

A Study on Singapore Chinese Language Teachers' Professional Proficiency and Training Needs for Sustainable Development

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Abstract

Continuous professional development can help teachers become responsible mentors for sustainable education. Taking into account subject characteristics and concentrating on investigation of professional proficiency and training needs of the Chinese language teachers in Singapore, this study seeks to shed light on providing more targeted in-service training and workplace learning support for teachers to attain the goals for sustainable development. An explanatory mixed methods approach was adopted in this study. A total of 1054 Chinese language teachers completed the questionnaire on subject content and professional knowledge, Chinese teaching practice and pedagogy, and knowledge of technology and its application. Focus group discussions and interviews of 112 teachers were conducted to further explore the results from the survey data. The findings of the study provide insights into shaping the forms and priorities of in-service training for teachers to be a powerful agent of sustainable teaching.

Keywords: teachers' professional proficiency, training needs, Singapore Chinese language teachers, second language teaching, sustainable development

Introduction

Continuous professional development can help teachers not only understand sustainable development concepts and issues but also experience life-long learning, thus becoming responsible mentors for sustainable education. It requires teachers to be learners, researchers, and collaborators, to reflect on their teaching practices and improve professional proficiency (Mohammadi & Moradi, 2017). Understanding teachers' professional proficiency and their training needs, government and university level policies and directives can provide more targeted in-service courses or workplace learning support for teachers to attain their goals for sustainable development (Kabadayi, 2016). The present paper reports on an exploratory investigation into the teachers' professional proficiency and training needs of Singapore Chinese Language (CL) teachers with various backgrounds. The findings of the study suggest the forms and priorities of training for in-service teachers to help them become a powerful agent of sustainable teaching.

Background

In teacher development, professional frameworks/standards represent a set of expectations and demands related to the knowledge, skills and attitudes the teachers are supposed to display in their activities with students. According to Shulman's (1987) views on teachers' professional proficiency, teaching, on top of the common factors of content knowledge and pedagogical skills, involves many factors that are often ignored. The scholar proposed categories of knowledge base, including content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends. The suggested category of pedagogical content knowledge revealed the nature of teachers' knowledge as a blend of different knowledge; teachers use drepertoires and engaged in a process which Shulman called "pedagogical reasoning and acting".

Day and Conklin (1992) identified four types of knowledge base of language teachers. These four components include content knowledge of the subject matter, pedagogic knowledge, pedagogic content knowledge and support knowledge. Content knowledge of the subject matter refers to elements within language such as syntax, semantics, phonology and pragmatics as well as literature and culture. Pedagogic knowledge focuses on knowledge of generic teaching strategies, beliefs and practices regardless of the subject matter, such as classroom management etc. Pedagogic content knowledge is about knowledge of how to deliver content knowledge in diverse ways so that students may understand. Support knowledge refers to knowledge of various disciplines that contribute to our approach to the teaching and learning of mother tongue language (psycholinguistics, linguistics, first language acquisition, sociolinguistics, research methods).

In CL speaking regions, such as Mainland China, Hong Kong and Taiwan, different governing bodies or professional institutions have come out with professional proficiency guidelines and standards for teachers, even specifically for teachers teaching Chinese as a foreign language (Ministry of Education, China, 2012a, 2012b; Ministry of Education, Implementation Direction for Subsidy Programs Assessing the Professional Development of Teachers, 2010; Shao & Shao, 2013). The commonalities and differences of these guidelines and standards can shed light on professional proficiency framework for Singapore CL teachers.

Table 1
Suggested Professional Proficiency in CL Speaking Regions

Role of the CL	Country/ area	Commonly mentioned			Uniquely suggested
		Knowledge	Skills	Attitude	Key proficiency
Native language	Taiwan	Lesson planning and instruction Classroom management and coaching	Professional development and research	Professionalism and attitude	
	Mainland China	Knowledge of the subject	Professional skills	Professionalism and ethics	
	Hong Kong	Instruction (skills)			Student development

Sequel to Table 1 see on the next page.

Sequel to Table 1.

					School development
					Professional community and service
Foreign language	Internationally (by Hanban, Mainland China)	Foundation of Chinese teaching Lesson organisation and classroom management	Chinese teaching pedagogies	Professionalism and development	Chinese culture & cross-culture communication

Table 1 shows commonly mentioned proficiency in these regions, including 1) subject content, 2) lesson planning and classroom management, 3) CL pedagogies and 4) professionalism and ethics/attitudes. Various terms have been used to refer to pedagogies, for example, lesson planning and instruction (Taiwan), professional skills (Mainland China), instruction skills (Hong Kong) and foundation of Chinese teaching and Chinese teaching pedagogies (Hanban, Mainland China). Since Chinese is taught as a second language in Singapore, professional knowledge and competency regarding second language teaching are emphasised. Meanwhile, teachers' information literacy is highlighted to cater to students' learning needs in the digital era, as well as to align with the fourth Master plan for Information and Communication Technology (ICT) in Education in Singapore in order to provide sustained professional learning and build efforts for ICT in learning. The Singapore CL teachers' professional proficiency framework, hence, consists of three aspects: (1) subject content and professional knowledge, (2) Chinese teaching practice and pedagogy and (3) knowledge of technology and its application. It has been acknowledged that the affective domain is essential for predicting teaching quality. Limited by the scope of the study, however, we did not take account of the affective domain in this study, but only concentrated on investigating CL teachers' knowledge and skills.

