

EFL engineering students' research article genre knowledge development through concept mapping tasks: a qualitative interview-based study

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Abstract

This qualitative study explores how the use of concept mapping can function as a genre knowledge scaffold within an experimental course that aimed to teach EFL undergraduate students how to read primary research articles in their discipline. Using semi-structured student interviews, the study explored the development of the rhetorical, formal, process and content research article genre facets of three second-year Electrical and Computer Engineering students after working collaboratively on three specially designed concept mapping tasks underpinned by the theories of genre analysis and metacognition. Our data suggest that the process of visual conceptualization encouraged students to engage in deeper forms of genre analysis and explore the different dimensions of the multifaced research article genre construct.

Keywords: research article genre, concept maps, English for Academic Purposes

1. Introduction

University students in EFL settings often face difficulties in reading challenging academic genres. Amongst all genres, research articles (RAs) in particular pose significant challenges to undergraduate students who usually end up avoiding reading them. In their study with medical students, Bitran, Zúñig and Leiva (2012) found that undergraduates tend to apply a sequential, slow reading approach, “probably the one that proved to be successful for understanding general publications” (:148). Additionally, their findings suggest that lower level ESL students are at a clear disadvantage, regardless of their level of discipline-specific knowledge, scoring lower marks in courses where RA reading was required. Most importantly, according to the authors, these students had negative initial experiences with reading RAs and felt it was an exhausting experience, something which may have a long-term impact in their later academic lives. These findings largely resemble the situation at the school of Electrical and Computer Engineering (ECE), at the Technical University of Crete, Greece where the first researcher works as an English for Academic Purposes (EAP) practitioner for the past nine years. In investigating possible teaching technological tools for assisting students to overcome these challenges, we decided to employ concept maps as a genre instructional tool and integrate them into an experimental EAP course (Seiradakis & Spantidakis, 2018a) that aimed to teach second-year undergraduate ECE students how to read RAs in English in an effective manner.

Previous works on the use of concept mapping tasks for facilitating EFL learners’ genre acquisition and/or awareness have focused on other genres such as book and literature reviews (Wette, 2017). The single study that has used concept mapping tasks for teaching the genre of research articles, is that of Negretti & McGrath (2018) which focused on PhD students who however have different needs and abilities compared to novices such as undergraduates. In an attempt to fill this gap, we aimed to explore how and if the integration of concept mapping into genre analysis tasks contributes to sensitizing novice readers to the research article genre. Accordingly, the quidding question of the present study is:

To what extent does the combination of concept mapping and genre-analysis tasks enhance participants’ research article genre knowledge development?

1.1 Genre-Based Instruction Using Concept Maps

Genre based pedagogies have been dominating the teaching of academic writing and reading in higher education for the past forty years, even though the focus has mostly been on descriptive linguistic research rather than pedagogic practice in realistic classroom settings (Hyland, 2010). From a Swalesian ESP perspective (1990, p. 33), “Genre is defined as a shared social practice recognized by a discourse community in which its members engage with the shared genre to mark their membership.” Although the majority of genre-based research has focused on writing rather than reading, ESP genre researchers have long been suggesting that genre knowledge especially for challenging academic genres such as the research article is a decisive factor for effective reading comprehension (Hyon, 2001;2002). Particularly for novices, Johns (1997) suggests that genre instruction and genre knowledge offers a “a shortcut” of both the “processing and production of written texts” (p.21).

Tardy's model of genre knowledge (2009) provides a comprehensive framework of the complex concept of genre and can function as a valuable tool both for designing genre-based courses and for analyzing students' genre knowledge development. Her framework divides genre knowledge into four facets: the formal facet refers to linguistic and structural aspects of genre, for example the "discourse or lexico-grammatical conventions of the genre, the contents or structural moves that are common to the genre" (p. 21), the rhetorical knowledge facet which is closely related to formal knowledge refers to the language writers use in order to apply an effective rhetoric and persuade their readers, the process knowledge facet includes the writing strategies writers use but also to the wider context a genre is produced and read and lastly the content knowledge facet covers the actual discipline-specific content of the articles. Recent findings suggest that especially for novices such as undergraduates, developing RA genre knowledge is a complex process that should be underpinned by the theory of metacognition and traditional metacognitive scaffolds such as reflective journals, summarizing and concept maps (Negretti & Kuteeva, 2011; Negretti & McGrath, 2018).

Mind mapping has been found effective in enhancing students' reading comprehension mainly because it functions as a cognitive tool for structuring complex concepts and ideas. There are three broad categories of mapping tools: mind maps, concept maps and argument maps (Davies, 2011). Despite their differences, all mapping techniques share a common purpose, that is to facilitate learners' understanding of complex concepts by forcing them to put cognitive effort in order to represent these concepts in a visual manner. During this process, students engage in deep rather than surface learning, as they must visualize a central idea and connect to it other ideas in a hierarchical manner. In this way students learn to remember and organize intricate and challenging concepts (Ettarres et al, 2017). Regarding genre learning, concept maps have been found more effective as opposed to the other types of mind maps. More specifically, Negretti & McGrath (2018) found that a concept map task they designed for enhancing their PhD students' RA genre knowledge had a positive effect on developing almost all four genre facets. Similarly, Wette (2017) found that concept mapping benefited students' genre awareness in relation to the book and the literature review genres.

