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# Unlocking Vital Professional Skills of EFL Educators to Cultivate Student English Core Competencies in the Digital Era



**Abstract:** - With the rapid development of artificial intelligence (AI) technology, the education sector has witnessed transformative changes. In the domain of secondary English language teaching, the advent and implementation of intelligent teaching systems have necessitated a reevaluation of Teacher Professional Competency (TPC). However, there is limited research exploring English as a Foreign Language (EFL) teachers' perspectives on the TPCs required for fostering student English core competencies in the era of AI. This study aimed to investigate the need for relevant TPCs among English teachers. A sample of 1089 English teachers from 335 schools across China participated in this research. The findings identified a total of 12 TPCs, with variations observed based on gender, years of teaching experience, school type, school level, and school location. Notably, Teaching Design Competency (TDC), English Knowledge and Application Competency (EKAC), and Teaching Implementation and Management Competency (TIMC) were identified as the most crucial TPCs. These results provide valuable insights into the components of EFL teacher professional competencies and offer guidance for competency-based teacher digital education programs.

**Keywords:** AI, EFL, Core Competencies, Teacher Competency, Digital Era.

## I. INTRODUCTION

Artificial intelligence (AI) technology has advanced rapidly, profoundly transforming education. Intelligent tutoring systems (ITSs), as the driver of this change, provide personalized, efficient learning for students while offering unprecedented instructional support for teachers [1]. Their advantages are mainly reflected in teaching pronunciation and increasing student fluency [2, 3] translation, and automated writing evaluation [4], spoken English practice [5], reading and writing [6]. Besides, benefits include giving online resources [7, 8] and assessment [9, 10]. Such technologies can help teachers enhance personalized learning through monitoring student progress and needs, and perform tasks like automatically providing feedback, self-diagnosis, and promoting online collaboration among learners [11]. However, teachers face challenges brought by AI technologies while benefiting from AI technologies. While language educators recognize the potential benefits of AI in language learning, they need to skillfully employ AI and ITSs [12]. Considerations around data quality, accuracy, completeness, consistency, timeliness and relevance of data used or generated by AI are also important. Ethical issues arising from AI technologies, such as privacy and data biases, require attention as well [4, 13]. In this situation, it is evident that traditional teaching concepts and methods alone can no longer fully meet the instructional needs of the new situation [14]. Teachers serve not only as knowledge transmitters but also language learning facilitators [9]. This has led some to worry about whether teachers' roles may be replaced by AI [15].

AI is revolutionizing teaching mode and methods and the ways of evaluation, etc. However, fully realizing AI's capabilities still requires refining how we integrate these tools into the classroom in an impactful way. Much exciting work remains to be done [16]. Therefore, teachers are expected to be digitally competent [17], dealing with the new instructional challenges related to technology [12]. For instance, teachers need to acquire both technology proficiency and pedagogical compatibility for language-teaching. In terms of mastery of technology, teachers need to learn to skillfully employ appropriate AI-driven technologies, including adaptive learning systems and intelligent agents, to facilitate daily management and instructional practices [18]. Further suggested a framework of core AI competencies for teachers, comprising skills such as utilizing basic AI tools, managing digital information, developing AI-enhanced learning materials, and facilitating student connectivity through educational technology. However, these competencies do not come naturally nor can teachers attain them through individual effort alone. Relevant and practical professional learning opportunities are needed to help teachers integrate emerging technologies meaningfully into their practice. Administrative leadership and technical expertise and

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resources must also be provided to establish a culture of collaborative experimentation and innovation [17]. However, studies show such support has been lacking while teachers desire further training to proficiently incorporate AI tools [19]. Reported Saudi instructors received inadequate preparation for online strategies. A survey of 140 Estonian K-12 educators also revealed limited familiarity with AI's practical classroom applications despite its transformative potential [20]. Likewise, [21] found a need for additional professional development on effective integration into practices. Therefore, providing teacher trainings or teacher technology assistants to the teachers who are still lacking in technological knowledge might fill the gap [15].

The Modernization of Education in China 2035 plan advocates leveraging modern technologies to accelerate reforms in talent cultivation models and achieve organic integration of mass education and personalized development [22]. Meanwhile, the Core Competencies and Values for Chinese Student Development framework shifts the focus from mere knowledge acquisition and exam scores to nurturing students' creative, problem-solving and critical thinking abilities under digital and intelligent conditions [23]. Issued in 2018, the General Senior High School English Curriculum Standards highlights English Core Competencies, including language ability, learning ability, thinking capacity and cultural awareness through digitalizing teaching spaces and times, optimizing students' learning approaches, and precisely conducting teaching evaluations [24]. The integration of AI in educational settings has triggered a re-examination of the competencies required of English teachers. Past research provides useful initial perspectives on teachers' needs with AI integration. However, few studies have empirically examined the specific competencies of EFL instructors from their first-hand experiences on the ground [25, 26].

