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A COMPARATIVE STUDY ON TEACHER ROLES OF ENGLISH COURSE AND COMPUTER SCIENCE COURSE

Qiang Huang[i]
School of English Education,
Guangdong University of Foreign Studies,
Guangdong, PR China

Abstract:
The study aims to examine and compare teacher roles in English course and computer science course. A 27-item scale, the STRI, was used to quantitatively measure teacher roles of the two courses at one university. Altogether 84 students participated in the survey and completed the questionnaires. Reliability tests showed that the STRI was pretty reliable and valid and that the three main teacher roles were all observed in the two courses. Further Results indicated that no significant difference was found between affective roles, managerial roles and the overall teacher roles of the two courses. Only the mean of cognitive role in English course was found to be significantly higher than that of computer science course, which indicated that cognitive role of the teacher in English course was perceived to be more noticeably impactful than that in computer science course. More specific features were also revealed in the study.

Keywords: comparative study, English course, computer science course, teacher roles, cognitive role, affective role, managerial role

1. Introduction

The roles of teachers are multifaceted, traversing multiple aspects from administrative, personal, instructional, social, cognitive, affective, managerial, technological to pedagogical domains (Wu et al., 2017; Baran et al., 2011; Alvarez, et al., 2009). A prolific research has been done to examine teacher roles from different perspectives and in different ways. For one thing, teacher roles have been studied across various instructional contexts such as face-to-face instruction, online learning and blended learning etc. (Huang, 2019; Keengwe & Kang, 2013; Compton, 2009) and among different subject areas such as English course, computer science course or mathematics course (Keiler, 2018; Huang, 2017; Kilinc et al., 2017; Admiraal et al., 2017; Yadav et al., 2016; Senior, 2010; Compton, 2009). Then researchers have also discussed teacher roles in relation to

[i] Correspondence: email gzmmhq@126.com

different learning theories, instructional approaches and pedagogical methods (Richards, 2017; Arthurs & Kreager, 2017; Zhai & Tan, 2015; Subramaniam, 2010; Jacobs & Farrell, 2003; Robins et al., 2003)

In the relevant literature, most of the research focuses on classifying and generalizing various roles of teachers out of particular instructional contexts. However, the classification and generalization of teacher roles turn out to be somewhat overlapping with each other and the findings are often mixed (Huang, 2019). Theoretically-generalized terms may appear blurred and vague as they fail to relate to classroom practices. Hence, some in-between research is considered to be necessary for classroom teachers and practitioners as it helps to connect theory and practice, to link researchers and teachers and thus to better clarify the theoretical terms and guide teaching practices in classrooms (Admiraal et al., 2017; Huang, 2017), which makes one of the main goals of the present study.

Regarding teacher roles in different instructional contexts such as face-to-face instruction, online learning and blended learning, findings of previous studies serve to reveal not only features pertaining to particular instructional context but also the evolvement of teacher roles from the past to the present (Huang, 2017, 2019). For example, some research observed little change and transformation of teacher roles between face-to-face learning and online learning whereas others found that teachers in online learning and face-to-face learning did have different impacts in terms of cognitive, affective and managerial roles (Huang, 2019; Coppola et al., 2002). Similar to the research across different instructional contexts, studies of teacher roles in various subject areas also contribute to a more complete picture. In terms of science subjects, science teachers are expected to dispense knowledge, mentor learning, monitor activities and help with inquiry etc. (Zhai & Tan, 2015). Then in the field of English teaching, teachers are supposed to humanize the learning environment, encourage interaction, present language input, organize activities, provide feedbacks and so on (Compton, 2009).

Despite plentiful research in the relevant field, studies that quantitatively examine and systematically compare teacher roles across different subject areas are rather scant. Therefore, it is the purpose of this present study to measure teacher roles in two different subject areas – English course and Computer science course. By using a 27-item 5-likert scale, the STRI (Huang, 2017), the researcher intends to find out through quantitative data whether teacher roles are similar or different and what similarities or differences might exist.

2. Literature review

2.1 Classification

Review of previous studies shows that there has been more classification and generalization of teacher roles than definitions (Huang, 2019). Researchers have attempted to identify diverse teacher roles from different subject areas like English course, computer science course, or mathematics course etc. (Huang, 2019; Lai et al., 2015;

Maulana et al, 2017; Meerbaum-Salant et al., 2013) and also across various instructional contexts (Baran et al., 2011).

On the one hand, various teacher roles that have been generalized are meaningful and insightful as each of these roles unveils one particular facet of teacher roles practiced in certain circumstances. And the combination of all the facets pieced together helps to contribute to a more complete picture of teacher roles across different subject areas and instructional contexts. On the other hand, miscellaneous terms have been used to describe the roles of teachers. With careful examinations, researchers may find that the assortment of these terms is not without problems: some terms, like "establish rapport", "nurturer", "devotee" etc., are provided with few explanations in the studies and thus vague for understanding (Lee, 2011; Wan et al., 2011). More importantly, a lot more terms have overlapped with each other. For instance, such roles as metaphorical terms of *provider, nurturer* and *instructor* (Wan et al., 2011); the role of *transmitting knowledge* (Mak, 2011); *sticker to facts* (Kilinc et al., 2017); *dispenser of knowledge* (Zhai & Tan, 2015); *content dispenser* (Keiler, 2018) and *instructive role* (Alvarez et al., 2010) all seem related to introducing and delivering subject content. Likewise, *friends, bartender* (Huang, 2017); i*nterest arouser* (Wan et al., 2011); *social role* (Alvarez et al., 2010), *the role of humanizing the learning environment* (Compton, 2009) all seem to deal with the teacher-student relationship, interaction and classroom environment. Actually, the list can continue with more terms like "f*acilitator, mentor of learning*, *content expert, content facilitator, process facilitator, facilitating discourse, instructional designer, instructor, designing role, planning role, administrative manager, administrative roles, social roles, reinforcer, and navigator*" etc. (Keiler, 2018; Alvarez et al., 2010; Baran et al., 2011).

As different terms have been used to refer to similar domains, classroom teachers might be confused about these overlapping terms and may feel lost as to what to do exactly in classroom teaching in relation to all the abstract and hazy terms (Keiler, 2018). With all the confusion and overlapping in terms of the fundamental concepts, it is rather challenging if researchers attempt to systematically compare the roles of teachers across different subject areas. In addition, it is also impossible to include all the miscellaneous roles as not all of them might be observed or practiced in every context. Therefore, the researcher of the present study thinks that it is necessary to link the theoretical generalizations to concrete classroom teaching-related behaviors and to clarify some basic and common concepts first.