Methodology

The study adopted an explanatory mixed methods approach to respond to the research objectives and ensure both breadth and depth of findings. An explanatory mixed methods approach consists of collecting both quantitative and qualitative data, and qualitative data are addressed to help explain or elaborate on the quantitative results (Creswell, 2005). In this approach, we first developed and administered a large scale survey to capture teachers' professional proficiency and training needs in reference to the three aspects of Singapore CL teachers' professional proficiency framework. Then the quantitative survey data were supplemented by qualitative exploration via focus group discussion (FGD) and interviews. The qualitative data were used to explore in greater depth and helped reveal teachers' perspectives concerning their strengths and difficulties of Chinese teaching in Singapore as well as in-service training needs.

Procedure and Participants

The target population of the study was Singapore in-service K-12 Chinese language teachers. An anonymous online survey was distributed to teachers via their MOE email accounts in 2013. A total of 1054 responses were collected, and 1044 responses were kept after data screening. The numerical responses to the questionnaire were analysed quantitatively using the SPSS statistical software. Descriptive tests were conducted to identify trends in responses. One-way ANOVAs and Kruskal-Wallis tests (for the factors which were the measures with non-normally distributed data) were used to test if statistical differences of professional proficiency could be found among teachers with different backgrounds. NVivo software was used to analyse the qualitative data from the open-ended survey questions and FGD and interview transcripts.

After the main survey questionnaire, 37 administrative teachers and 75 general teachers were invited to FGD and interviews. The FGD and interviews, lasting approximately one hour, were semi-structured and conducted face-to-face by our team members. All the processes were audio-recorded and fully transcribed. Though the participants came from a convenient sample, the sample consisted of teachers with different length of service, age and teaching levels. More details about their characteristics can be seen in Table 2.

Verbal protocol analysis was adopted to analyse the qualitative data from the open-ended survey questions and verbatim transcripts. In this approach, responses to the open survey questions and transcripts were segmented into idea units representing a complete thought or distinct idea (Trickett & Trafton, 2007). The demographic characteristics of the teachers involved in the study are summarised in Table 2.

Table 2
Descriptive Characteristics of the Participating Teachers

Teacher Characteristics		N (%) in the questionnaire	N (%) in FGD and interviews
School types	Government	809 (77.5 %)	10 (55.6 %)
	Government-aided	176 (16.9 %)	7 (38.9 %)
	Independent	59 (5.7 %)	1 (5.6 %)
School levels	Primary	626 (60 %)	34 (65.4 %)
	Secondary	340 (32.6 %)	14 (26.9 %)
	Junior college	78 (7.5 %)	4 (7.7 %)
Teaching experience	0–2 years	126 (12.1 %)	19 (17 %)
	2–5 years	200 (19.2 %)	17 (15.2 %)
	6–10 years	287 (27.5 %)	26 (23.2 %)
	11–30 years	356 (34.1 %)	42 (37.5 %)
	More than 30 years	75 (7.2 %)	8 (7.1 %)
Teachers' age	21–30	237 (22.7 %)	29 (25.9 %)
	31–40	365 (35 %)	35 (31.3 %)
	41–50	271 (26 %)	26 (23.2 %)
	Above 50	171 (16.4 %)	22 (19.6 %)

Instrumentation

The questionnaire used in this study was structured on the basis of Singapore CL teachers' professional proficiency framework with the three main aspects. In addition to the part of the survey designed to obtain information regarding teachers' characteristics, the initial version of the questionnaire comprised three sections with 67 items and 3 open-ended questions. The 67 statements covered the three key areas of knowledge and skills emphasised in the framework, namely, subject content and professional knowledge, Chinese teaching practice and pedagogy, as well as knowledge of technology and its application. All items were presented with a 7-point Likert-type scale, ranging from one "strongly disagree" to seven "strongly agree". The open-ended questions invited participants to write down the topics in which they felt they needed further training.

In the questionnaire, some of the initial items were adapted from Schmidt, Baran, Thompson, Mishra, Koehler and Shin (2010) and Chai, Koh and Tsai (2011), and all the items were subject to expert review with two professors and two master teachers who were familiar with teacher education research and CL teaching. To investigate teachers' perception towards subject content and professional knowledge, we first generated items reflecting CL teachers' knowledge based on our review of the literature. Subsequently, six scales and a pool of 31 items were constructed. These six scales were pedagogical content knowledge (KPC), Chinese language knowledge (KCL), curricular knowledge (KCR), Chinese culture knowledge (KC), assessment knowledge (KA) and research knowledge (KR). In the same vein, five scales with 22 items and three scales with 14 items were constructed to separately test teachers' perception towards Chinese teaching practice and pedagogy and knowledge of technology and its application. The details of the five scales regarding Chinese teaching practice and pedagogy were classroom management (PCM), content-based pedagogical design (PCPD), pedagogical design (PPD), learning assessment (PLA) and pedagogical research (PPR). In the section regarding teachers' knowledge of technology and its application, we defined three scales: ICT resources for improving Chinese teaching and learning (ICTR), Integrating ICT in Chinese teaching and learning (ICTI) and ICT for supporting collaborative learning and self-directed learning (ICTCS).

Validity and Reliability

Exploratory factor analysis (EFA) was used to clarify the structure of the teachers' perception of their professional proficiency based on the obtained survey data. Suitability of the data for the factor analysis was first confirmed through Kaiser-Meyer-Olkin (KMO) test (KMO value of .97, .97 and .96 for each section) and Bartlett's Test of Sphericity ($p < .001$). Items with a factor loading of less than 0.5 were subject to deletion from the item pool. Additionally, Cronbach's alpha values were estimated to confirm the reliability of the overall instrument and each item. After the EFA with the principal component analysis and Varimax rotation with Kaiser normalization, 5 items were eliminated due to low factor loadings. The retained items in each section of the survey are provided in Appendices 1–3.