Historically, TPCs have been defined in literature as consisting of professional knowledge [27], a combination of knowledge, skills, and attitudes [28], and observable behaviors that synthesize educational concepts, knowledge, skills, and attitudes [29]. Within this framework, English language teachers require a diverse set of practice-oriented competencies. These include classroom management, instruction, assessment, technology, reflective practice, knowledge integration, educational research and innovation, designing and implementing creative lessons, educational research, information and communication technology, test item construction and intercultural communication [30-32]. Additionally, classifications of TPCs have been proposed, ranging from linguistic to pedagogical to self-development competencies [33-35], with linguistic competency and teaching competency being in the central position [36, 37]. Among them, pedagogical competency and self-development competency are universally recognized as essential for all disciplines. What distinguishes the English subject from other subjects is the unique nature of language proficiency. Therefore, this study takes linguistic competency, pedagogical competency and self-development competency as the three foundational pillars for constructing the specific professional competencies required of English teachers in the AI context. Based on this, the research aims to construct and examine professional competency items in the digital era guided by two questions. One is what professional competencies are needed by secondary school EFL teachers according to their views? Prior research, primarily through surveys, has revealed variations in TPC levels based on demographic factors such as teaching experiences, school locations, and school levels, indicating different TPC needs among teachers [38]. The study reported high competency level, high level of integration technology in teaching and high level of using online assessment. It also found that the only significant difference was in teachers' integration of technology, which varied by gender [39]. Accordingly, this study also focuses on question 2: Is there any difference in the need for professional competencies regarding gender, school type, years of teaching experience, school levels and school locations? This study seeks to fill the gap in empirical research by examining EFL teachers' views on the professional competencies required to develop students' English core competencies in the era of AI, particularly in the Chinese context. Given the government-led campaign for implementing the new curriculum in China and the recent demand for enhancing teacher digital competencies, the current study could offer more definitive evidence on the competencies that are most critical for teachers and inform targeted professional development initiatives for some stakeholders such as curriculum developers and teacher educators and teachers.

## II. METHODS

### A. Participants

An online survey through the Wenjuanxing platform was administered to them during three months in three cities in the north part of Anhui province, using a simple random sampling and stratified sampling [40]. Ultimately, a total of 1261 English teachers from 335 schools filled out the online questionnaire with the piloted samples (n=208) and the formal samples (n=1053). Totally, 33 piloted samples and 139 formal samples were removed respectively due to a certain response across the scale items or filling time less than four minutes. A total of 175 participants were asked to state their perceptions about the need for TPCs. Finally, 1089 responses constated the

final sample. In the formal survey, most of them were females (749, 69%), with 165 males. Specifically, 606 teachers were from junior high schools and 308 teachers from senior high schools; 384 teachers were from rural schools and 530 from urban schools; 596 teachers were from general school and 318 teachers from model schools. There are 56 teachers with 1-3 years of teaching experience, 208 teachers with 4-10 years of teaching experience, 219 teachers with 11-15 years of teaching experience, 432 teachers with over 16 years of teaching experience.

**B. Instrument**

Although an empirically valid and reliable measure of the need for TPCs scale has not yet been developed in the literature, previous studies has provided several TPC classifications available that have included various aspects/relevant items of TPCs (see Table 1). The selection of three factors (CELAC, TC and SDC) and 14 sub-factors was mainly informed by previous teachers' competency classifications. Drawing on the Iceberg Model [41] and Onion Model [42] theories, this study operationally defines competencies as a set of observable behaviors underpinned by a dynamic mix of knowledge, skills, attitudes, values, and personal traits. Accordingly, we developed an initial 118-item scale and EFL teachers rated the items on a five-point Likert scale (1=unnecessary, 2=somewhat unnecessary, 3=somewhat necessary, 4=necessary, 5=very necessary) with higher values indicating higher degree of the need for TPCs. Most items used in this study have not been validated in previous studies, so in the pilot study Exploratory Factor Analysis (EFA) via SPSS 25.0 was conducted to test explore factors for developing the formal scale. Given the well-defined dimensional structure of the scale, a full-scale exploratory factor analysis is not requisite for exploratory purposes [43]. Therefore, we explored the sub-factors of three factors respectively. The results of both the KMO test and bartlett's sphericity test of CELAC (KMO=0.893,  $\chi^2=2103.448$ ,  $df=190$ ,  $p=0.000$ ), TC (KMO= 0.927,  $\chi^2 =8479.695$ ,  $df= 1081$ ,  $p=0.000$ ) and SDC (KMO= 0.918,  $\chi^2 =5099.511$ ,  $df= 435$ ,  $p=0.000$ ) showed that the initial scale meets the requirement of EFA. For EFA, the varimax rotation was used to analyze item loadings to verify whether each factor of the scale was valid.

Table 1: Three Factors and 14 Sub-factors

Factors (competencies)	Sub-factors (sub-competencies)	Definition	Sample items	References
Comprehensive English language application competency (CELAC)	Linguistic competency (LC)	Ability to express ideas and communicate verbally and critically in the target language	Master a solid knowledge of English phonetics, vocabulary, grammar, discourse and pragmatics	[35]
	Intercultural communicative competency (ICC)	Ability to communicate with English native speakers or English as a second langue speakers interculturally	Master conversation strategies in English, expressing personal opinions, feelings, and idea	[35]
	English cognition competency (ECC)	Ability to process, store, and retrieve information about the English language	Comprehend the cognition of the new English curriculum reform, such as the whole concept unit teaching	[44]
Teaching competency (TC)	Teaching design competency (TDC)	Ability to design lesson plans before class	Design teaching objectives	[32]
	Teaching implementation competency (TIC)	Ability to perform teaching steps in classrooms, solving specific teaching problems and achieving teaching objectives	Ask questions and respond appropriately to students' questions and answers	[45]
	Classroom organization and management competency (COMC)	Ability to attract students to actively participate in classroom activities by coordinating various interpersonal relationships in classrooms	Maintain order in classroom	[46]
	Classroom communication and cooperation competency (CCCC)	Communication between teachers and students, students and students on the explored learning issues for the completion of the task	Encourage students to participate in class activities	[47]
	Curriculum resource development and utilization competency (CRDUC)	Ability to utilize and develop curriculum resources	Utilize off-campus resources, such as community, family, society, and interpersonal communication	[48]
	Information and communication technology competency (ICTC)	Ability to use information technology and multimedia to serve teaching and students' learning	Utilize teaching resources from the internet	[49]
	Assessment competency (AC)	Ability to evaluate students' learning activities and their learning results	Master a knowledge of assessment, such as test function, reliability, validity, difficulty and discrimination	[29]
Self-development competency (SDC)	Teaching reflection competency (TRC)	Ability to carefully self-examine, evaluate, feedback, control, adjust and analyse their educational behaviours based on the teaching effects	Reflect on teaching methods	[50]
	Teaching innovation competency (TIC2)	Ability to absorb the latest educational and teaching achievements, creatively applying them to education and teaching, forming a distinct teaching personality	Cultivate students' innovative spirits and develop creative thinking	[44]
	Educational research competency (ERC)	Ability to define scientific research problems, make research plans, conduct research, collect data, analyse data, and write scientific research papers and reports, followed by applying research achievements into teaching practice	Utilize various educational research methods to collect data, such as survey research, case research, action research	[51]
	Lifelong learning competency (LLC)	Ability to perform independent learning, career plans and teamwork	Possess positive attitude towards professional trainings for professional development	[37]