2.2 Definitions

In contrast to prolific classifications of teacher roles in the literature, only a few researchers have provided concrete explanations and definitions. Among them, Wright (1987) defined roles as "*What one does or is expected to do in a given environment and it incorporates three principal elements: the work done and job-related activities, the relationships and communications one has with others, and beliefs and attitudes*". Lam & Lawrence (2002) stated that a role referred to what one does or is expected to do in a given environment. Keiler (2018) produced an even simpler definition – "*What teachers do in classrooms*". On the basis of these understandings, Huang (2019) further clarified teacher role as "*all the*

teaching–related behaviors that teachers do or are expected to do either before class, during class or after class across various contexts and levels". Obviously, teacher role is more related to what teachers can actually do in order to teach certain subject matter and is thus more behavior-based rather than theory-oriented. In other words, research of teacher roles is supposed to target more at actual teaching-related behaviors, actions and activities but less at abstract beliefs, ideas and thoughts, which falls into the areas of teacher belief or teacher identity.

Within the broad category of teacher roles, cognitive role, affective role and managerial role are a few subdomains that have been refined. According to Coppola et al (2002), cognitive role deals with teachers' instruction pertaining to learning, information storage, memory, thinking and problem solving etc. And the researcher of the present study holds that cognitive role is related to instructing content knowledge to students. Affective role, then, is related to what teachers do to affect the relationship between students, teachers and the classroom atmosphere. Finally, managerial role is concerned about what teachers do to manage the course. It comprises tasks of course planning, organizing, leading, and controlling (Huang, 2019; Baran et al., 2011; Coppola et al., 2002). Among miscellaneous teacher roles previously generalized and researched, cognitive, affective and managerial roles are regarded as central and common. It is hold that the three focal teacher roles probably apply to different subject contents, pedagogical conditions and instructional contexts. Furthermore, the three teacher roles also constitute the conceptual framework of the measurement instrument, the STRI, that the present study has employed to examine and compare the roles of teachers in two courses. In other words, it is these three roles of teacher, namely, cognitive role, affective role and managerial role, that are to be examined and compared between the two courses in the present study.

2.3 Previous studies in the field

One communality that previous research share in the field of teacher roles lies in the research methods employed by most researchers. Most of the previous studies are qualitative research that has used methods like single case study, interviews, classroom observations, field notes and open-ended survey questions. Very few studies have employed quantitative methods to examine teacher roles (Huang, 2019, 2017b; Baran et al., 2011; Alvarez et al., 2009). Table 1 presents some of the previous studies of teacher roles in relation to their research approaches, methods & instruments employed, subjects of studies and samples sizes.

Table 1: Previous studies of teacher roles regarding their research approaches, methods & instruments, subjects of studies and sample sizes

Subject areas	Studies	Research approaches	Methods & Instruments	Subjects of studies	Sample sizes
English	Huang, 2019	Quantitative	a 27-item 5-likert scale (the STRI)	Students	153
	Yandell, 2017	Qualitative (narrative approach)	Observation	Pre-service Teachers (2)	2
	Huang, 2017a	Qualitative	Open-ended questions, metaphors	Students	103
	Lai et al, 2015	Qualitative	Interview	Teachers (10) Learners (15)	25
	Mak, 2011	Qualitative	Interviews, reports of beliefs field notes, classroom observations etc.	Student Teacher (1)	1
	Wan et al, 2011	Qualitative	Open-ended questions Metaphors	English Teachers (33) English Students (70)	103
	Senior, 2010	Theoretical discussion	/	/	/
	Compton, 2009	Theoretical discussion	/	/	/
	Jacob & Farrell, 2003	Theoretical discussion	/	/	/
Science	Molander & Hamza, 2018	Qualitative	interviews	Student Teachers (6)	6
	Keiler, 2018	Qualitative	Case study, interviews	Teachers (13)	13
	Killinc et al, 2017	Qualitative	Survey of teaching vignettes, open-ended questionnaires	Students (324)	324
	Wu & Cai, 2017	Qualitative	Four open-ended survey questions	Teachers (68)	68
	Zhai & Tan, 2015	Qualitative	Class video recordings	Teachers (3)	3
	Yadav et al, 2016	Qualitative	interview	Teachers (24)	24
	Wachira et al, 2013	Qualitative	Classroom observations, field notes, interviews	Students (6)	6
	Subramaniam, 2010	Qualitative	Interview, observation, Focus group discussion	Teachers (5)	5

Table 1 has by no means exhausted the list of studies in the field of teacher roles in English courses and science courses. In the list of English courses, qualitative studies plus theoretical discussion of teacher roles have dominated the literature (Yandell, 2017; Lai et al., 2015; Mak, 2011; Wan et al., 2011) with only a few exceptions of quantitative studies conducted (Huang, 2019). This is even more so in the case of science courses. All the studies of teacher roles listed in table 1 are qualitative. Owning to the nature of qualitative research, the investigation methods are mainly case study, open-ended survey questions, interviews or classroom observations (Yandell, 2017; Lai et al., 2015). Additionally, the sample sizes of qualitative studies are mostly less than 10, with a few exceptions reaching 68 (Wu et al., 2017), 103 (Huang, 2017; Wan et al., 2011), 153 (Huang, 2019) or 324 (Killinc, 2017) The smaller sample sizes, combined with qualitative research methods, serve to pinpoint unique features of teacher roles pertaining to certain particular circumstances and provide in-depth insights into the relevant areas. However, qualitative research has its own limitation and it is considered to be more difficult to generalize their findings in other contexts. Therefore, the present study intends to employ a 27-item 5-likert scale, the STRI (Huang, 2017b), to quantitatively measure teacher roles in two different subject areas—English course and computer science course. For one thing, quantitative measurement instrument generates numerical data and helps to reveal possible trends and patterns hidden in the data. For another, quantitative methods also make it possible to statistically measure and systematically compare research subjects across different content areas (Hesse-Biber & Johnson, 2015). When it comes to the subjects of studies, the majority of previous qualitative studies have targeted at teachers rather than students (Keiler, 2018; Wu & Cai, 2017; Yandell, 2017; Yadav et al., 2016). The present study holds that students, as the object of teaching and the subject of learning, constitute an indispensable part of classroom teaching and cannot afford to be neglected. Teaching serves learning and teacher roles should be discussed in relation to students. Therefore, the present research took university students as research subjects and aimed to find out how students had perceived the roles of their teachers while learning English or computer science.

Based on the above literature review, the main purpose of the present study is to quantitatively measure and compare teacher roles in two different subject areas by investigating university students with a 27-item 5-likert scale (the STRI). Thus, the research questions to be addressed by the researcher include:

1) What kind of roles do the teachers perform in English course and computer science course?
2) What characterizes the teacher roles in the two courses?
3) Are the teacher roles similar or different in the two courses?
4) How the teacher roles similar or different in the two courses?

