of the symbols. Iconicity refers to the visual relationship of symbol of its referent and varies along a continuum from transparent to opaque. (Sar)
>
> (2) Some of existing works only suggested a list of refactoring without ordering and the others suggest refactoring sequences. However, these works do not include the criteria. Therefore, our research problem is "Can we find an optimal refactoring sequence that removes the bad smells, uses the least effort to understand refactored code and improves the maintainability?" (Pan)

Second, while being trained, the participants learned to plan more for their thoughts to be woven into effective sentences conveying their intended meaning. The following sample was the less effective work with less-planned thoughts that could not attract readers.

> The physical rehabilitation for these groups of people is important to maximize their capability, promote independent living, return them to the society and have good quality of life under individual's circumstance. (Jak)

Related to the participants' planning are logic elements. The participants, after being trained to write academically through the model, witnessed that the most important element of writing is logic. The following sentences showed the participants' problems in organizing content that may have made audience unable to follow their actual meaning:

> (1) CO_2 from the Roi Et green Plant is from biomass combustion and hence, being part of the global carbon cycle, does not contribute to global warming. This is a distinct advantage of biomass-based production. (Neu)
>
> (2) Current available methods for determining the fungal resistance of synthetic polymeric materials such as ASTM G21 and JIS Z 2911, have the disadvantage in time-consuming in order that the visual fungal growth is shown. (Ked)

Fourth, the model was helpful for those with difficulty in argumentative skills through logical sentences and the flow of connected ideas. Also, it helps those normally orientating their readers through the inductive approach, when they are developing ideas or arguments in paragraphs, to witness that the same ideas with the deductive approach became more effective as they could serve native English speaking readers more. The first sample demonstrates incomplete thoughts where the idea in the sentences between inter move shifts was not completely connected. Also, the second exemplifies paragraphs inductively written unnecessarily.

> (1) Thai Government Pharmaceutical Organization (GPO) has started the first vaccine production in pilot plant-scaled level and has purchased 2 million doses of pandemic inactivated vaccine from the Sanofi-Pasture company while high priority groups of population is 4 million people. Lacking of the facilities and know-how of industrial-scaled influenza vaccine production, our country will have not the self-reliance for the emergency of the pandemic. (Sup)

> (2) Not pattern such influences on the perception of graphic symbols, but also the influences on culture will be considered. Culture is generally defined as a set of behaviors, institutions, beliefs, technologies and values invented and passed on by a group of individuals to sustain what they believe to be high quality of life and to negotiate their environments. To sum up, culture is a perceptually shared reality, a world view. (Sar)

In these examples, the writers could have relied more on on-going development with unclear centrality. This became more severe as the writers could not make a point and failed to connect paragraphs in terms of logical ties. However, such phenomena prevalent among the participants could be handled better when the participants were trained to write in English, starting from logical sentences to systematic paragraphs, essays, and research articles. Below is a paragraph written with on-going explanation, and its revised version finally published in his field journal:

> (Earlier draft) Fig.8 represents the results of the thermal conductivity (k) of the non-doped $CuAlO_2$ sample from 300 K (room temperature) to 1000 K. The results showed that the values of thermal conductivity were decreased with the range from 3.5 to 1.5 W/mK with measuring temperature from 300 to 1000 K respectively. The maximum value of k was 3.48 W/mK at room temperature and minimum value was 1.5 W/mK at the range temperature from 800 to 1000 K. (Zhe)

> (Revision) Fig.8 shows the thermal conductivity (k) of the non-doped $CuAlO_2$ sample from 300 K (room temperature) to 1000 K. It is measured by using a laser flash method with the relation $k = dC_p a$, where d, C_p *and* a are the same density, specific heat and thermal diffusivity respectively. The results of k value are the range from 3.5 to 1.5 W/mK in temperature 300 to 1000 °K respectively. These results shows that the thermal conductivity of the non-doped $CuAlO_2$ sample at room temperature is decreased depending on increasing temperature. (Zhe)

Last but equally important, the participants learned through the model to observe the three leading frameworks I used as generic features (Kanoksilapatham , 2005; Swales & Feak, 2012; Weissberg & Buker, 1990) so they could write RAs in their disciplines in a quite flexible manner. In fact, the participants worked in various disciplines, such as microbiology, applied physics, biochemistry, nanotechnology, materials sciences, computer sciences, and the like, but the generic feature of RAs can be of help as the structure, though in different academic discourses, can more or less share such generic features. As such, observing RAs written through the generic features based on these flexible frameworks can help them justify what works and what does not in their own field. What is more helpful is the actual work we took from some journals with high impact factors, such as *Science*, *Nature*, *British Medical Journal*, *Journal of the American Chemical Society, Green Chemistry, Angewandte Chemie International Education, Advanced Energy materials, Catalysis Today*, and the like, through which they can learn to observe real practice in their field and across others so they implement these practices in their work more substantially. With the guidelines and continuous feedback I always offered in the workshop, the participants could demonstrate their skills in RA writing**.**