In the factor CELAC, the factor loadings for the identified four sub-factors are displayed (see Table 2). Together the 4 sub-factors, with a total of 20 items, explained 66.41% of the variance. The first sub-factor, with eigenvalue of 5.87, explained 29.36% of the variance, the second sub-factor, with an eigenvalue of 2.85, explained 14.26% of the variance; the third sub-factor, with an eigenvalue of 2.52, explained 12.58 % of the variance; the fourth factor,

with an eigenvalue of 2.04, explained 10.20% of the variance. In the factor CELAC the four extracted sub-factors are sequentially named as ECC, English Skills (ES), ICC and English Knowledge and Application Competency (EKAC). The result is slightly different from the original three sub-factors (LC, ICC and ECC) because of LC being divided into ES and EKAC. In the factor TC, the factor loadings for the identified five sub-factors are shown in Table 3. Together the 5 sub-factors, with a total of 47 items, explained 69.93% of the variance. The first sub-factor, with eigenvalue of 10.20, explained 21.70% of the variance; the second sub-factor, with an eigenvalue of 8.88, explained 18.89% of the variance; the third sub-factor, with an eigenvalue of 7.61, explained 16.20 % of the variance; the fourth factor, with an eigenvalue of 4.27, explained 9.08% of the variance; the fifth factor, with an eigenvalue of 1.91, explained 4.06 % of the variance. Five extracted sub-factors are named as Teaching Implementation and Management Competency (TIMC), ICTC, TDC, Test Item Construction Competency (TICC) and Comment Competency (CC). This integrates the original seven sub-factors into five sub-factors with AC divided into TICC and CC. In the factor SDC, the factor loadings for the identified five sub-factors are displayed in Table 4. Together the 4 sub-factors, with a total of 30 items, explained 72.92 % of the variance. The first sub-factor, with eigenvalue of 6.84, explained 22.80% of the variance; the second sub-factor, with an eigenvalue of 5.55, explained 15.81% of the variance; the third sub-factor, with an eigenvalue of 5.16, explained 17.20 % of the variance; the fourth factor, with an eigenvalue of 4.34, explained 14.45% of the variance. Four sub-extracted factors are named as TRC, ERC, TIC2, and LLC that are consistent with the original four factors. The scale is reliable for the Cronbach alpha coefficients of the total scale and three factors are 0.985, 0.924, 0.975 and 0.959 respectively. Ultimately, after the deletion of 21 items, a formal 97-item scale including 13 sub-factors was administered for this study.

Table 2: Factor Loadings of the Factor CELAC from Exploratory Factor Analyses (n = 175)

Items	English Cognition Competency (ECC)	English Skills (ES)	Intercultural Communicative Competency (ICC)	English Knowledge and Application Competency (EKAC)
q94	0.820			
q98	0.803			
q101	0.794			
q96	0.770			
q95	0.722			
q102	0.711			
q99	0.661			
q97	0.646			
q100	0.645			
q103	0.637			
q2		0.816		
q4		0.771		
q5		0.770		
q6		0.574		
q92			0.851	
q91			0.786	
q93			0.654	
q7				0.668
q1				0.656
q8				0.531

Note. Factor loadings greater than .5 are shown.

Table 3: Factor Loadings of TC from Exploratory Factor Analyses (n = 175).

Items	Teaching Implementation and Management Competency (TIMC)	Items	Information and Communication Technology Competency (ICTC)	Items	Teaching Design Competency (TDC)	Items	Test Item Construction Competency (TICC)	Items	Comment Competency (CC)
q38	0.868	q71	0.796	q13	0.805	q53	0.795	q55	0.563
q37	0.832	q76	0.776	q14	0.777	q54	0.783	q58	0.542
q36	0.784	q74	0.766	q12	0.745	q51	0.740	q56	0.531
q41	0.773	q75	0.765	q18	0.741	q52	0.655		
q43	0.760	q73	0.753	q11	0.715				
q39	0.755	q78	0.735	q21	0.711				
q44	0.748	q77	0.721	q15	0.700				
q40	0.744	q70	0.718	q9	0.657				
q42	0.713	q79	0.693	q16	0.619				
q32	0.693	q81	0.674	q17	0.587				
q33	0.680	q69	0.672	q28	0.574				
q45	0.673	q72	0.671						
q48	0.574	q68	0.667						
q31	0.548	q80	0.585						
q30	0.510								

Note. Factor loadings greater than .5 are shown.

Table 4: Factor Loadings of SDC from Exploratory Factor Analyses (n = 175).