On the whole, the survey used in this study revealed acceptably high alpha reliability coefficients (Thompson & Daniel, 1996) for all items. The scales, hence, were considered to be sufficiently reliable for assessing the CL teachers' professional proficiency. In addition to data source triangulation, two members of our team checked the transcripts and coded the qualitative data for the validation of the study.

Results

Teachers' background in this study was investigated by considering school types, school levels, teachers' age and teaching experience. To investigate whether local CL teachers with different backgrounds vary in their professional proficiency, one-way ANOVAs were performed with these four independent variables, respectively.

The one-way ANOVA results showed that there was no significant difference in each scale among the teachers from different school types (Appendix 4). Such results indicate that CL teachers' professional proficiency at different school types is fair. In the following sections, we will focus on presenting the relation of school levels, teachers' age and teaching experience to Chinese teachers' professional proficiency. Nevertheless, based on the FGD data, it is worth noting that traditions, administrative arrangement or mission of a school affected how teachers perceived their work and how they interacted professionally among themselves.

Table 3
One-way ANOVA Results by Teaching Experience

Factors	<i>df</i>	<i>MS</i>	<i>F</i>	<i>Sig.</i>	η^2
KPC	4	9.70	12.71	.000**	.047
KCL	4	3.36	4.20	.002**	.016
KCR	4	26.54	31.25	.000**	.107
KC	4	7.41	8.48	.000**	.032
KA	4	8.68	10.19	.000**	.038
KR	4	19.45	14.25	.000**	.052

Looking at the results of one-way ANOVAs with the independent variables: "school levels" and "teachers' age" (shown in Appendix 5 and Appendix 6), certain statistically significant differences among teachers' professional proficiency could be found. Yet, since the effect size values of them were too low, we had to indicate that though teachers from different school levels and in different age groups varied in their professional proficiency, the effects of school levels and teachers' age on their knowledge and skills were not strong. Therefore, in this report, only the one-way ANOVAs for teaching experience, by which significant differences among teachers were found with large effect size, were elucidated (Table 3). Besides, means and standard deviations for all values were discussed to explore and identify the specific strengths or weaknesses of teachers at different school levels, age, or years of teaching.

In response to the open-ended questions in the survey, teachers were asked to indicate all the topics in which they felt that further training was needed. We quantified these sections of qualitative data and combined them with qualitative FGD and interview data to provide insights into training needs for CL teachers.

Teachers' Background and "Subject Content and Professional Knowledge"

The descriptive statistics for subject content and professional knowledge varied due to school levels (Table 4). Except for primary school teachers' perception towards research knowledge ($M=4.96$, $SD=1.20$), the mean score for each factor was above 5.00, indicating that teachers perceived themselves to have an above medium level of

knowledge. In general, primary school teachers had a lower self-rated score than secondary school teachers and junior college teachers, particularly in areas such as pedagogical content knowledge (KPC), Chinese language knowledge (KCL) and Chinese culture knowledge (KC). There was not much difference between secondary school and junior college teachers.

Table 4
Descriptive Statistics of Subject Content and Professional Knowledge by School Level

Factors	Primary (n=626)		Secondary (n=340)		Junior college (n=78)	
	Mean	SD	Mean	SD	Mean	SD
KPC	5.38	.88	5.59	.90	5.64	.85
KCL	5.78	.89	6.00	.92	5.80	.85
KCR	5.48	.97	5.51	.99	5.62	.90
KC	5.47	.95	5.83	.90	5.75	.99
KA	5.43	.92	5.50	.96	5.44	.96
KR	4.96	1.20	5.06	1.21	5.01	1.13

As shown in Table 5, teachers' subject content and professional knowledge increased as their age increased, but not for the teachers aged above 50. In that age group, most of teachers' self-rated item scores were lower than the scores from teachers aged between 41 and 50. There is no surprise the means for teachers' self-rated scores consistently increased as their years of teaching increased (Table 6), but the mean of research knowledge (KR) was an exception.

Table 5
Descriptive Statistics of Subject Content and Professional Knowledge by Age

Factors	21-30 (n=237)		31-40 (n=365)		41-50 (n=271)		Above 50 (n=171)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
KPC	5.28	.94	5.44	.86	5.60	.86	5.60	.89
KCL	5.70	.96	5.83	.92	5.95	.80	5.88	.89
KCR	5.10	1.01	5.51	.91	5.68	.93	5.75	.93
KC	5.42	.97	5.50	.97	5.75	.88	5.86	.98
KA	5.25	.99	5.44	.87	5.61	.93	5.50	.98
KR	4.68	1.22	5.05	1.08	5.22	1.19	4.96	1.32

Table 6
Descriptive Statistics of Subject Content and Professional Knowledge by Teaching Experience

Factors	0-2 (n=126)		3-5 (n=200)		6-10 (n=287)		11-30 (n=356)		Above 30 (n=75)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
KPC	5.00	.93	5.47	.85	5.47	.86	5.57	.89	5.77	.81
KCL	5.61	1.01	5.79	.86	5.80	.91	5.94	.87	6.02	.84
KCR	4.77	1.01	5.34	.87	5.52	.92	5.73	.93	5.95	.85
KC	5.29	.98	5.50	.95	5.57	.95	5.73	.91	6.00	.84
KA	5.00	.97	5.41	.89	5.48	.92	5.57	.95	5.66	.82
KR	4.35	1.27	4.86	1.07	5.06	1.10	5.22	1.21	5.12	1.26

Regarding KR, teachers with more than 30 years of teaching experience showed lower score than teachers with the experience of 11–30 years. As shown in Table 3, the means for KR were comparatively lower than the means of other factors regardless of school levels or teaching experience. These results suggest that there is room to improve in this area, in particular. Teachers' responses in the FGD and interview also supported this finding. However, it is worth noting that while teachers seemed to be less confident in KR, training regarding this topic was the least demanded according to the quantified data from the open-ended question (Figure 1).