As a result, the skills of being ethnographers I taught in the sessions, where one observes actual journals of any target discipline for any discourse patterns, can help them in any quest of knowledge. What they always need to do in their real world is to investigate generic features and certain linguistic use of the research articles in their discipline. For any local grammatical mistakes, they are very happy with being ethnographers observing actual use of language from English corpus concordancers (http://www.lextutor.ca/conc/eng/ & http://corpus.leeds.ac.uk/protected/query.html), where they can self correct using patterns most frequently occurring in the concordance lines, although some unacceptable grammatical errors may still appear in their manuscripts.

Conclusion

All the findings suggest that periphery professionals, if trained to write scholarly, are believed to hold strong competence in writing at all levels, which should subsequently contribute to their high confidence and motivation to publish more. For self study among those professionals, we clearly learn that the problems encountered by these professionals could result from an absence or lower levels of awareness of the role of genres in academic conventions (Swales, 1984; Swales & Feak, 2000). When writers lack appropriate schemata or generic features for academic text production, they thus need to be sensitive to the complexity and variation of academic conventions, and the awareness of such genres is truly required (Holmes, 1997). Therefore, the professionals who wish to develop themselves through self-directed learning should be aware of generic features of scientific RAs. And when it comes to publishing their works in international journals, where English is required as an international language with Anglo-American norms, style and conventions, those in periphery areas should not feel that they are at a linguistic or rhetorical disadvantage to L1 researchers any more. Together, the findings kept me informed that my exploration is of use for their career lives, and this certainly can imply the effectiveness of the model I have created to be used as a tool to help EFL researchers to develop themselves professionally.

References

Adams-Smith, D. (1983). Style in medical journals. *British Medical Journal (Clin Res Ed)*, *287*(6399), 1122-1124.

Bazerman, C. (1988). *Shaping written knowledge*. Madison, Wisconsin: University of Wisconsin Press.

Bhatia, V. K. (1993). *Analyzing genre: language use in professional settings*. New York: Longman.

Blicblau, A. S., McManus, K. J., & Prince, A. (2009). Developing Writing Skills for Graduate NESBC Students. *The Reading Matrix,* 1 9, 198-210.

Cameron, C. (2007). Bridging the gap: Working productively with ESL authors. *Sci Ed*., 30, 43-44.

Celce-Murcia, M. (Ed.). (2001). *Teaching English as a second or foreign language* (3rd Ed.). Boston: Heinle & Heinle.

Chen, Y.-H. (2009). Lexical Bundles across Learner Writing Development. *Unpublished doctoral thesis*, Lancaster University, Lancaster, UK.

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.

Christie, F. (Ed.). (1990). *Literacy for a changing world: A fresh look at the basics*. Melbourne: Australian Council of Educational Research.

Christie, F. (1998). Learning the literacies of primary and secondary schooling. In F. Christie & R. Misson (Eds.), *Literacy and schooling: New directions* (pp. 47–73). London: Routledge.

Cope, B., & Kalantzis, M. (Eds) (1993). *The Powers of Literacy: A Genre Approach to Teaching Writing* . London: Falmer Press.

Crookes, G. (1986). Towards a validated analysis of scientific text structure. *Applied Linguistics*, 7, 57-70.

Dudley-Evan, T. (1994). Genre analysis: an approach to text analysis for ESP. In M. Coulthard (Ed.), *Advances in written text analysis*. London: Routledge.

_____. (1995). Common-core and Specific Approaches to the Teaching of Academic Writing, in D. Belcher & G. Braine, (Eds), *Academic Writing in a Second Language*. Norwood N.J: Ablex Publishing Corporation.

Duszak, A., & Lewkowicz, J. (2008). Publishing academic texts in English. A polish perspective. *Journal of English for Academic Purposes*, 7, 108-120.

ElMalik, A. T., & Nesi, H. (2008). Publishing research in second language: The case of Sudanese contributors to international medical journals. *Journal of English for Academic Purposes*, 7, 87-96.

Ebenezer, J., Chacko, S., Kaya, O. N., Koya, S. K., & Ebenezer, D. L. (2010). The effect of common knowledge construction model sequence of lessons on science achievement and rational conceptual change. *Journal of Research in Science Teaching*, 47(1), 125-146.