3. Method

3.1 Context of the study

To compare teacher roles in different subject areas, the researcher randomly chose two courses from two different schools at the same university. One is an English course— the integrative English course at School of English and Education; the second is a computer science course—the data structure course at School of Computer and Information Technology. Both courses are face-to-face teaching. They last 16 weeks for one semester and each week had two lessons of 160 minutes. The teachers of the two courses were both Chinese and females. The English course was taught in English whereas the computer science course was taught in Chinese. In terms of their pedagogy, the English teacher thought that her English class was mainly activity-dominated while the computer science teacher thought she delivered lecture-based instruction.

3.2 Participants

Participants of the present study included 84 sophomores from two different schools at the same university. Among them, 49 participants were all English and education majors from the English course. The other 35 participants were all computer majors from the computer science course. In spite of their different majors, these participants were similar in their ages and English proficiency levels due to similar policies of enrollment and admission as well as similar requirements of English learning at the same university. Both the teachers and the participants voluntarily joined in the survey after the researcher explained the academic nature of the study.

3.3 Instrument

The present study has employed a questionnaire to explore how participants perceived the roles of their teachers in the two different courses. Overall, the questionnaire has four sections: section I – the purpose of the study and the personal information of the participants; section II – the STRI, the main body of the 27-item and 5-likert scale about teacher roles; section III – one MC question about classroom activities and exercises. To this question, a list of 20 different activities and exercises were provided for students to choose from and they were also allowed to add up more options on the blank if they had done alternative activities. section IV – the last section of optional written comments about teacher roles in case students had more to report.

Previous studies have shown that the STRI is pretty reliable and valid (Huang, 2019; 2017b). The scale was designed and developed on the basis of the conceptual constructs by Coppola et al (2002). The three conceptual constructs are cognitive role covering items 1-10, affective role of items 11-20 and managerial role of items 21-27. All the 27 items in the questionnaire describe teaching behaviors of teachers and are thus believed to link the theoretically-generalized terms to concrete teaching-related practices. The entire questionnaire is in English, including the STRI. The STRI was designed, developed and written in English at the very beginning. The researcher decided to keep the original English version of the questionnaire in the survey rather than translating it

into Chinese. The reasons are twofold: first, the items that describe teacher roles are simple English sentences without jargons and they have been piloted by the researcher with other participants at the same university in previous studies (Huang, 2019, 2017b). It is believed that university students, with their English level, will be able to understand the simple English sentences, questions and instructions in the questionnaire. Second, translation between two different languages could be subtle and challenging as meaning could be lost or altered in the process (Pennycook, 2008). To ensure the reliability and validity of the instrument, the researcher kept the original English version but added some notes in Chinese to assist understanding.

3.4 Data collection and analysis

To collect the data, the researcher first gained participants' consents to take the survey. Then the researcher took the paper-printed questionnaires to the classrooms. In the classrooms, participants were assured of the academic nature of the research so that they could objectively respond to the questionnaires. Once completed, the questionnaires were then submitted to the researcher on the spot. As to those who did not want to participate, questionnaires were left blank. In the end, a total of 84 valid questionnaires were collected, with 49 from integrative English course and 35 from data structure course. After questionnaires were collected, data was then input in the computer and a series of statistical analyses were run. As very few participants wrote the optional comments in the fourth section, no textual data but only numerical data was collected and later analyzed.

4. Results

4.1 Reliability tests of the STRI

Reliability tests were conducted first to show whether the instrument utilized in the study was reliable. Statistical results indicated that the STRI was pretty reliable with all the Cronbach alpha values reaching from the lowest *.793* to the highest *.939*. Table 2 listed the data. In particular, the Cronbach alpha values of the entire scale all went above .922. These high values suggested that the scale was highly reliable with not only all participants (n=84) but also English course students (n=49) and computer science course students respectively (n=35). Then the Cronbach alpha values of the three main roles ranged from the lowest of *.793 to the highest of .908*, indicating that all the three main roles of teachers were also pretty reliable. They were all observed and enacted in the two different courses in this study (Wu, 2012)

Table 2: Results of reliability tests of the STRI

	Entire scale	**Cognitive role**	**Affective role**	**Managerial role**
All participants (n=84)	.928	.866	.811	.835
English course (n=49)	**.939**	.908	.831	.813
Computer science course (n-35)	.922	.850	**.793**	.850

4.2 Comparison of teacher roles of English course & computer science course

To examine and compare teacher roles between the two different courses, a series of *t-tests* were run to probe into how students perceived the roles of their teachers. Figure 1 compared the means of all the roles between the two courses. According to the figure, the mean of the overall teacher role of computer science course (4.1471) was a bit higher than that of English course (4.0688). Similarly, the means of affective role (3.9371) and managerial role (4.2408) of computer science course were also higher than those of English course (3.8449 and 3.9854 respectively). The only exception existed in cognitive roles and its mean of English course (4.3510) was higher than that of computer science course (4.2914). The comparison revealed that the overall teacher roles, together with affective roles and managerial roles of the two courses showed similar patterns but the relationship between cognitive roles of the two courses was different from the rest.