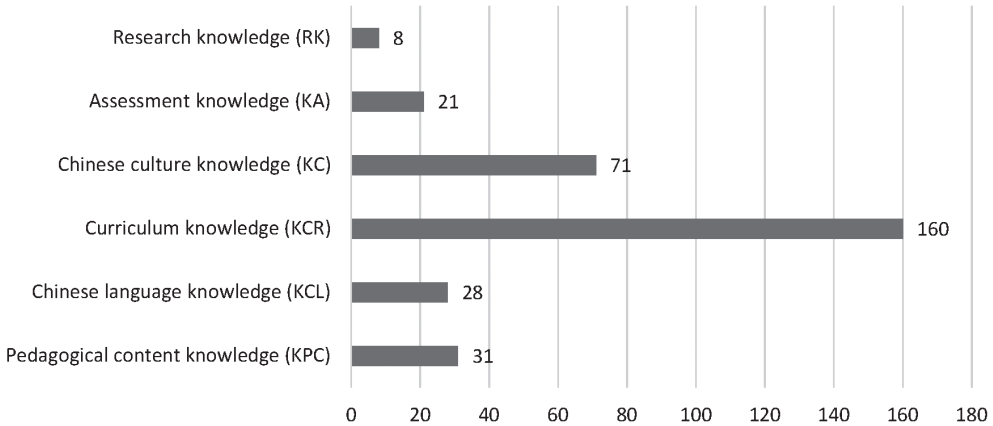


Figure 1. Training needs regarding subject content and professional knowledge

Additionally, the one-way ANOVA results indicated that there were statistical differences by teaching experience in all factors (Table 3). Significant effect of teaching experience was found on teachers' curricular knowledge (KCR), $F(4, 1039) = 31.25$, $p < .01$, with large effect size ($\eta^2 = .107$). Post hoc comparisons using the LSD test further revealed that the mean score for teachers' KCR consistently increased as their years of teaching increased. Significant differences could be found among teachers in all the subgroups, except for teachers with teaching experience between 11–30 years and above 30. Meanwhile, the FGD and interview data revealed that not only the beginning teachers but also the teachers with a rich teaching experience highlighted the importance and necessity of training in KCR, particularly when they were required to implement a new national curriculum. This finding is consistent with their response to the open-ended question in the survey. 15.33% of teachers explicitly expressed that they needed further training in curricular knowledge. As shown in Fig. 1, this topic was in high demand as well. Therefore, the finding suggests the necessity of constant curriculum knowledge training regardless of teaching specialty.

Teachers' Background and "Chinese Teaching Practice and Pedagogy"

Looking at teachers' self-rated scores for Chinese teaching practice and pedagogy, primary school teachers tended to be less confident than secondary and junior college teachers. The same as the results about teachers' subject content and professional knowledge, no much difference could be found between secondary and junior college teachers (Table 7).

Table 7
Descriptive Statistics of Chinese Teaching Practice and Pedagogy by School Level

Factors	Primary (n=626)		Secondary (n=340)		Junior college (n=78)	
	Mean	SD	Mean	SD	Mean	SD
PCM	5.77	.92	5.82	.88	5.84	.93
PCPD	5.55	.93	5.70	.91	5.74	.93
PPD	5.53	.91	5.61	.90	5.65	.90
PLA	5.65	.90	5.86	.82	5.78	.94
PPR	5.30	1.11	5.51	.98	5.31	1.16

As shown in Table 8, the mean of teachers' self-rated scores increased as their age increased, but not for the teachers aged above 50. Similarly, the means increased as teachers' teaching years increased (Table 9). Teachers' first ten years of teaching were found to be the prime time for enhancing their proficiency of teaching practice and pedagogy.

Table 8
Descriptive Statistics of Chinese Teaching Practice and Pedagogy by Age

Factors	21-30 (n=237)		31-40 (n=365)		41-50 (n=271)		Above 50 (n=171)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PCM	5.43	.93	5.79	.88	5.97	.81	6.00	.92
PCPD	5.32	1.00	5.62	.88	5.81	.83	5.71	.95
PPD	5.25	1.00	5.56	.84	5.77	.84	5.67	.89
PLA	5.47	.96	5.69	.86	5.92	.78	5.88	.86
PPR	5.14	1.07	5.40	1.01	5.56	.99	5.31	1.26

Table 9
Descriptive Statistics of Chinese Teaching Practice and Pedagogy by Teaching Experience

Factors	0-2 (n=126)		3-5 (n=200)		6-10 (n=287)		11-30 (n=356)		Above 30 (n=78)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PCM	5.23	.95	5.61	.80	5.83	.89	5.98	.86	6.15	.87
PCPD	5.04	1.01	5.51	.84	5.65	.86	5.80	.92	5.84	.85
PPD	5.05	1.00	5.41	.85	5.59	.89	5.76	.85	5.77	.84
PLA	5.24	.95	5.64	.87	5.74	.83	5.80	.95	5.94	.80
PPR	4.91	1.14	5.29	1.01	5.47	.95	5.48	1.09	5.40	1.31

Besides, the results shown in Tables 4-9 indicated that the means for self-rated research knowledge (RK) were lower than those for competency of pedagogical research (PPR). Such results suggest that teachers' basic knowledge about doing educational research was not solid enough, though they might have experiences in doing action research or lesson study. The FGD and interview data can help explain the reasons behind it. Episode 1 was extracted from the interview data about a young CL teacher of a secondary school, who had 4 years of teaching experience. According to her, although she had experiences of doing research, without her own initiative motivation she did not feel that she could benefit a lot from it. A primary school teacher with 7 years of

teaching experience also expressed her concerns about doing research regarding the lack of adequate time and Chinese literature (Episode 2).