2. Methodology

2.1 Participants and Setting

The present study adopted a case study approach and was carried out at the ECE department of the Technical University of Crete, Greece during the Spring semester of 2017. The three students who participated were selected through purposive sampling (Stake, 2000) based on the first researcher's evaluation about their general English academic reading difficulties and their reluctance in reading assigned research articles from the ECE faculty. As with the majority of undergraduate students at the Technical University of Crete surveyed by the first author, all three participants had obtained an English language certificates at B2 level during their high-school years through intense training in private foreign language schools.

2.2 *Research Tools*

Data were gathered through individual semi-structured interviews, even though the specific research tool exhibits important limitations (Denzin and Lincoln 1998), as it tends to produce “situated understandings grounded in specific interactional episodes” (p. 36). Accordingly, we recognize that what participants shared with the first author during the interviews was largely affected by the fact that she was their English teacher for two years and she was the one who used concept mapping as a teaching and learning tool with them. Interviews with another interviewer would probably have produced different findings. Interview questions (Appendix 1) mainly explored participants’ views and thoughts about how their research article genre knowledge and their searching strategies developed through genre-based tasks which included concept mapping.

2.3 *Data Analysis*

Participants’ interviews were recorded with Camtasia software. Subsequently, recordings were transcribed and analyzed qualitatively using a top-down coding approach that focused on Tardy’s four dimensions of genre knowledge (2009). Our qualitative analysis included multiple readings of the interview transcriptions with the use of a qualitative analysis software program that facilitated the identification of common meaning units and themes and helped us condense data into smaller, controllable patterns. The procedure involved a five-stage process which included compiling, disassembling, reassembling, interpreting, and concluding as described by Yin (2015).

2.4 *The Course and the Tasks*

Our experimental course was based on ESP school genre analysis (Swales, 1990), metacognition and cognitive apprenticeship (Seiradakis & Spantidakis, 2018a). Genre analysis was essentially used to promote students’ “writerly engagement with texts” (Cheng, 2008), that is, their ability to read as a writer and study a text from the writer’s perspective. More specifically, the course aimed to raise students’ awareness on the RA writer-reader and purpose triangle and how these factors interact with one another to create meaning in a text. In other words, we aimed to use genre as an “explicit tool of learning” (Cheng, 2008: p. 65).

The focus of the course was the formal, rhetorical, process and content facets (Tardy. 2009) of the research article genre. More specifically, the course focused on the RA macro-structure and its sub-genres, that is, the Abstract, the Introduction, M&M, Discussion & Conclusion. The choice of the articles included in the course was based on relevant descriptive move-based research findings focusing in the research article genre within the ECE discipline (Chang & Kuo, 2011). Typical genre-based tasks included students performing move analysis tasks (Cheng 2008; 2011) on authentic research articles from highly rated journals and conferences from IEEE, ACM, Elsevier and Springer. Given that our target student population was undergraduate students who had limited exposure to RAs and move analysis, we piloted and evaluated different versions of move coding schemes and chose a simplified version of moves and sub-moves that corresponded to our students ZPD.

Concept maps were used as an extra metacognitive scaffold imbedded in three specific genre

analysis tasks that aimed to support and facilitate students' acquisition of all genre facets. The first task, asked students to create a concept map that would illustrate the profiles and the identities of the RA writers and the readership of a specific RA. The second task asked students to visualize the different databases RA readers can find articles online and the last task asked students to create a concept map of an RA of their choice integrating all four genre knowledge facets per section.

3. Results & Discussion

The following section presents the common themes that emerged through the content-analysis of the interview transcriptions regarding the development of participants' formal, rhetoric, process and content RA genre knowledge facets. We subsequently present the themes related to participants' perceived research article reading benefits. Of the genre knowledge and the reading strategies related themes revealed by the analysis, only those that were commonly stated by the participants are discussed. The selected interview quotations reported, aim to highlight themes related to the research question mentioned earlier. These quotations which are accompanied by the participants' pseudonyms, have been translated by the researchers from Greek into English and in some cases excerpts have been summarized.

Out of the four genre dimensions, participants' accounts revealed that the combination of concept mapping with genre-analysis tasks had the most noticeable effect on the development of RA formal genre knowledge, as George's account below reveals:

"...these tasks helped me a lot with recognizing the moves in the article...it was hard because you essentially have to summarize each move and its content and put it in hierarchical order...to do that, you have to understand what it says."

(George)

Similarly, Elsa's account revealed that the task helped her to adopt a more "writerly reader" approach in understanding the structure of RAs:

"I think it helped a lot with the structure... In order to create the concept map, I had to pretty much summarize what was in each section and then think of the writer's purpose to sort of visualize it...it was like I was drawing the writer's draft when he was preparing the article."