Items	Teaching Reflection Competency (TRC)	Educational Research Competency (ERC)	Items	Teaching Implementation Competency (TIC)	Lifelong Learning Competency (LLC)
q63	0.874		q84	0.859	
q65	0.854		q83	0.802	
q61	0.835		q85	0.780	
q64	0.832		q89	0.685	
q62	0.827		q87	0.668	
q66	0.808		q82	0.663	
q60	0.767		q88	0.646	
q59	0.721		q86	0.628	
q109		0.882	q117		0.774
q108		0.840	q115		0.770
q107		0.835	q118		0.748
q110		0.817	q116		0.729
q112		0.687	q114		0.672
q111		0.682	q113		0.628
q105		0.642			
q106		0.617			

Note. Factor loadings greater than .5 are shown

C. Data Analysis

The formal survey data from the valid 914 responses were adopted to conduct a normal distribution test, Confirmatory Factor Analysis (CFA) via AMOS 25, and reliability test before answering research questions. We evaluated model adequacy using the following indices: absolute fitting index ( $\chi^2/df \leq 3.00$ ), Goodness-of-Fit Index ( $GFI \geq 0.90$ ), Adjusted Goodness-of-Fit Index ( $AGFI \geq 0.90$ ), Root Mean Residual ( $RMR \leq 0.08$ ), Comparative Fit Index ( $CFI \geq 0.90$ ), Normed Fit Index ( $NFI \geq 0.90$ ), Tucker Lewis Index ( $TLI \geq 0.90$ ) [52,53] and Root Mean Square Error of Approximation ( $RMSEA \leq 0.08$ ) [54,55]. The results of P-P plots of three factors (CELAC, TC, and SDC) and 13 sub-factors (ECC, ES, ICC, EKAC, TIMC, ICTC, TDC, TICC, CC, TRC, ERC, TIC2, LLC) showed that the observed data were largely consistent with the expected value of normal distribution. For the factor CELAC, there were four sub factors: ES, EKAC, ICC, and ECC. The model fit indices were  $\chi^2/df=2.261$ ,  $RMSEA=0.037$ ,  $RMR=0.018$ ,  $GFI=0.971$ ,  $AGFI=0.958$ ,  $NFI=0.976$ ,  $TLI=0.982$ , and  $CFI=0.986$ . For the factor TC, we gained four sub-factors: TIMC, ICTC, TDC, and TICC. The model fit indices were  $\chi^2/df=2.523$ ,  $RMSEA=0.01$ ,  $RMR=0.018$ ,  $GFI=0.933$ ,  $AGFI=0.919$ ,  $NFI=0.962$ ,  $TLI=0.942$ , and  $CFI=0.977$ . For the factor SDC, four sub-factors emerged: TRC, ERC, TIC and LLC. The model fit indices were  $\chi^2/df=2.724$ ,  $RMSEA=0.043$ ,  $RMR=0.023$ ,  $GFI=0.936$ ,  $AGFI=0.920$ ,  $NFI=0.967$ ,  $TLI=0.975$ , and  $CFI=0.979$ . These fitting indices suggested a good model fit with a total of 74 items left. The scale has been shown as a reliable tool for Cronbach’s alpha coefficients [56] of CELAC (17 items), TC (30 items), SDC (27 items) and the whole scale (74 items) are 0.924, 0.971, 0.968 and 0.984 respectively. Finally, 12 sub-factors were extracted after CFA. Some variations emerge in CELAC and TC. CELAC includes ECC, ES, ICC and EKAC and TC consists of TIMC, ICTC, TDC, TICC and CC. The components of SDC stay the same as before. In order to determine TPCs needed by teachers and compare the level of significance differences between mean scores of the responses based on gender, school type, years of teaching experience, school level and school location, descriptive statistics, one-sample t-test, independent sample t-test, and one-way ANOVA were adopted.

III. RESULTS

A. Question1: What Professional Competencies are Needed by Secondary School EFL Teachers According to Their Views?

Results (see Table 5) show that the total mean scores of teachers’ opinions on all TPCs of 4.02 is significantly bigger than the value 3.0. This means that, for the vast majority of secondary school EFL teachers, the offered professional competencies are thought to be needed in teaching practice. The need for these 12 TPCs from high to low is TDC, EKAC, TIMC, LLC, TRC, TIC2, ICTC, ECC, TICC, ICC, ERC and ES. In the scale the value of 3.0 refers to ‘somewhat necessary’ for professional competency and the values of the need for all 12 professional competencies are also all above 3.0. Although there are five categories in the range, it is hard to tell the level of need for competencies based on Arabic numerals with two decimals like 3.98, and 3.89 in Table 5. Therefore, we modified the prior range of five categories into the new range with equal proportion to tell the difference among five extreme values of the stimuli that form the context for judgment. According to the range principle [57], Table 5 presents the new category range with 0.8 as the range value among five categories. Based on the new category

range, the need for TDC, EKAC and TIMC is very high and the need for other professional competencies is high, too, indicating that 12 professional competencies are all needed. Regarding for the need for three key competencies (CELAC, TC and SDC), the need from high to low is TC, SDC and CELAC.

Table 5: The Need for 12 Sub-TPCs and Three Key Competencies

TPCs	Mean	SD	t	p	No.	Distribution of new category range		Degree of need for TPCs
						Mean score	Category	
TDC	4.30	0.59035	66.420	0.000	1	1.00 – 1.80	Unnecessary	Very necessary
EKAC	4.25	0.60575	62.250	0.000	2			Very necessary
TIMC	4.24	0.66857	55.983	0.000	3			Very necessary
LLC	4.19	0.65381	55.185	0.000	4	1.81 – 2.61	Somewhat unnecessary	Necessary
TRC	4.17	0.67183	52.779	0.000	5			Necessary
TIC2	4.12	0.65459	51.700	0.000	6			Necessary
ICTC	4.07	0.67010	48.388	0.000	7	2.62 – 3.42	Somewhat necessary	Necessary
ECC	3.98	0.67471	44.042	0.000	8			Necessary
TICC	3.89	0.75509	35.450	0.000	9			Necessary
ICC	3.86	0.8016	32.323	0.000	10			Necessary
ERC	3.73	0.76723	28.725	0.000	11	3.43 – 4.23	Necessary	Necessary
ES	3.50	0.77273	19.576	0.000	12			Necessary
TC	4.17	0.56965	62.080	0.000	1			Necessary
SDC	4.05	0.58943	53.739	0.000	2	4.24 – 5.00	Very necessary	Necessary
CELA C	3.92	0.56790	49.093	0.000	3			Necessary
Total	4.02	0.69053						Necessary