Flowerdew, J. (1999a). Writing for scholarly publication in English: The case of Hong Kong. *Journal of Second Language Writing*, 8(2), 123-145.

_____. (1999b). Problems in writing for scholarly publication in English: The case of Hong Kong. *Journal of Second Language Writing*, 8(3), 243-164.

Giannoni, D. S. (2008). Medical writing at the periphery: The case of Italian journal editorials. *Journal of English for Academic Purposes*, 7, 97-107.

Gosden, H. (1995). Success in research article writing and revision: A social-constructionist perspective. *English for Specific Purposes*, 14, 37-57.

Hinkel, E. (2006). Current Perspectives on Teaching the Four Skills. *TESOL Quarterly*, 40(1), 109-131.

Holmes, R. (1997.) Genre Analysis and the Social Sciences: An Investigation of the Structure of Research Article Discussion Sections in Three Disciplines. *English for Specific Purposes*, 16 (4), 321-337.

Hyland, K. (2007). Genre pedagogy: Language, literacy and L2 writing instruction. *Journal of Second Language Writing,* 16, 148-164.

Johns, A. (1993). Written argumentation for real audiences: Suggestions for teacher research and classroom practice. *TESOL Quarterly*, 27, 75-90.

Kanoksilapatham, B. (2005). Rhetorical structure of biochemical research articles. *English for Specific Purposes*, 24, 269-292.

Lavelle, E. (2003). The quality of university writing: a preliminary analysis of undergraduate portfolios. *Quality in Higher Education,* l 9, 87-93.

Martin, J. (1992). *English text: System and structure.* Philadelphia: Benjamins.

_____. (1999). Mentoring semogenesis: 'genre-based' literacy pedagogy. In F Christie (Ed.), *Pedagogy and the shaping of consciousness: Linguistics and social processes.* London: Continuum.

Mauranen, A. (1993). Contrastive ESP rhetoric: Metacontext in Finnish-English economics texts. *English for Specific Purposes*, 12, 3-22.

Miller, C. (1984). *Genre as social action. Quarterly Journal of Speech*, 70, 151-67.

Moses, I. (Ed.) (1985). *Supervising postgraduates: DEST higher education research and development.* Canberra.

Pagel, W., Kendall, F., & Gibbs, H. (2002). Self-identified publishing needs of nonnative English-speaking faculty and fellows at an academic medical institution. *Science Editor*, 25, 111-114.

Salager-Meyer, F. (2008). Scientific publishing in developing countries: Challenges for the future. *Journal of English for Academic Purposes*, 7, 121-132.

Samraj, B. (2008). A discourse analysis of master's theses across disciplines with a focus on introductions. *Journal of English for Academic Purposes*, 7, 55-67.

Spack, R. (1988). Initiating ESL students into the academic discourse community: how far should we go*? TESOL,* 22, 29-51.

Swales, J. (1981). *Aspects of article introductions*. Birmingham, UK: The University of Aston, Language Studies Unit.

_____. (1984). Research into the structure of introductions to journal articles and its application to the teaching of academic writing. In R. William, J. Swales, and J. Kirkman (Eds.), *Common ground: Shared interests in ESP and communication studies* (pp. 77-86). ELT Documents 117.

_____. (1987). Utilizing literature in teaching the research paper. *TESOL Quarterly*, 21(1), 41-68.

_____. (1990). *Genre analysis: English in academic and research settings*. Cambridge: Cambridge University Press.

Swales, J., & Feak, C. B. (2000). English in today's research world: a writing guide. Ann Arbor: University of Michigan Press.

_____. (2012)**.** Academic Writing for Graduate Students (3rd Ed.). Ann Arbor: University of Michigan Press

Tardy, C. (2004). The role of English in scientific communication: lingua franca or Tyrannosaurus Rex? *Journal of English for Academic Purposes,* 3, 247-269.

Tychinin, D. N., & Kamnev, A. A. (2005). Beyond style guides: Suggestions for better scientific English. *Acta Histochem*, 107, 157.

Wang, M., & Bakken, L. (2004). An academic writing needs assessment of English-as-a-second-language clinical investigators. *Journal of Continuing Education in the Health Professions*, 24, 181-187.

Weissberg, R., & Buker, S. (1990). *Writing up research: Experimental research report writing for students of English*. New Jersey: Prentice-Hall Regents.

Widdowson, H. G. (1983). *Learning Purpose and Language Use*. Oxford: Oxford University Press.

Contact email: sthongrin@yahoo.com, sthongrin@gmail.com