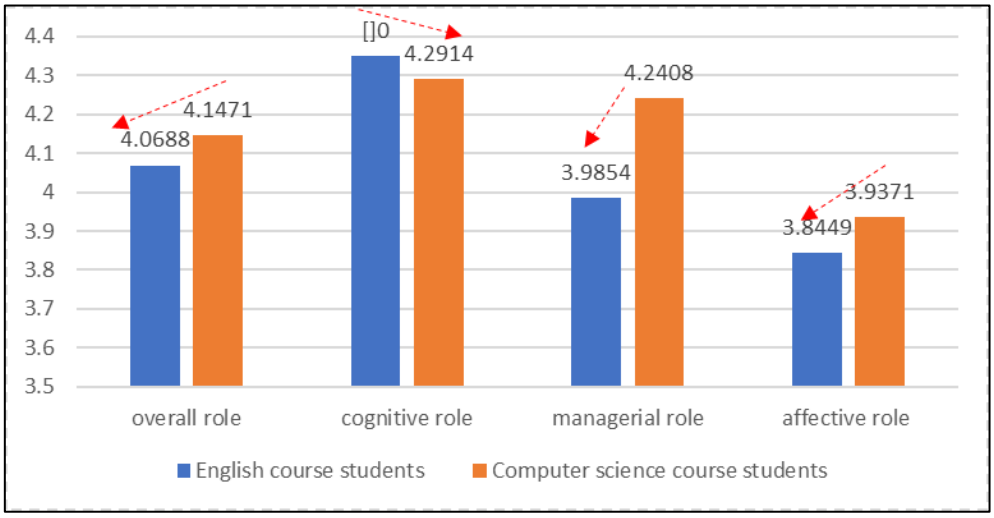

Figure 1: Comparison of all the role means between the two courses

More t-tests were conducted to reveal whether significant differences existed between teacher roles of the two courses. According to table 3, the overall means of English course (n=49) and computer science course (n=35) had no significant difference from each other (p=.197 > .050; t=.705, df=82). The findings meant that the teacher role as a whole of English course was not significantly different from that of computer science course. Likewise, the means of affective roles and managerial roles of the two courses did not have significant difference either. However, the mean of cognitive role in English course was significantly different from, actually significantly higher than that in computer science course (p =.040 < .050; t=.511, df=62.763). In short, significant difference only existed between cognitive roles but not between affective roles, managerial roles or the overall teacher roles of the two courses. Therefore, the findings seemed to indicate that the teachers in the two different courses had exerted similar impact especially in terms of affective and managerial roles whereas the teacher in English course had performed notably greater cognitive role than the teacher did in computer science course.

Table 3: Comparison of the mean differences of teacher roles between the two courses

Teacher roles compared between the two courses	Independent t-tests					
	F	**Sig.**	**t**	**df**	**Mean differences**	**SD**
Overall roles	1.695	.197	.705	82	-.07831	.11113
Cognitive roles	4.367	***.040***	.511	62.763	.05959	.11663
Affective roles	2.641	*.108*	-.710	82	-.09224	.12993
Managerial roles	.836	*.363*	-2.089	82	-.25539	.12225

To further pinpoint more possible features, the means of teacher roles were also compared within each course. Figure 2 compared the means of the three main roles within each course. In particular, in terms of English course, cognitive role had the highest mean of 4.3510, followed by managerial role of 3.9854. The affective role had the lowest mean of 3.8449. The same patter existed in computer science course too: cognitive role also ranked the first with the highest mean of 4.2914 and managerial role stayed the second (4.2408). Finally, affective role was the lowest (3.9371). Obviously, the two courses had the same patterns and relationships of the three main teacher roles, i.e., both with cognitive role at the top, managerial role at the medium and affective role at the lowest.

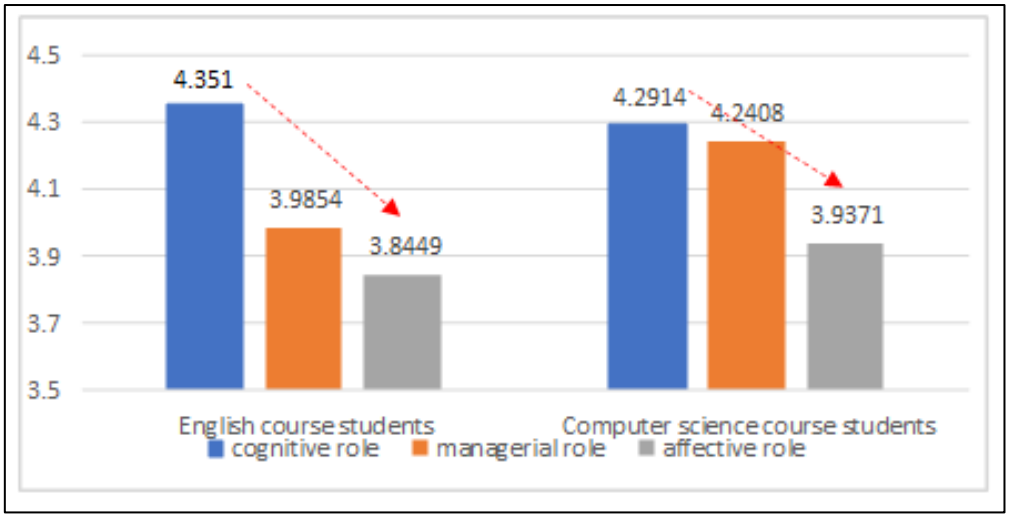

Figure 2: Comparison of all the role means within each course

Further t-tests were conducted to reveal whether these differences were significant. Table 4 displayed the results. all the mean differences had *p* values lower than .050 except the pair of cognitive and managerial roles in computer science course (p=.505>.050). The results suggested that the mean of cognitive role was significantly higher than that of managerial role in English course but not so in computer science course. Then the means of managerial roles were both significantly higher than those of affective roles in the two courses. In other words, in the English course, the cognitive role of the teacher was perceived as significantly more influential than managerial role and managerial role appeared significantly more impactful than affective role. Nevertheless, the pattern was a bit different in computer science course where cognitive role of the teacher seemed as significant as managerial role to the participants although managerial role was regarded as distinctly more significant than affective role.

Table 4: Comparison of the mean differences of teacher roles within each course

Courses	The pair of roles compared	Mean differences	SD	SE	t	df	Sig. (two-tailed)
English (n=49)	Cognitive - Managerial	.36560	.39016	.05574	6.559	48	**.000**
	Managerial - Affective	.14052	.40023	.05718	2.458	48	**.018**
Computer (n=35)	Cognitive - Managerial	.05061	.44432	.07510	.674	34	.505
	Managerial - Affective	.30367	.45973	.07771	3.908	34	**.000**

4.3 Results of the MC question about classroom activities

Finally, in the third section of the questionnaire was one multiple-choice question that aimed to find out what classroom activities and exercises that teachers had frequently adopted in the two subject courses. Figure 3 compared the percentages of students who identified the classroom activities and exercises in the two courses. Data showed that the percentages in English course almost outnumbered all those in computer science course. In English course, up to 15 kinds of activities and exercises were identified by over 50% students, including True or False, blank-filling, multiple-choice question, open-ended question, matching, brainstorming, retelling, exchange information, summarizing, dialogue, group discussion, role play, interview, group presentation and research. In addition, 4 activities out of the 15 kinds, i.e., exchange information, summary, group discussion and role play, were recognized by all students (100%). On the contrary, in computer science course, the activities and exercises selected by over 50% of students were limited to only 4 kinds: True or False, multiple-choice question, summary and group discussion. Obviously, the teacher in English course had adopted much more diverse activities and exercises than the teacher in computer science course did and most of those activities in English course turned out to be interactive and collaborative in nature.