(Elsa)

Another common theme from the participants' accounts, was that move analysis tasks that encapsulated concept mapping were particularly effective in helping students acquire genre knowledge of the sections they viewed as the most challenging ones:

"... for me the most confusing sections were the M&M and the Results and how they can actually be merged and become R&D... that had confused me a lot, and I remember that concept mapping helped me into visualizing how these sections were actually structured..."

(Maria)

“...it helped a lot in the move analysis for the Methodology section...especially in the article with the devices for the people with the hearing problems which had seven-eight separate sections in the M&M and each on was a separate move. It helped me understand the macrostructure of this section and the hidden moves.”

(George)

Heightened awareness of specific rhetorical moves was also identified as a key theme from the analysis. Maria’s account below demonstrates how concept mapping helped her in monitoring her GAP move knowledge:

“I remember I was using it (the concept map tool) for a move analysis task of an introduction from a biomedical IEEE paper for hearing device or something and I finally ended up with a concept map with three GAP move cycles, each one with several references...I realized then these writers really know how to use rhetorical devices to actually persuade you that their research is really needed...”

(Maria)

Out of the three participants, Maria seemed to adopt more metacognitive behaviors and actually started to question the reasons RA writers used specific rhetorical strategies such as specific references to build their arguments:

“...you know you start creating the map and then you realize that they (the writers) have a specific reference for a specific purpose and then you start thinking why they have used three references there and like two references here”.

(Maria)

Emerging themes related to formal and rhetorical genre knowledge also included participants increased awareness of linguistic genre facets at the micro-level, including the use of specific discourse markers and grammar features directly linked with the genre’s purpose:

“I think it helped me pay attention to the grammar and syntax and compounds and so on...I don’t think I would pay attention to these features if I didn’t have to create the concept map...”

(Elsa)

Grammar was also mentioned by George. His comments below are rather enlightening as he describes how concept mapping combined with move analysis helped him become more aware of how RA writers use English grammar to realize specific moves:

“...the task with the concept map we created for the whole article helped me to pay attention to grammar...I actually remember that for instance they tend to use Present Perfect to create their Gap move...you know when they review all the previous literature and they want to convince you that it hasn’t been done before...I remember it I think because I had to visualize the moves in a specific shape and use specific photos to create the concept map... And after so many years of English it was the first time I actually understood what I kept hearing when

I was taking the FCE exam that the Present Perfect is for actions from the past till now blah blah...”

(George)

Nominalizations also caught Maria’s attention during creating the concept maps, who stated that although she had been introduced to them during class, it was when she had to create the concept map that she realized that there were so many of them:

“...I knew they use many normalizations, in general, but here in this task, because I had to sort of summarize each section, I realized that they do it a lot and constantly...and it is more often in research articles from journals rather than conferences.”

(Maria)

Themes related to online reading included participants’ belief that that the genre analysis tasks combined with concept mapping contributed in developing genre-specific searching strategies:

“...I think one of the most important things I gained is that now I am aware of where I have to look when I for example an IEEE have a fifteen-page paper...for example the concept map I created with Markos for all the possible RA databases, the pictures and the drawings we used, helped me to actually learn them, so now I remember all of them.”

(George)

“All these publishing houses and journals and all the different titles ... just for ECE. I remember creating a concept map and it was really crumped”.

(Elsa)

For Maria, the tasks helped her to connect facets of process genre knowledge related to the writing strategies RA writers use as opposed to the writing strategies she used as an undergraduate student for writing a different academic genre, namely the lab report. Her comments below indicate an increased awareness of the different contexts within which these two genres are produced and the way context actually effects their formal and rhetorical genre dimensions implying traces of cross-genre awareness:

“...the task where we had to visualize the RA writers’ profiles of the specific article as compared to us when we write Lab reports... it was interesting because we understood that our professors much like us when we write a report, they also work in teams and they are also evaluated by others like the journal reviewers and other experts in the specific field...”.

(Maria)

Overall, our findings seem to suggest concept mapping enhances students’ RA genre knowledge development. Participants’ accounts indicate the tasks helped them enact their monitoring skills and reflect on their thoughts about specific RA genre facets which is an important initial step for developing metacognitive genre knowledge (Negretti & McGrath, 2018). This type of monitoring focused on rhetorical moves and their manifestations both at

the micro and macro-level from bottom-up linguistic features such as nominalizations, references, to top-down content and rhetorical reading strategies. Although the present study exhibits several limitations, our findings show that concept mapping tasks combined with ESP genre analysis can offer EAP teachers a valuable reflective tool through which novices such as undergraduates can explore different genres in higher education settings.

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Appendix

Appendix 1.

Interview Guide

1. Do you think that the concept mapping tasks helped you understand better the four research article genre facets?
2. Can you give me examples of how they helped you?
3. Do you think genre analysis combined with concept mapping helped you searching and reading research articles more effectively?

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