$P < 0.05$ ;  $M =$  Mean;  $SD =$  St. Deviation;  $MD =$  Mean Difference;  $Category\ range = (5-1)/5 = 0.8$

**B. Question2: Is There Any Difference in the Need for TPCs Regarding Gender, School Type, Years of Teaching Experience, School Level and School Location?**

The results are presented in Tables 6, 7, and 8. The results of independent t-test (see Table 6) indicate the need for ECC, ICC, EKAC, TIMC, ICTC, TDC, TICC, TRC, TIC2, LLC and three key competencies (CELAC, TC, SDC) for male teachers is significantly different from the need for those for female teachers. Inspections of the two group means show that the average score of the need for them for male teachers is significantly lower than that for them for female teachers. That means female teachers need more these TPCs than male teachers. The results of independent t-test (see Table 6) show the mean values of ES ( $t = -3.577$ ,  $p = 0.000$ ), ICC ( $t = -2.145$ ,  $p = 0.032$ ) and dimension one CELAC ( $t = -1.986$ ,  $p = 0.047$ ), and their p values are less than 0.05, so ES, ICC and CELAC needed by general school EFL teachers are significantly different from those needed by model school EFL teachers. Evidently, the need for ES, ICC and CELAC for general school EFL teachers is significantly lower than those for model school EFL teachers. In other words, general school EFL teachers need less ES, ICC and CELAC than model school EFL teachers. In the comparison of the mean values of TC ( $t = -0.369$ ,  $p = 0.712$ ) and SDC ( $t = -1.061$ ,  $p = 0.289$ ) and other TPCs, their values are more than 0.05, so there is no significant difference between teachers from different schools about TC, SDC and other TPCs. To compare views of EFL teachers with different years of teaching experience (1-3; 4-10; 11-15; and 16-longer), One-way ANOVA and post hoc tests were employed. The results show that (see Table 7) the need for ES ( $F = 1.752$ ,  $p = 0.155 > 0.05$ ), EKAC ( $F = 1.348$ ,  $p = 0.258 > 0.05$ ), and TIMC ( $F = 1.479$ ,  $p = 0.219 > 0.05$ ) does not reach a significant level at  $p < 0.05$ , indicating that there is no significant difference regarding years of teaching experience. On the other hand, the need for ECC ( $F = 5.588$ ,  $p = 0.001 < 0.05$ ), ICC ( $F = 9.732$ ,  $p = 0 < 0.05$ ), ICTC ( $F = 7.637$ ,  $p = 0 < 0.05$ ), TDC ( $F = 2.832$ ,  $p = 0.037 < 0.05$ ), TICC ( $F = 3.317$ ,  $p = 0.019 < 0.05$ ), TRC ( $F = 4.269$ ,  $p = 0.005 < 0.05$ ), ERC ( $F = 9.508$ ,  $p = 0 < 0.05$ ), TIC2 ( $F = 7.057$ ,  $p = 0 < 0.05$ ), LLC ( $F = 3.978$ ,  $p = 0.008$ ), CELAC ( $F = 5.796$ ,  $p = 0.001 < 0.05$ ), TC ( $F = 3.717$ ,  $p = 0.011 < 0.05$ ), and SDC ( $F = 8.21$ ,  $p = 0 < 0.05$ ) reaches a significant level at  $p < 0.05$ , indicating that the need for these nine professional competencies and three dimensions (CELAC, TC and SDC) is significantly varied by years of teaching experience. For instance, teachers with 1-3 years, 4-10 years or 11-15 years need these competencies more than teachers with 16 years and above. In other words, young teachers need them more than elder teachers. The results of independent t-test (see Table 8) shows that ES, ICC and CELAC needed by junior high school EFL teachers are significantly different from those needed by senior high school EFL teachers. Inspections of the means of two groups indicate that the need for ES, ICC and CELAC for junior high school EFL teachers is lower than that for senior high school EFL teachers. The results of independent t-test (see Table 8) show the means of CELAC ( $t = -2.935$ ,  $p = 0.003$ ), TC ( $t = -2.237$ ,  $p = 0.026$ ) and SDC ( $t = -2.717$ ,  $p = 0.007$ ), and that their p values are less than 0.05. The need for ECC, ES, ICC, TIMC, TICC, TRC, ERC, and three key competencies (CELAC, TC and SDC) for rural school EFL teachers is significantly different from that for urban school EFL teachers. Inspections of the means of two groups indicate the need for them for rural school EFL teachers is significantly lower than that for urban school EFL teachers.

Table 6: Comparison in the Need for 12 Sub-TPCs and Three Key Competencies Regarding Gender and Type