Episode 1: Everyone is busy. When we are doing a research report, everything needs to be repeated over and over again, including preparing the materials, discussing and selecting the research topic, the intervention etc. Therefore, despite of getting the benefits from our research work, the holistic things that we need to do have already made us frustrated. Lastly, it looks like doing the task for the sake of doing and the meaning of doing it has been lost.

Episode 2: Literature about action research or lesson study is mainly in English. We need to digest it, but we are used to digest materials in Chinese. Besides, we have to present the findings in English. In fact, this would be a problem for us, because we did not want to make the things so complicated. ...

It will not be a problem for us to know the process of action research or lesson study; it still seems little unrealistic to us, because we have no time to do research.

Episode 3 is extracted from a primary school lead teacher's interview data, in which the teacher (at the age of 41–50 with 23 years of teaching experience) highlighted the importance of collaboration among teachers while doing research.

Episode 3: Actually, I have done action research with a lot of schools. From my observation, most of the CL teachers are always under heavy workloads, so I will suggest adopting a cooperative model. Teachers can group by themselves to do action research. Maybe, I can handle this and you can do the other stuff. We will get our learning during this process. After practice over and over again, everyone will know how to do it, and then you will be able to do it by yourself. We are trying this approach in our school now.

The one-way ANOVAs indicated that there were statistical differences by teaching experience in Chinese teaching practice and pedagogy (Table 10). For those factors by which the assumptions of sphericity and homogeneity of variances were violated, Kruskal-Wallis tests were conducted and the results also revealed that there were statistical differences between groups in regard to classroom management (PCM), $\chi^2(4, 1031) = 101.49, p < .01$; and learning assessment (PLA), $\chi^2(4, 1044) = 58.35, p < .01$.

The results showed there were significant effects of teaching experience on teachers' self-reported proficiency. Significant effect of teaching experience was found on teachers' content-based pedagogical design (PCPD), $F(4, 1039) = 19.00, p < .01$, with effect size ($\eta^2 = .068$); and pedagogical design (PPD), $F(4, 1039) = 18.28, p < .01$, with effect size ($\eta^2 = .066$).

Table 10
One-way ANOVA Results by Teaching Experience Variable

Factors	df	MS	F	Sig.	η^2
PCPD	4	15.23	19.00	.000**	.068
PPD	4	14.12	18.29	.000**	.066
PPR	4	8.84	7.85	.000**	.029

Note. df = degrees of freedom, * $p < .05$, ** $p < .01$

The factors by which the assumptions of sphericity and homogeneity of variances were violated were not included.

The LSD test results further revealed that the means in regard to teachers' PCPD and PPD were significantly different among teachers in all the subgroups, but not for teachers with teaching experience between 11–30 years and above 30. It indicated that constant in-serve training about (content-based) pedagogical design for teachers with less than 10 years of teaching experience was still necessary. As shown in Fig. 2, data from the open-ended question supported the need of training in these areas as well. This finding is consistent with what we found in FGD and interviews. Considering CL students have different starting points in Singapore, our teachers highlighted the importance and the need of training about differentiated instruction in CL teaching.

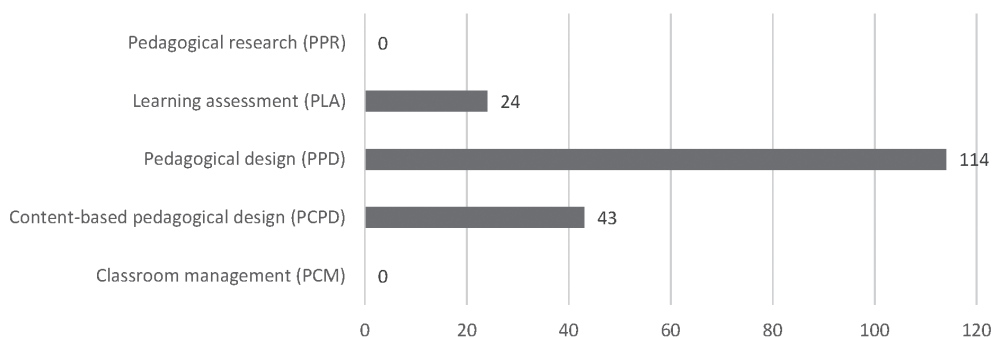


Figure 2. Training needs regarding Chinese teaching practice and pedagogy

Besides, according to the FGD and interview data, novice teachers seemed to have a lack of confidence in classroom management (PCM), in general, and learning assessment (PLA), in particular. However, there was no teacher who mentioned that he or she needed training about classroom management and not many teachers mentioned learning assessment in response to the open-ended survey question (Figure 2). Some reasons behind this inconsistency can be explained by the FGD and interview data. Novice CL teachers said that they would like to get guidance from expert teachers or to observe expert teachers' teaching, and in this way to improve their competency of assessment and classroom management. In other words, compared with traditional training they would like to improve their knowledge and skills in these areas in the workplace.

Meanwhile, the qualitative data noted that although CL teachers seemed familiar with the term "formative assessment", they still had no clear idea about how to align assessment with the goal of promoting learning. When talking about assessment, their major concern was still how to design examination items. It suggested that training for the design of new assessment items was still needed to support teachers in implementing a new curriculum and assessment for sustainable education.

Teachers' Background and "Knowledge of Technology and Its Application"

Regarding teachers' knowledge of technology and its application, secondary school teachers' advantages were not quite obvious compared with primary school teachers (Table 11). The lowest scores were found by junior college teachers (Table 11). The interview data helped explain the reason why. Junior college teachers less frequently

used technology than primary or secondary school teachers, mainly due to the short term of learning (only 2 years) and the pressure of national standard examinations.