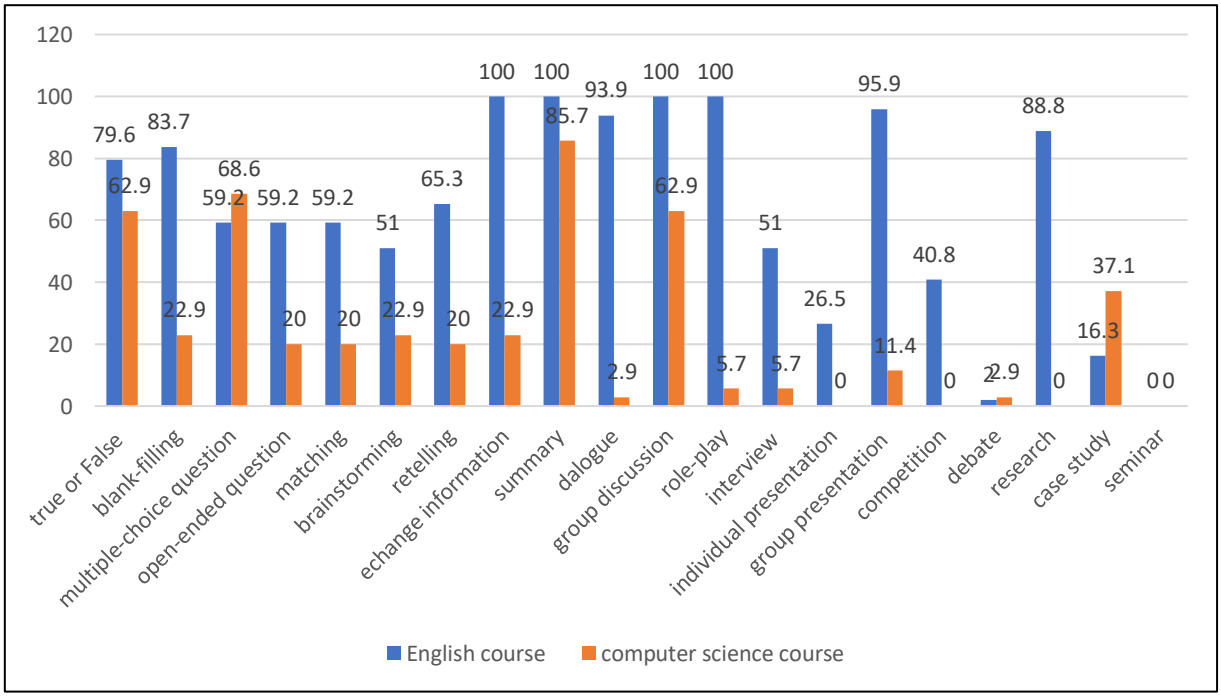

Figure 3: Comparison of the percentages of the students who identified the frequently-used activities & exercises in the two courses

5. Discussion

Similar to the previous studies in the field, the three main roles of teacher were also observed and enacted in the two courses in question. The present study believes that these three main roles are common and fundamental across different subject areas. For example, in the area of English courses, cognitive role, affective role and managerial role are all observed. Wen et al. (2012) have generalized similar EFL teacher roles such as providing knowledge, promoting learning atmosphere, maintain an orderly learning environment and monitoring students' learning etc. Mak (2011) summarized teachers' roles in CLT context as transmitting knowledge, managing communicative activities, directing students' work, helping students enjoy the learning process and boosting learners' confidence. In TBLT context, researchers also recognized students' expectations for EFL teachers such as providing grammar explanations, offering feedback to utterances, correcting learners' pronunciation and pushing and encouraging students' learning (Bao & Du, 2015). These various aspects actually feature and illustrate the three main teacher roles in different ways.

The same holds true for teachers' roles in science area. Among numerous concerns identified by computer science teachers, some of the priorities involve making content knowledge comprehensible to students and classroom management (Huling et al., 2012). Indeed, as an attempt to effectively teach computer science, teachers have expressed great concern about being equipped with "*adequate computer science content and pedagogical knowledge*" (Yadav et al., 2016). Moreover, Kilinc et al., (2017) also uncovered similar roles of science teachers such as transmitting scientific knowledge, building better learning environment by promoting collaboration and encouraging interaction among students in class. These concerns of science teachers obviously fall into the same scope of the three main teacher roles even though the researchers did not adopt the same conceptual terms and no relevant teaching behavior has been specified under these categories.

Al-Mahrooqi et al. (2015) stated that teachers from various disciplines shared similar qualities irrespective of their subject matters. The researcher holds that the three main domains of teacher role are to be observed across different subject areas. It is thus this commonality of teacher roles that makes it possible to draw analogy and make comparisons across various content areas.

In the present study, comparison of teacher roles between English course and computer science course has exposed more detailed characteristics of teachers. One major findings lie in the significant differences between cognitive roles of the two courses. The cognitive role of English course was regarded as significantly more impactful than the that of computer science course. The researcher holds that carefully examining and comparing the 10 items of cognitive roles helps to uncover more attributes in the domain and provides some hints for understanding the distinction between the two courses.

For instance, the means of item 1,2 and 7 in English course were significantly higher than those in computer science course. The three mean differences were .294 (item 1, p=.000<.050, t=1.486, df=46.081); .955 (item 2, p=.000<.050, t=4.971, df=47.319); and .114 (item 7, p=.017<.050, t=.701, df=56.657). Item 1 and 2 deal with teacher's use of multimedia

aids (videos & audios) to learn English. And item 7 is related to teacher's making comments on students' work. In other words, the teacher in English course played markedly greater role in these three aspects than the teacher in computer science course did. According to the previous literature, it is important for English teachers to provide, select and modify rich language input to suit students' level. These language inputs and learning materials may take diverse forms ranging from texts, videos, audios to even posters and cue cards (AI-Mahrooqi et al., 2015). Elder (1994) suggested that to modify and produce well-informed language input for learners was one of the main abilities for teachers to teach language effectively. Back to the present study, the teacher in English course had frequently introduced learning contents in the form of videos and audios for students to learn English. In contrast, the use of videos and audios was less notable in computer science course. Regarding the representation modes of learning content and resources, previous literature of computer science course produces mixed findings. Some studies have found that certain computer courses are "knowledge driven" and depend on textbooks that present subject knowledge elaborated with examples and exercises. Textbooks are used especially when explicit instruction is needed (Meerbaum-Salant et al., 2013). Nonetheless, other research has reported that different options of materials including images, sounds, pictures, animated and tangible visuals, videos along with texts are used to assist conceptual learning or to introduce computing in computer science courses (Grover et al., 2015).

In this study, less use of audios or videos in computer science course does not indicate that other means of instructional materials were not used either. It was likely that the teachers might have introduced learning materials in other modes that were not listed in the STRI. Videos and audios are only two options among many possibilities that are impossible to be exhausted by the STRI. The researcher holds that such disparity of cognitive roles of teachers in the two subject courses might result from either the need to accommodate to different teaching goals or personal preferences of individual teachers of different courses.