	Male teachers		Female teachers		MD	t	p
	(N=165)		(N=749)				
	M	SD	M	SD			
ECC	3.8598	0.67622	4.0100	0.67180	-0.15016	-2.596	<b>0.010</b>
ES	3.4424	0.81331	3.5131	0.76348	-0.07070	-1.064	0.288
ICC	3.7455	0.76676	3.8816	0.80749	-0.13617	-1.978	<b>0.048</b>
EKAC	4.1434	0.60061	4.2701	0.60488	-0.12670	-2.439	<b>0.015</b>
TIMC	4.0498	0.70640	4.2795	0.65317	-0.22965	-4.027	<b>0.000</b>
ICTC	3.9065	0.68922	4.1091	0.66069	-0.20260	-3.538	<b>0.000</b>
TDC	4.1488	0.58299	4.3296	0.58733	-0.18080	-3.584	<b>0.000</b>
TICC	3.7288	0.80651	3.9199	0.73940	-0.19111	-2.955	<b>0.003</b>
TRC	3.9409	0.69701	4.2240	0.65569	-0.28306	-4.962	<b>0.000</b>
ERC	3.6416	0.75141	3.7482	0.76984	-0.10668	-1.618	0.106
TIC2	3.9593	0.66368	4.1547	0.64772	-0.19538	-3.492	<b>0.001</b>
LLC	3.9927	0.65104	4.2377	0.64652	-0.24492	-4.400	<b>0.000</b>
CELAC	3.8160	0.55342	3.9456	0.56875	-0.12953	-2.661	<b>0.008</b>
TC	4.0022	0.57211	4.2066	0.56282	-0.20441	-4.211	<b>0.000</b>
SDC	3.8777	0.59654	4.0852	0.58160	-0.20753	-4.130	<b>0.000</b>
	General school EFL teachers		Model school EFL teachers		MD	t	p
	(N=596)		(N=318)				
	M	SD	M	SD			
ECC	3.9648	0.68566	4.0169	0.65338	-0.05214	-1.113	0.266
ES	3.4340	0.78640	3.6247	0.73158	-0.19073	-3.577	<b>0.000</b>
ICC	3.8171	0.83275	3.9319	0.73511	-0.11475	-2.145	<b>0.032</b>
EKAC	4.2478	0.59687	4.2463	0.62300	0.00143	0.034	0.973
TIMC	4.2269	0.67995	4.2589	0.64723	-0.03203	-0.690	0.491
ICTC	4.0841	0.68954	4.0508	0.63254	0.03337	0.736	0.462
TDC	4.2839	0.59811	4.3215	0.57564	-0.03752	-0.915	0.360
TICC	3.8846	0.76684	3.8868	0.73376	-0.00214	-0.041	0.967
TRC	4.1508	0.67592	4.2142	0.66319	-0.06343	-1.360	0.174
ERC	3.7013	0.79294	3.7808	0.71492	-0.07943	-1.539	0.124
TIC2	4.1122	0.67242	4.1330	0.62060	-0.45700	-0.457	0.648
LLC	4.1960	0.64726	4.1887	0.66693	0.00729	0.161	0.872
CELAC	3.8950	0.55610	3.9732	0.57837	-0.07819	-1.986	<b>0.047</b>
TC	4.1647	0.57837	4.1792	0.55371	-0.01459	-0.369	0.712
SDC	4.0326	0.60212	4.0761	0.56473	-0.04343	-1.061	0.289

P<0.05; MD= Mean Difference

Table 7: The Result of ANOVA

		Sum of Squares	df	Mean Square	F	p	Post Hoc Tests (LSD)	Post Hoc Tests (Tamhane)
	Within Groups	408.105	910	0.448			2>4	
	Total	415.624	913				3>4	
ES	Between Groups	3.130	3	1.043	1.752	0.155		
	Within Groups	542.036	910	0.596				
	Total	545.167	913					
ICC	Between Groups	18.236	3	6.079	9.732	<b>0.000</b>	1>4;2>3	
	Within Groups	568.417	910	0.625			2>4;3>4	
	Total	586.653	913					
EKA C	Between Groups	1.482	3	0.494	1.348	0.258		
	Within Groups	333.525	910	0.367				
	Total	335.007	913					
TIMC	Between Groups	1.980	3	0.660	1.479	0.219		
	Within Groups	406.113	910	0.446				
	Total	408.093	913					
ICTC	Between Groups	10.068	3	3.356	7.637	<b>0.000</b>		2>4
	Within Groups	399.9	910	0.439				3>4
	Total	409.968	913					
TDC	Between Groups	2.943	3	0.981	2.832	<b>0.037</b>	3>4	
	Within Groups	315.244	910	0.346				
	Total	318.187	913					
TICC	Between Groups	5.631	3	1.877	3.317	<b>0.019</b>	1>4	
	Within Groups	514.926	910	0.566			2>4	
	Total	520.558	913					
TRC	Between Groups	5.719	3	1.906	4.269	<b>0.005</b>	2>4	
	Within Groups	406.374	910	0.447			3>4	
	Total	412.093	913					
ERC	Between Groups	16.334	3	5.445	9.508	<b>0.000</b>	1>3;1>4	
	Within Groups	521.102	910	0.573			2>3;2>4	
	Total	537.435	913					
TIC2	Between Groups	8.895	3	2.965	7.057	<b>0.000</b>		2>4
	Within Groups	382.317	910	0.420				3>4
	Total	391.212	913					
LLC	Between Groups	5.051	3	1.684	3.978	<b>0.008</b>		2>4
	Within Groups	385.229	910	0.423				
	Total	390.281	913					
CEL AC	Between Groups	5.521	3	1.840	5.796	<b>0.001</b>	2>4	
	Within Groups	288.935	910	0.318			3>4	
	Total	294.456	913					
TC	Between Groups	3.587	3	1.196	3.717	<b>0.011</b>	2>4	
	Within Groups	292.68	910	0.322			3>4	
	Total	296.267	913					
SDC	Between Groups	8.360	3	2.787	8.21	<b>0.000</b>	1>4	
	Within Groups	308.844	910	0.339			3>4	
	Total	317.204	913					

P<0.05; 1=1-3 years, 2= 4-10 years, 3=11-15 years, 4=16 years and above

Table 8: Comparison in the Need for 12 Sub-TPCs and Three Key Competencies Regarding School Level and School Location