Table 11
Descriptive Statistics of Knowledge of Technology and Its Application by School Level

Factors	Primary (n=626)		Secondary (n=340)		Junior college (n=78)	
	Mean	SD	Mean	SD	Mean	SD
ICTR	5.53	.99	5.63	.89	5.38	.96
ICTI	5.26	1.01	5.37	1.00	5.21	.98
ICTCS	5.18	1.08	5.33	1.06	5.12	1.00

Table 12 shows the descriptive statistics of teachers’ knowledge of technology and its application by age. It is worth highlighting that we usually think young teachers are more tech-savvy. Some teachers also mentioned this point in their interview. However, the questionnaire results revealed that teachers aged between 41 and 50, most confident with their subject content and professional knowledge and Chinese teaching practice and pedagogy, were more positive about using ICT resources for assisting/improving the Chinese language learning than teachers at other age groups.

Table 12
Descriptive Statistics of Knowledge of Technology and Its Application by Age

Factors	21–30 (n=237)		31–40 (n=365)		41–50 (n=271)		Above 50 (n=171)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
ICTR	5.50	.99	5.55	.88	5.64	.94	5.51	1.08
ICTI	5.28	1.03	5.34	.87	5.37	1.02	5.09	1.19
ICTCS	5.23	1.06	5.32	.92	5.31	1.07	4.90	1.30

When CL teachers responded to questions about the challenges in implementing ICT lessons, the most common answers were still a lack of time or logistics issue. Meanwhile, our data indicated that the effectiveness of the use of ICT in strengthening CL teaching had been well and widely acknowledged by teachers. Figure 3 shows that 14.36 % of respondents identified “ICT resources for improving Chinese teaching and learning” as being current training needs.

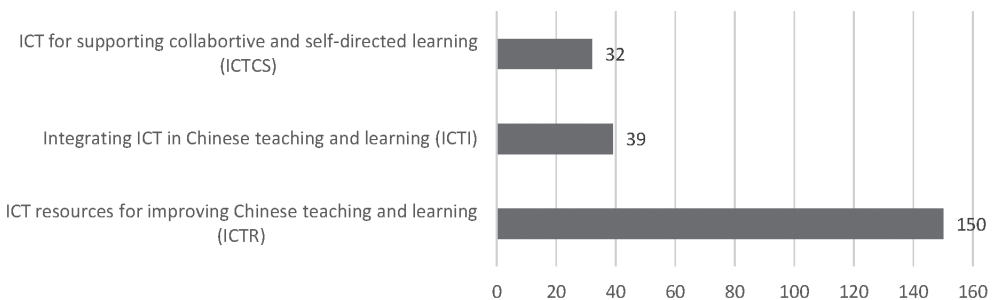


Figure 3. Training needs regarding knowledge of technology and its application

Although the one-way ANOVAs revealed statistically significant differences in regard to ICT knowledge and applications among teachers with different years in service (Table 13), the effect of service years on teachers' ICT knowledge and application was not powerful.

Table 13
One-way ANOVA Result by Teaching Experience Variable

Factors	<i>df</i>	<i>MS</i>	<i>F</i>	<i>Sig.</i>	η^2
ICTR	4	2.88	3.18	.013*	.012
ICTI	4	5.19	5.21	.000**	.020
ICTCS	4	6.63	5.90	.000**	.022

Table 14
Descriptive Statistics of Knowledge of Technology and Its Application by Teaching Experience

Factors	0-2 (n=126)		3-5 (n=200)		6-10 (n=287)		11-30 (n=356)		Above 30 (n=78)	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
ICTR	5.28	1.00	5.60	.89	5.62	.94	5.57	.96	5.57	1.04
ICTI	4.95	1.06	5.40	.89	5.38	.97	5.31	1.02	5.17	1.16
ICTCS	4.90	1.10	5.38	.92	5.35	1.01	5.21	1.12	5.01	1.22

As shown in Table 14, the means for ICT facilitating collaborative and self-directed learning were particularly low. In line with this finding, some teachers explicitly mentioned that they had no idea of how to make the use of ICT to facilitate collaborative learning and self-directed learning, and further training in this topic for CL teaching should be provided. Meanwhile, the FGD and interview data showed us that a number of teachers had an open mind towards training approaches. They would like to experience online training course by themselves, and in that way to have a deeper understanding of using technologies for enabling self-directed learning and collaborative learning.

Discussion

The aim of the present paper has been to learn more about teachers' professional proficiency and training needs, and on that basis to suggest the forms and priorities of training for in-service teachers to become a powerful agent of sustainable teaching. Four suggestions proposed based on the results are discussed below.

Teachers Reported above Medium Confidence in Proficiency and the Proficiency Difference due to School Levels but not due to School Types: Preparing More Training for Primary School Teachers

The mean score of teachers' perception towards each factor was approximately or above 5.00, indicating that most teachers felt confident, in general, in their professional proficiency. The results also indicated the fair distribution of CL teachers in Singapore. That means CL teachers from different school types have no significant difference in

knowledge and competency. Yet, the results further revealed that primary school teachers needed more support than teachers from secondary schools or junior colleges, particularly in the areas such as CL knowledge, Chinese culture knowledge, content related pedagogical knowledge and design. This may be because most of the CL teachers at the secondary level or junior college have an undergraduate background about the Chinese language, but in Singapore primary CL teachers have diverse educational backgrounds.