When it comes to item 7, the result indicated that the teacher in English course had played significantly greater role in making comments on students' work. In other words, the English teacher made much more comments or more frequently than the computer science teacher did in class. As the English course was mainly activity-dominated while computer science course had much less interactive activities, it is thus likely that the significant difference of item 7 was attributed to the differences of instructional approaches enacted in the two courses. The researcher thinks that teachers tend to make more comments in activity-dominated class with more interactive and collaborative activities. Instead, in lecture-based class dominated by direct instruction, teachers probably have less chances to make comments but rather provide direct answers more often (Mansour, 2010).

In fact, data of the MC question in section III of this study also verified this finding. The frequently-used classroom activities and exercises specified by almost all students in English course were either pair work or group work that were interactive and collaborative in nature. They characterized the main features of student-centered

instruction and constructivist approach (Batenburg et al., 2019; Arthur & Kreager, 2017). While organizing these activities, the teacher in English course had to make more comments on students' work so as to encourage active learning. Indeed, English teachers need to give useful feedback more frequently on the accuracy and appropriacy of students' language output (Richards, 2017). Instead of providing direct keys, comments and feedback on using the language in the activities are more preferred in language classrooms (Jacobs & Farrell, 2003). Conversely, in computer science course of the present study, only one interactive and collaborative learning activity—group discussion was commonly recognized by students, much less than those in English course. Actually, the computer science course seemed to be dominated by more traditional mechanical drills like T/F questions, and MC questions. With much less interactive and collaborative activities in class, teachers probably provided direct instruction by correcting mistakes and giving answers more often (Robins et al, 2003). This finding is consonant with the argument in the previous literature. Kilinc et al. (2017) found that science teachers who adopted the role of stickers to facts tended to transmit knowledge without much comment. Teachers tended to play the role of "knowledge authority" and the instruction mainly focused on facts and evidences rather than conflicts or values. If knowledge is considered to be absolute truth and isolated facts, teachers seldom elicited argument or interactions in class (Sadler et al., 2006). With less argument or interaction, comments will probably be less observed in class.

The second major finding of this study concerns the patterns and relationships of the three main roles, especially the relationship between cognitive role and managerial role within each course. On the one hand, the teacher in English course had exerted significantly distinct impacts in all the three main domains. Among them, cognitive role was perceived as significantly more impactful than managerial role and managerial role significantly more influential than affective role. The findings are consistent with the results of previous studies (Huang, 2019). Due to similar sample subjects, content areas and instructional settings in the studies, the researcher suggests that such common attributes of teacher roles are understandable.

On the other hand, in computer science course, cognitive role and managerial role had no significant difference in spite of the significant difference between managerial role and affective role. This result of very close footings between cognitive role and managerial role of computer science teacher contradicts with the findings of English course. It is also incompatible with the results of previous studies where researchers have found that managerial role, exceeding the impact of cognitive role, was perceived to be the foremost prominent in online English learning mode (Huang, 2019). Regarding this finding, a look into the relevant literature may provide some insight into understanding it. The researcher proposes that teacher roles might be influenced by multiple factors involving instructional settings, subject contents, instructional approaches and individual differences as well. In addition to instructional settings, instructional approaches may also contribute to dissimilar impacts of teacher roles in classroom practices.

Some research hold that managerial role appeared weakened especially in student-centered classrooms. In Keiler's study (2018), the teachers reported that many management problems had been reduced. They were relieved that their burden of disciplining the class was lessened partly due to the help of assistants and partly as a result of their transition to student-centered instruction. In opposition, other studies have found that managerial role was strengthened in class. For example, Maulana et al (2017) found that classroom management, along with clarity of instruction, emerged as two most significant domains among 11 effective teaching behaviors. Besides, in traditional classrooms, the teachers recognized that they had to devote much more time and efforts to dealing with some behavioral issues in teacher-centered class and teachers often had to take on the undesirable "disciplinarian roles" while teaching (Keilers, 2018). Researchers think that lengthy lecture in teacher-centered instruction tends to exceed students' attention span and makes students a passive recipient of knowledge from the teacher. Students cannot actively learn but passively receive (Tamim & Grant, 2013). To guarantee teaching, teachers in traditional lecture-based instruction are likely to take on stricter and stronger managerial role to discipline the students and control the class. In some cases, the managerial role has to be so strong that teachers become "*enforcers, disciplinarians and even police officers*" (Gutstein, 2007). With classroom management enhanced, managerial role of teachers probably becomes more noticeable and impactful.

Furthermore, results of the MC question in section III of this study revealed more features and justified the findings of managerial role in computer science course. For one thing, the teacher in computer science course described her instruction as mainly lecture-based. Then this was also supported by the data MC questions in this study. The computer science course in question was more characterized by classroom activities and exercises like T/F and MC questions. Such exercises appeared more product-oriented rather than process-oriented (Jacobs & Farrell, 2003). In other words, they focused more on searching for correct answers rather than facilitating students to construct knowledge (Arthur & Kreager, 2017). These exercises mostly required individual work rather than group cooperation. In fact, very few collaborative learning activities were recognized by the students in computer science course except group discussion and case study. Other interactive learning activities like exchanging information, dialogue, role-play and interview were barely used in class by the teacher. The information gave a hint to the lecture-based instruction in the course. Judged from the frequently-used classroom activities and exercises used in computer science course, the teacher seemed to dominate the class, acting as the content deliverer and content expert that characterized teacher-centered instruction (Keiler, 2018). To successfully engage students in teacher-centered instruction, the teacher probably needed to exert higher degree of managerial role in class to guarantee the teaching. As a result, the findings of classroom activities & exercises and the findings of stronger managerial role in computer science course mutually support each other and indicate the findings of the present study are consistent.

Although cognitive roles and managerial roles seem to exert unequal impacts in the two courses, affective roles in both courses appeared quite similar and both remained

the lowest influential among the three domains. This finding is congruent with previous studies (Huang, 2019; 2017b).

Why is affective role the least influential in the two courses? The hidden reasons could be complicated. Whether the lower impact of affective role has derived from individual differences of teachers or could be attributed to other factors like instructional settings or approaches requires further research. However, the present study managed to disclose more attributes of affective roles by closer look into the particular items of the scale. In terms of English course, item 17 in the domain of affective role had the lowest mean (3.29) of the whole scale. Item 17 states "*While learning, I feel confident of myself because of the teacher*". Only around one third of the English course students (32.7%) agreed or strongly agreed to this item and more than half of the students (57.1%) did not take side. In contrast, item 17 of computer science course had a mean of 3.80. Up to 68.6% of the students agreed or strongly agreed to item 17, indicating the teacher in computer science course had made the majority of students confident of themselves. Although there was no statistically significant difference between the means of item 17 of the two courses ($p=.393>.050$; $t=2.681$; $df=82$), the moderate percentages of English course students who agreed to item 17 indicated that the English course was probably quite stressful for the students and was thus alarming to the teacher. This conjecture was validated by data of item 18 and 19. Even though the majority of English course students (59.2%) agreed or strongly agreed that the English teacher had made learning interesting to them (item 18), up to 53% of them agreed or strongly agreed that their English teacher had made learning stressful to them (item 19). More importantly, statistically significant difference was found between the means of item 19 in English course and computer science course ($p=.002<.050$; $t=.543$, $df=52.494$). The result suggested that English course teacher had made the students significantly more stressed than computer science course teacher did in class.