	Junior high school EFL teachers (N=606)		Senior high school EFL teachers (N=308)		MD	t	p
	M	SD	M	SD			
	ECC	3.9585	0.70187	4.0308			
ES	3.4274	0.78866	3.6439	0.72031	-0.21655	-4.159	<b>0.000</b>
ICC	3.8168	0.84371	3.9361	0.70613	-0.11932	-2.257	<b>0.024</b>
EKAC	4.2486	0.58523	4.2446	0.64519	0.00404	0.095	0.924
TIMC	4.2382	0.69229	4.2377	0.62033	0.00044	0.009	0.993
ICTC	4.0884	0.69679	4.0413	0.61412	0.04712	1.047	0.295
TDC	4.3009	0.58693	4.2893	0.59790	0.01156	0.280	0.780
TICC	3.9010	0.76716	3.8547	0.73103	0.04628	0.876	0.381
TRC	4.1578	0.69285	4.2025	0.62847	-0.04472	-0.951	0.342
ERC	3.7030	0.81038	3.7801	0.67266	-0.07718	-1.528	0.127
TIC2	4.1176	0.67413	4.1229	0.61540	-0.00528	-0.115	0.908
LLC	4.1990	0.65490	4.1825	0.65260	0.01654	0.361	0.718
<b>CELAC</b>	3.8910	0.58225	3.9836	0.53417	-0.09258	-2.335	<b>0.020</b>
<b>TC</b>	4.1766	0.57952	4.1563	0.55039	0.02029	0.509	0.611
<b>SDC</b>	4.0371	0.61141	4.0687	0.54395	-0.03156	-0.765	0.444
	Rural school EFL teachers (N=384)		Urban school EFL teachers (N=530)		MD	t	p
	M	SD	M	SD			
	ECC	3.9287	0.69124	4.0222			
ES	3.3837	0.79876	3.5849	0.74269	-0.20123	-3.916	<b>0.000</b>
ICC	3.7639	0.85661	3.9245	0.75290	-0.16064	-2.942	<b>0.003</b>
EKAC	4.2361	0.56781	4.2553	0.63222	-0.01923	-0.474	0.636
TIMC	4.1632	0.72083	4.2922	0.62309	-0.12905	-2.892	<b>0.004</b>
ICTC	4.0502	0.69778	4.0887	0.64950	-0.03846	-0.856	0.392
TDC	4.2630	0.58347	4.3216	0.59462	-0.05857	-1.482	0.139
TICC	3.8249	0.79269	3.9292	0.72424	-0.10438	-2.066	<b>0.039</b>
TRC	4.0843	0.71469	4.2370	0.63196	-0.15272	-3.412	<b>0.001</b>
ERC	3.6514	0.80794	3.7852	0.73198	-0.13376	-2.569	<b>0.010</b>
TIC2	4.0923	0.67331	4.1391	0.64061	-0.04682	-1.067	0.286
LLC	4.1469	0.66489	4.2272	0.64420	-0.08029	-1.835	0.067
<b>CELAC</b>	3.8577	0.57325	3.9689	0.55991	-0.11123	-2.935	<b>0.003</b>
<b>TC</b>	4.1203	0.59235	4.2055	0.55041	-0.08522	-2.237	<b>0.026</b>
<b>SDC</b>	3.9857	0.61343	4.0927	0.56778	-0.10694	-2.717	<b>0.007</b>

P<0

#### IV. DISCUSSION AND CONCLUSION

The present study aimed at identifying TPCs needed by secondary school EFL teachers as well as the inquiry into the difference in the need for TPCs in the era of AI. It has meticulously delineated the variegated needs for 12 sub-TPCs across three key competency domains, revealing the nuanced interplay between these competencies and teachers' demographic characteristics. By directly soliciting frontline teachers' views, we could gain deeper insight into both the nature and urgency of the competencies demanded to not only adapt to technological changes, but to lead students confidently in this new landscape.

##### A. Professional Competencies Needed by Secondary School EFL Teachers

The study findings underscore the paramount importance of competencies directly linked to pedagogical practice, such as Teaching Design Competency (TDC), English Knowledge and Application Competency (EKAC), and Teaching Implementation and Management Competency (TIMC). These findings resonate with assertion that TDC is a universal professional competency, essential not only for EFL teachers but for educators across various disciplines. The emphasis on TDC is predicated on the advanced pedagogical constructs that inform the lesson planning process, encompassing objectives, strategies, and evaluative measures. The heightened need for EKAC can be traced to the unique demands placed upon EFL educators to not only comprehend but also proficiently deliver content in English. This competency transcends mere language proficiency; it embodies the very identity of an EFL teacher and their ability to navigate the linguistic intricacies of their teaching context. Teaching implementation and management is also a routine for secondary school teachers, in which they have to think of ways to instruct well via presenting teaching content, asking questions and responding to students to satisfy students of various needs. Thus, Teaching Implementation and Management Competency (TIMC) is considered as highly needed. In contrast, competencies such as Lifelong Learning Competency (LLC), Teaching Reflection Competency (TRC), and Teaching Innovation Competency (TIC2) were deemed less critical. This perception may be indicative of a broader educational culture where communal professional development is favored over individual



learning pursuits, possibly due to the constraints imposed by the teachers' heavy workload. Yet, this stance may inadvertently undermine the individual agency and autonomy that are crucial for personal and professional growth.