Teachers Said They Needed Continued and Persistent Training on Curricular Knowledge, Pedagogical Design and the Use of ICT for CL Teaching and Learning: Customising Training Sequence

In Singapore, teachers are required to design school-based curriculum, use innovative teaching approaches or take use of new technology to empower CL teaching. Therefore, it is not surprising to find a great need for in-service training in these areas among all the teachers regardless of their age, experience or teaching levels, including those experienced teachers who have given a comparatively high rating to their professional proficiency. Noting teachers' diverse backgrounds and capabilities of using ICT, we recommend developing the appropriate training sequence and customising it to teachers. For example, for non-tech-savvy teachers, we can design training sessions to help them experience and get familiar with the functions of ICT tools or Apps, and in this process to understand the pedagogical affordances of tools. For tech-savvy teachers, training can proceed from the need of specific teaching content and the approaches of activity enactment.

Beginning Teachers Needed More Support from the Experienced Teachers, Particularly in Classroom Management and Learning Assessment: Encouraging Collaboration and Leveraging ICT to Provide Follow-up Guidance

According to Morant's stage theory (1981), in-service teacher education programme should take into account the experience of teachers. The results of this study confirmed that the difference of teachers in perception of their current knowledge and competencies is related to teaching experience. Our data also evidenced that experienced CL teachers felt more confident about their knowledge and competency than CL teachers in the early teaching years. Initial teaching stage has been well recognised as a particular and pivotal stage of teacher learning. Teachers in early years often feel unprepared for classroom management challenges and consistently rate classroom behaviour as a top reason for leaving the profession (Ingesoll, 2001). In our study, while most beginning CL teachers felt well prepared for the teaching content, they were less confident in classroom management and learning assessment.

Rather than a didactic approach, collaborative and interactive partnership or training activities were welcome by our interviewed teachers. To improve proficiency regarding classroom management and learning assessment, informal workplace learning should be emphasised compared to formal training. Beyond formal training, informal workplace learning or feedback through collaborative learning is an important mechanism for fostering teacher professional development (Bayrakc, 2009; OECD, 2014). Using existing collaboration platforms such as Professional Learning Communities to enhance teaching has been mentioned in Singapore government's Mother Tongue Languages Review

Committee Report (2010). Therefore, strategies about facilitating professional communication among teachers need to be further integrated to teachers' training.

Collaborative approaches should be employed to examine and analyse teaching activities. When a training activity is followed by opportunities for practice and feedback, it will result in the best involvement by teachers (Duke, 1986; TALIS, 2013). We suggest providing follow-up communication and guidance for teachers after they attend one-time workshop or training days to assist them in integrating the new ideas or strategies into daily instruction.

Moreover, several researchers have pointed out that ICT can be an extremely useful tool for feedback while and after training activities (Morrison, Carlton, Henk, & Thornburg, 2007). To fit teachers' busy schedules and draw upon powerful resources that are often not available locally, the benefits of online training for in-service teachers have been widely discussed (Pape, Prosser, Griffin, Dana, Algina, & Bae, 2015; Whitehouse, Breit, McCloskey, Ketelhut, & Dede, 2006). In our study, some teachers also expressed their desire for experiencing online training or online networked learning, and they hoped in this way to have a better understanding of greater use of social technologies for self-directed and collaborative learning. Except for existing collaboration platforms, more web-based applications or online learning communities focusing on specific topics can be designed and organised to offer persistent teacher professional development.

Gaps between Teachers' Perception of Proficiency and Training Needs: Assisting Teachers to Understand the Theory behind Practice

Neither the analysis of the teacher proficiency nor of their perceived training needs is adequate to design an appropriate curriculum for in-service teacher education (Fok, Chan, Sin, Ng, & Yeung, 2005). Therefore, we took teachers' perceived capacities and needs into account as we put forward training recommendations in our study. The message from teachers regarding training needs was clear that training activities planned with sufficient relevance to particular classroom practices were in high demand. As shown in the data, although most teachers felt less confident in action research methods, they did not think additional training in this area was needed. In their own opinions, teaching practice had taken up too much their time and energy, and, hence, they seemed reluctant to perform action research or lesson study. From the viewpoints of teacher education researchers, however, analysing and reflecting on practice area valuable way to improve teaching and promote student learning; the paradigm of teachers' professional development should move to lifelong learning (Fraser, 2007; Friedman & Philips, 2004), and action research as a form of practitioner research encourages teachers to become lifelong learners (Pipere, Veisson, & Salite, 2015; Sowa, 2009).

Superficially, there is a dilemma between teaching and doing research. Teachers and teacher education researchers are apt to view things from their own stances. Fundamentally, maybe it is due to a lack of sufficient theoretical knowledge. As found in our study, a large part of the participants had no clear understanding of the conceptual or theoretical knowledge about action research, lesson study, or even assessment for learning, though these terms were not strange to them. Our results indirectly reflected that the effort of education reforms for catering 21st century learning had been working well, as teachers have had a strong awareness of implementing collaborative learning, self-directed learning or assessment for learning. Yet, to do it well, more support and efforts are still needed.

Therefore, our central claim is that teacher training should place more emphasis on the theoretical and research background that is necessary for quality teaching and learning. For sustainable development, the training for teachers should focus not only on improving existing practice, but also on assisting teachers to understand what they are doing and how to do well, based on independently made professional judgements.

Conclusion

Based on the analysis of both teachers' proficiency and their perceived needs, the present study has provided insight into the professional proficiency among CL in-service teachers with diverse backgrounds in Singapore. The findings can shed light on shaping the forms and priorities of in-service training for teachers in other subjects as well.

The findings were drawn according to the perception-based nature of the data. However, self-report measures have been criticised for assessing confidence rather than actual proficiency (Lawless & Pellegrino, 2007), so the perception-based data may not provide accurate value of teachers' proficiency. The study has provided insight into the trend of training needs. However, teachers' professional proficiency still needs to be further validated with classroom observation. Further research is needed to explore in which mode online and face-to-face professional development can be provided for teachers to improve the effectiveness, or what strategies can be addressed to help build up professional learning communities for effective and persistent learning.