In this respect, the findings in the existing English teaching literature are quite inconsistent. On the one hand, some researchers have found that information gap tasks and interactive activities make class more fun and interesting as they help to increase learners' participation, ease their anxiety, make learners more relaxed and thus boost self-confidence (Bao & Du, 2015). Contrary to these findings is the result of the present study where the activity-dominated English course was perceived to be significantly more stressful than the lecture-based computer science course. Researchers have found that tasks and activities with information gap that feature interactive and collaborative language learning might not increase learners' confidence especially when instructional support of interactional strategies or scaffolding of necessary language inputs are missing during the process (Batenburg et al., 2019). In addition, information gap activities like role play, dialogue, exchanging information and group discussion are more challenging for both language teacher and students to manage since language use is often unpredictable. To develop language through meaningful interaction in the classroom can be considerably daunting and thus requires higher level of professional knowledge and language skill (Richards, 2017). In other words, those frequently-used interactive and information gap activities in the English class might be rather demanding in terms of

English proficiency. If it is true with teacher, it poses even greater threats to the students who were still learning the language. When students in the English course lacked adequate language knowledge and discourse skills to practice and complete the learning activities, they were likely to become more stressful and anxious in class. In the present context of the study, English is the foreign language. Therefore, in English classes, English was both the instruction target and the instruction medium, a characteristic that distinguished itself from computer science course which was instructed in the native language of Chinese of both the teacher and the students. In computer science course, there was no language barrier and the instruction media of Chinese did not pose a threat to the students. Plus, much less interactive and information gap learning activities were reported in the computer science course. Students in computer science course might, therefore, felt less stressful in class than the English class students.

Even though no statistically significant difference existed between the overall affective roles of the two courses, careful examination of some particular aspects of the affective roles still helps to pinpoint some specific features pertaining to the two subject courses. It seems to the researcher that affective roles remained the least impactful in both courses regardless of their disparities of subject contents and instructional approaches in this study. Previous studies also show that affective roles were the least influential among the three roles in spite of the differences of instructional modes (Huang, 2019). Whether affective roles will be influenced by other factors like individual differences or personal traits of the teachers needs further research.

6. Conclusion and implication

Overall, the roles of the teachers in English course and computer science course displayed both similarities and differences. Firstly, the three main roles of teacher, namely, cognitive role, affective role and managerial role were all observed and enacted in the two courses. Then comparison of teacher roles between the two courses revealed that only the cognitive role in English course was perceived as significantly greater than that in computer science course. No significant difference was found between affective roles, managerial roles and the overall teacher roles of the two courses. Furthermore, regarding the patterns of the three main roles, in English course, cognitive role was perceived to be the most influential, followed by managerial role and affective role turned out to be the least impactful. However, in computer science course, cognitive role and managerial role were found to be similarly significant while managerial role was considered to be distinctly more impactful than affective role.

In relation to the main findings of the present study, several implications can be drawn. Regarding cognitive roles, teachers should provide rich learning materials of diverse modes for students rather than constraint to only textbooks so as to engage students. This is a major ability for classroom teachers to teach effectively (AI-Mahrooqi et al, 2015). Besides, it is also important for teachers to provide comments and offer feedback on students' work especially in the case of student-centered instruction dominated by interactive and collaborative activities.

In terms of affective role, it is necessary for the teacher to provide more sufficient scaffolding to the students, which includes offering simplified problems and learning materials, display modelling explicitly and providing corrective feedback to students' performances etc. (Maulana et al., 2017). Scaffolding can help students to narrow the gap between learners' competences and their learning targets and thus make learning within their reach (Batenburg et al., 2019).

As to managerial role, teachers may adopt constructivist approach to reduce the burden by increasing more pair work or group work for students. Such interactive and collaborative activities help to better engage students and promote active learning.

7. Limitation and future study

Although the present quantitative survey has some strengths in disclosing some features that characterize teacher roles in two different subject courses, the study has its limitations. Quantitative research method alone is unable to locate the underlying causes for the findings. Future studies will combine both quantitative methods and qualitative methods such as classroom observations, field notes and interviews to discover more about the attributes of teacher roles. Additionally, it is worthwhile to investigate more diverse sample subjects to avoid homogeneity of the participants at the same university. Finally, future research will benefit if the researcher includes both the perceptions of students and the awareness of their teachers so that the findings will be more comprehensive.

Conflicting of interest statement

The Author declares that there is no conflict of interest.

About the author

The author has been teaching English at university for over twenty years. After years of teaching an array of various English courses at university, she has come to take interests in the area of teacher education, online learning, blended learning, material development & evaluation as well as classroom research and action research, etc.

References

Al-Mahrooqi, B., Denman, C. AI-Siyabi, J. & AI-Maamari, F. (2015). Characteristics of a good EFL teacher: Omani EFL teacher and student perspectives. Sage Open, April-June 1-15. DOI: 10. 117712158244015584782.

Admiraal, W., Buijs, M., Claessens, W., Honing, T. & Karkdijk, J. (2017). Linking theory and practice: teacher research in history and geography classrooms. *Educational Action Research*. 25:2, 316-331.

Alvarez, I., Guasch, T., & Espasa, A. (2009). University teacher roles and competencies in online learning environment: A theoretical analysis of teaching and learning practices. *European Journal of Teacher Education*, 32(3), 321–336.

Arthur, L. A. & Kreager, B. Z. (2017). An integrative review of in-class activates that enable active learning in college science classroom settings. *International Journal of Science Education*. 39:15, 2073-2091.

Bao, R. & Du, X. (2015). Implementation of task-based language teaching in Chinese as a foreign language: benefits and challenges. *Language, Culture and Curriculum*, 28:3, 291-310.

Baran, E., Correia, A. P., & Thompson, A. (2011). Transforming online teaching practice: Critical analysis of the literature on the roles and competencies of online teachers. *Distance Education*, 32(3), 421–439.

Batenburg, E. L. V., Oostdam, R., Gelderen, A. J. S. V., Fukkink, R. G., & De Jong, V. H. (2019). Oral interaction in the EFL classroom: the effects of instructional focus and task type on learner affect. *The Modern Language Journal,* 103,1: 308-326.