Firstly, the moderate valuation of TRC and TIC2 is intriguing, especially considering the scholarly emphasis on the role of reflective practice in teacher development and the impetus for innovation in pedagogical approaches. The study's findings, while acknowledging the significance of these competencies, suggest that actual engagement with them is stymied by the constraints of the educational environment and the existing curriculum standards in China. Secondly, the reluctance to fully engage with Information Communication and Technology Competency (ICTC) can be attributed to the perceived increase in workload that such engagement entails. This is despite the growing recognition of the importance of digital literacy in the 21st-century classroom. This result may be as a result of the lack of AI technology proficiency for teachers to apply it to practice. The moderate necessity accorded to English Cognition Competency (ECC) is puzzling, given the complex cognitive demands of teaching. This suggests a potential disconnect between teachers' understanding of ECC and its critical role in the nexus of coursework, teaching methodology, and foundational theories of language acquisition. Similarly, the limited emphasis on Test Item Construction Competency (TICC) raises questions about the alignment between the theoretical importance of assessment literacy and its practical relevance, particularly in the high-stakes examination context. The availability of ready-made assessment resources may have inadvertently led to a devaluation of this competency among teachers, highlighting a dissonance between theoretical expectations and the realities of professional practice. Thirdly, the relatively low prioritization of Intercultural Communicative Competency (ICC) by teachers, despite its recognized importance in fostering global communicative abilities among students, is a point of contention. This discrepancy can be attributed to the teachers' own limited ICC and the exam-centric orientation prevalent in the Chinese EFL context's exploration of intercultural pedagogy underscores the necessity of teachers' own intercultural competence in effectively imparting such knowledge. The lack of emphasis on ICC in classroom instruction may also reflect a broader systemic issue where curricular goals are subordinated to the imperatives of standardized testing. Fourthly, the lukewarm response to the need for Educational Research Competency (ERC) amongst teachers can be understood through two lenses: the perceived disconnect between academic research and immediate classroom outcomes, particularly in relation to exam performance, and a possible deficiency in the teachers' research competencies. While action research is gaining popularity as a means of addressing specific educational challenges, the broader scope of research competencies remains undervalued. This is despite policy efforts by educational authorities to incentivize research engagement through professional evaluations. Fifthly, the moderate need for English Skills (ES) competency reported by teachers could be interpreted as an indication that such skills are considered foundational and thus, already adequately addressed during qualification processes. However, this perceived adequacy may lead to complacency, where continuous professional development in these areas is neglected. This is concerning given the dynamic nature of language and the evolving challenges of EFL teaching. The lack of focus on oral English, in particular, due to its exclusion from key examinations, highlights a misalignment between pedagogical priorities and comprehensive language proficiency. The findings also reveal a general disinterest among teachers in further developing competencies such as ECC, TICC, ICC, ERC, and ES. This could be symptomatic of a broader issue where the integration of these competencies into everyday teaching is not clearly articulated or valued. The heavy workload faced by teachers, driven by student enrollment pressures, may further exacerbate this situation, leaving little room for the cultivation of competencies perceived as tangential to their primary instructional duties. Lastly, the concept of situated learning posited by provides a valuable framework for understanding the context-dependent nature of teachers' professional development. When competencies are not immediately relevant to the teachers' current practice, their motivation to engage with them diminishes. This highlights the importance of contextualizing professional competencies within the realities of teachers' day-to-day experiences. Furthermore, the moderate need for competencies such as TRC and TIC2 can be interpreted through the lens of model of teacher change, which emphasizes the role of reflection and enactment in professional growth. Teachers' developmental stages and cognitive levels vary according to context, influencing their capacity for change and professional development.

#### *B. The Difference in the Need for TPCs*

The present research elucidates the differential need for teacher professional competencies among secondary school EFL teachers, with a focus on the influence of demographic variables such as gender, teaching context, professional tenure, and geographic location of schools. The research contributes to a nuanced understanding of how these factors shape EFL teacher perceived professional development needs.

Firstly, in examining gender differences, the study reveals a notable divergence in the perceived need for most sub-TPCs between male and female teachers. This may be reflective of broader societal and cultural forces that influence gender roles within the profession. Female teachers often outnumber their male counterparts, which can lead to a gendered distribution of professional enthusiasm and engagement in ongoing professional development. Conversely, the relative scarcity of male teachers could engender a predilection for administrative responsibilities over the pursuit of pedagogical excellence, potentially resulting in a less pronounced drive for competency enhancement within this group. This phenomenon warrants further exploration, particularly in relation to how institutional cultures and gender expectations shape professional learning trajectories. Secondly, the contrast in TPCs between teachers at general and model schools is striking and indicative of systemic disparities in educational expectations. Teachers in general schools may perceive their English skills as adequate, possibly leading to a stasis in professional growth, especially in competencies such as Intercultural Communicative Competency (ICC). In contrast, model school teachers are often held to higher standards, necessitating a more pronounced need for advanced competencies. This disparity underscores the need for equitable professional development opportunities that are sensitive to the specific contexts and challenges of different school types. Thirdly, the relationship between years of teaching experience and the perceived need for TPCs highlights a potential complacency that can develop over time. While novice teachers display an eagerness to enhance their competencies, there appears to be a diminishing impetus for such development among seasoned educators, especially in reflective practices. This trend suggests a potential plateau in professional growth, raising questions about the efficacy of ongoing professional development models for experienced teachers. Fourthly, the disparity in competency needs between junior and senior high school teachers further illustrates the stratified nature of the educational landscape. Junior high school teachers' lower need for competencies such as ES and ICC may stem from a self-assessment of sufficient language proficiency for their instructional context. However, senior high school teachers face more stringent curriculum and linguistic demands, necessitating a higher proficiency in language instruction and content knowledge. Fifthly, the study also sheds light on the stark differences in competency needs based on school location. Rural teachers often contend with more traditional pedagogical approaches and have access to fewer professional development re-sources, leading to a lower overall level of TPCs. This finding is particularly concerning as it may contribute to the perpetuation of educational inequities between urban and rural settings.

The study, while informative, is not without limitations. The reliance on self-reported surveys could be complemented by qualitative methods such as inter-views or focus groups to deepen the interpretive richness of the data. Such an approach would allow for a more textured understanding of the interplay between teacher identity, context, and perceived competency needs. Theoretically, the confirmation of three key competencies through the lens of 12 sub-TPCs underscores the universal aspects of English teaching and the shared competencies required by EFL teachers. Meanwhile, it also shows that TDC, and EKAC are the base of making full use of AI and ITSs in the era of AI. Practically, the insights gleaned from this study can inform the design of teacher digital literacy training programs by enabling educators to conduct a needs analysis that is tailored to the specific requirements of the teachers and their respective institutions. In conclusion, this research offers a critical lens through which to view the professional development needs of EFL teachers, highlighting the importance of demo-graphic considerations in shaping these needs. As the field of education continues to evolve, so too must our understanding of how to best support teachers in their professional journeys, ensuring that all educators, regardless of background or context, have access to the competencies necessary for effective instruction.

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