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Appendix 1

Results of Exploratory Factor Analysis _ Section 1 (n=1044)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1: Pedagogical content knowledge, $\alpha=.97$, Mean= 5.47, SD = .89						
K20	.792					
K19	.789					
K21	.786					
K22	.782					
K13	.629					
K17	.627					
K12	.625					
K18	.590					
K15	.588					
Factor 2: Chinese language knowledge, $\alpha=.97$, Mean=5.84, SD =. 90						
K7		.827				
K6		.812				
K9		.808				
K8		.790				
K10		.704				
Factor 3: Curricular knowledge, $\alpha=.92$, Mean=5.50, SD =.97						
K4			.840			
K5			.834			
K3			.656			
K2			.644			
K1			.631			
Factor 4: Chinese culture knowledge, $\alpha=.90$, Mean=5.60, SD =.95						
K30				.811		
K31				.739		
K29				.718		
K28				.709		
Factor 5: Assessment knowledge, $\alpha=.95$, Mean=5.45, SD =.94						
K24					.677	
K25					.650	
K23					.625	

Sequel to Appendix 1 see on the next page.

Sequel to Appendix 1.

Factor 6: Research knowledge, $\alpha=.87$, Mean=5.00, SD =1.2						
K27						.796
K26						.777
Percentage of variance	21.50 %	19.40 %	14.06 %	12.43 %	8.61 %	7.75 %
Overall $\alpha= .98$ Total variance explained was 83.75 %						

Appendix 2

Results of Exploratory Factor Analysis _ Section 2 (n=1044)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1: Classroom management, $\alpha=.97$, Mean=5.79, SD =.91					
P16.	.810				
P15.	.801				
P18.	.797				
P19.	.797				
P17.	.779				
Factor 2: Content-based Pedagogical design, $\alpha=.96$, Mean=5.61, SD =.93					
P4.		.758			
P6.		.752			
P3.		.739			
P5.		.727			
P2.		.723			
P1.		.647			
Factor 3: Pedagogical design, $\alpha=.92$, Mean=5.56, SD =.91					
P7.			.727		
P8.			.661		
P11.			.560		
P9.			.517		
Factor 4: Learning Assessment, $\alpha=.93$, Mean=5.73, SD =.88					
P13.				.670	
P12.				.665	
P14.				.598	
Factor 5: Pedagogical research, $\alpha=.89$, Mean=5.37, SD =1.08					
P22.					.830
P21.					.754
Percentage of variance	25.36 %	24.60 %	13.31 %	12.10 %	11.42 %
Overall $\alpha=.98$ Total variance explained was 86.78 %					

Appendix 3

Results of Exploratory Factor Analysis _ Section 3 (n=1044)

	Factor 1	Factor 2	Factor 3
Factor 1: ICT for supporting collaborative & self-directed learning, $\alpha=.98$, Mean=5.23, SD =1.07			
T12.	.797		
T13.	.795		
T14.	.794		
T11.	.783		
T10.	.778		
Factor 2: ICT for improving Chinese teaching & learning, $\alpha=.95$, Mean=5.55, SD =.96			
T1.		.844	
T4.		.804	
T2.		.796	
T3.		.780	
Factor 3: Integrating ICT in Chinese teaching and learning, $\alpha=.97$, Mean=5.29, SD =1.01			
T8.			.750
T7.			.745
T9.			.683
T6.			.626
T5.			.605
Percentage of variance	33.91 %	31.38 %	25.49 %
Overall $\alpha=.98$ Total variance explained was 90.78 %			

Appendix 4

One-way ANOVA with “School Types” as the Independent Variable

Factors	df	MS	F	Sig.
KPC	2	.62	.79	.46
KCL	2	.58	.72	.49
KCR	2	.34	.36	.70
KC	2	2.21	2.47	.09
KA	2	.15	.17	.85
KR	2	1.16	.81	.45
PCM	2	.40	.48	.62
PCPD	2	.67	.78	.46
PPD	2	.47	.58	.56
PLA	2	.70	.91	.40
PPR	2	1.52	1.31	.27
ICTR	2	.05	.05	.95
ICTI	2	.47	.47	.63
ICTCS	2	1.11	.97	.38

Note. *df* = degrees of freedom, **p*< .05, ***p*< .01

Appendix 5

One-way ANOVA with "School Levels" as the Independent Variable

Factors	<i>df</i>	<i>MS</i>	<i>F</i>	<i>Sig.</i>	η^2
KPC	2	5.70	7.24	.001**	.014
KCL	2	3.71	4.62	.010*	.009
KCR	2	.72	.76	.470	
KC	2	15.02	17.23	.000**	.033
KA	2	.58	.66	.516	
KR	2	1.12	.78	.457	
PCM	2	.41	.50	.607	
PCPD	2	3.02	3.55	.029*	.007
PPD	2	1.11	1.35	.261	
PLA	2	4.76	6.20	.002**	.012
ICTR	2	2.27	2.49	.084	
ICTI	2	1.54	1.53	.217	
ICTCS	2	2.35	2.06	.128	

Note. *df* = degrees of freedom, **p* < .05, ***p* < .01

Appendix 6

One-way ANOVA with "Teachers' Age" as the Independent Variable

Factors	<i>df</i>	<i>MS</i>	<i>F</i>	<i>Sig.</i>	η^2
KPC	3	5.44	6.94	.000**	.020
KCL	3	2.74	3.42	.017*	.009
KCR	3	19.18	21.42	.000**	.010
KC	3	9.68	11.08	.000**	.031
KA	3	5.50	6.34	.000**	.018
ICTR	3	1.04	1.14	.333	

Note. *df* = degrees of freedom, **p* < .05, ***p* < .01