Compton, L. K. L. (2009). Preparing language teachers to teach language online: A look at skills, roles, and responsibilities. *Computer Assisted Language Learning*, 22(1), 73–99.

Coppola, N. W., Hiltz, S. R., & Rotter, N. G. (2002). Becoming a virtual professor: Pedagogical Roles and asynchronous learning networks. *Journal of Management Information Systems*, 18(4), 169–189.

Elder, C. (1994). Performance testing as benchmark for foreign language teacher education. *Babel: Journal of the Australian Federation of Modern Language Teachers Associations*, 29(2): 9-19.

Grover, S. Pea, R. & Cooper, S. (2015). Designing for deeper learning in a blended computer science course for middle school students. *Computer Science Education*, 25:2, 199-237.

Gutstein, E. (2007). "An that's just how it starts": teaching mathematics and developing student agency. *Teachers College Record*, 100(2), 420–448.

Hesse-Biber, S., & Johnson, R. B. (Eds). (2015). The Oxford handbook of multimethod and mixed methods research inquiry. Oxford. UK. Oxford University Press.

Huang, Q. (2017a). A study on the roles of teachers in CLT classrooms by metaphor analysis. *Canadian Social Science*, 13(6). 62-71.

Huang, Q. (2017b). Development of an instrument to explore teacher roles based on perceptions of English learners in online learning context. *Cross-Cultural Communication*, 13(5), 1–13.

Huang, Q. (2019). Comparing teacher's roles of f2f learning and online learning in a blended English course. *Computer Assisted Language Learning*. DOI:10.1080/09588221.2018.1540434

Huling, L., Resta, V. & Yeargain, P. (2012). Supporting and retaining novice teachers, *Kappa Delta PlRecord*, 48, 140-143.

Jacobs, G. M. & Farrell, S. C. (2003). Understanding and implementing the CLT paradigm. RELC Journal. 34:5, 6-32.

Keiler, L. S. (2018). Teachers' roles and identities in student-centered classrooms. International *Journal of STEM Education*. 5(34), 1-20.

Keengwe, J. & Kang, J. J. (2013). A review of empirical research on blended learning in teacher education programs. *Education and Information Technologies*. 18(3), 479–493.

Kilinc, A., Kelly, T., Eroglu, B., Demiral, U., Kartal, T., Sonmez, A. & Demirbag, M. (2017). Stickers to facts, imposers, democracy, advocators, and committed impartialists: preservice science teachers' beliefs about teacher's roles in socioscientific discourses. *Int J of Sci and Math Educ*. 15:195-213.

Lai, C., Yeung, Y., & Hu, J. (2015). University Student and teacher perceptions of teacher roles in promoting autonomous language learning with technology outside the classroom. *Computer Assisted Language learning*. doi: 10.1080/09588221.2015.1016441

Lam, Y., & Lawrence, G. (2002). Teacher-Student role redefinition during a computer based second language project: are computers catalysts for empowering change? *Computer Assisted Language Learning*, 15(3), 295–315.

Lee, D. Y. (2011). Korean and foreign students' perceptions of the teacher's role in a multicultural online learning environment in Korea. Educational Technology Research and Development, 59(6), 913–935.

Mak, S. H. (2011). Tensions between conflicting beliefs of an EFL Teacher in Teaching Practice. *RELC Journal*, 42:53-66.

Mansour, N. (2010). Impact of the knowledge and beliefs of Egyptian science teachers in integrating a STS based curriculum: A sociocultural perspective. *Journal of Science Teacher Education*, 21, 513-534.

Maulana, R., Helms_lorenz, M. & de Grift, W. V. (2017). Validating a model of effective teaching behavior of pre-service teachers. *Teachers and Teaching*, 23: 4, 471-493.

Meerbaum-Salant, O., Armoni, M. & Ben-Ari, M. (2013). Learning computer science concepts with Scratch. *Computer Science Education*. 23:3, 239-264.

Odom, A. L., & Bell, C. V. (2015). Associations of middle school student science achievement and attitudes and science with student-reported frequency of teacher lecture demonstrations and student-centered learning. *International Journal of Environmental & Science Education*, 10(1), 87–97.

Pennycook, A. (2008). English as a language always in translation. *European Journal of English Studies*, 12(1):33-47.

Richards, J. C. (2017). Teaching English through English: proficiency, pedagogy and performance. *RELC Journal*, 48:1, 7-30.

Robins, A., Rountree, J. & Rountree, N. (2003). Learning and teaching programming: a review and discussion. *Computer Science Education*, 13:2, 137-172.

Sadler, T. D. Aminshokoohi, A. Kazenpour, M. & Allspaw. (2006). Socioscience and ethics in science classrooms: teacher perspectives and strategies. *Journal of Research in Science Teaching*, 43(4), 353-376.

Senior, R. (2010). Connectivity: A Framework for understanding effective language teaching in face-to-face and online learning communities. RELC Journal, 41(2), 137–147.

Subramaniam, K. (2010). Understanding changes in Teacher roles through collaborative action research. *Sci Teacher Educ*, 21, 937–951.

Tamim, S. R. & Grant, M. M. (2013). Definitions and uses: case study of teachers implementing project-based learning. *Interdisciplinary Journal of Problem-Based Learning*, 7(2), 72-101.

Wan, W., Low, G. D. & Li, Miao (2011). From students' and teachers' perspectives: metaphors analysis of beliefs about EFL teachers' roles. *System*, 39: 403-415.

Wachira, P. Pourdavood, R. G. & Skitzki, R. (2013). Mathematics teacher's role in promoting classroom discourse. *International Journal for Mathematics Teaching & Learning*, preceding p1.

Wen, C. L., Shein, P. P., & Yang, S. C. (2012). Exploring personal EFL teaching metaphors I pre-service teacher education. *English Teaching: Practice and Critique*, 11(1), 183-199.

Wright, T. (1987). Roles of teachers and learners. Oxford: Oxford University Press.

Wu, M. L. (2012). Statistical analysis of questionnaire: SPSS operation and application. Chongqing: Chongqing University Press.

Wu, Y. Hwang, S & Cai, J. (2017). Being a mathematics teacher educator in China: challenges and strategic responses. Int J of Sci and Math Educ 15:1365-1384.

Yadav, A., Gretter, S., Hambrusch, S. & Sands, P. (2016). Expanding computer science education in schools: understanding teacher experiences and challenges. *Computer Science Education*.26:4, 235-254.

Yandell, J. (2017). Knowledge, English and the formation of teachers. *Pedagogy, Culture & Society*, 25:4, 583-599.

Zhai, J. & Tan, A. (2015). Roles of teachers in orchestrating learning in elementary science classrooms. *Res Sci Educ*. 45: 907-926.