

A Study on the Correlation between Professional Competence and Professional Identity of Computer Science Teachers at Y University in Shandong Province, China

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Abstract: This study examines the relationship between professional competence and professional identity among computer science teachers at Y University in Shandong Province, China. It also compares these two variables across gender, educational background, teaching experience, and professional title in order to clarify the actual development needs of the teaching team. Using an exploratory quantitative design, the study surveyed 100 computer science teachers selected from 512 teachers at Y University through convenience sampling. The questionnaire adapted existing professional competence and professional identity scales and included 40 items measured on a five-point Likert scale. Descriptive statistics, independent-sample t tests, one-way ANOVA, LSD post-hoc tests, and Pearson correlation analysis were used. The results show that teachers generally reported relatively high professional competence and professional identity. After correcting the t-test results, no significant gender differences were found, while educational background, teaching experience, and professional title showed significant differences. Professional competence was positively correlated with professional identity, indicating that competence development and identity formation should be considered jointly in teacher development.

Keywords: Professional Competence, Professional Identity, Y university in Shandong Province.

1. Introduction

Globally, the professional competence and professional identity of computer science teachers have received increasing attention because they jointly influence instructional quality, teacher commitment, and student learning. International studies on teacher identity emphasize that teachers' agency, emotions, and professional communities shape how they respond to reform (Bulut, 2022), while research on teacher efficacy shows that competence beliefs are closely related to motivation and classroom practice (Gibing, 2022).

In computer science education, this relationship is especially important because teachers must update technical knowledge continuously while maintaining confidence in the educational value of the subject. Instead of solely emphasizing teacher competency development, recent research increasingly views professional competence and professional identity as parallel

objectives for building a stable and high-quality teaching workforce. Competence provides the practical basis for curriculum design, classroom management, and technical innovation, whereas identity supports persistence, reflective practice, and willingness to participate in disciplinary development.

In China, with the rapid development and widespread penetration of information technology in recent years, computer science has become a core driving force for social transformation and industrial upgrading, and the importance of computer education has become increasingly prominent. Liu (2023) pointed out that the professional competence and professional identity of computer science teachers are two key variables determining education quality: professional competence serves as the foundation for teachers to conduct high-quality instruction (e.g., professional knowledge, teaching skills), while professional identity is the internal driving force

3. Materials and Methods

The questionnaire contained three parts. The first part collected demographic information, including gender, educational background,

The questionnaire adopted a five-point Likert scoring method. To improve content validity, two educational administration scholars and one computer science education teacher reviewed the items from three aspects: relevance to computer science teaching, clarity of wording, and consistency with the intended dimension. Items that were too general or unrelated to the university teaching context were revised before formal distribution. The reliability test showed that Cronbach's α coefficients of the professional competence scale and the professional identity scale were both above 0.85, and the α coefficients of each dimension were above 0.80, indicating acceptable internal consistency. Because the scales were adapted to the computer science context, further confirmatory factor analysis, convergent validity testing, and discriminant validity testing are recommended in future research.

According to the data filled in the questionnaire, among the teachers who answered

the questionnaire, 51 were male (51%) and 49 were female (49%). In terms of education background, 15 subjects were associate's degree, accounting for 15%; 23 people were bachelor's degree, accounting for 23%; 46 people were master's degree, accounting for 46%; 16 people were doctoral degree, accounting for 16%. In terms of the years of teaching experience of the subjects, 26 were 1–5 years, accounting for 26%; 23 people were 6–10 years, accounting for 23%; 47 people were 11–15 years, accounting for 47%; 4 people were above 16 years, accounting for 4%. In terms of the professional title of the subjects, 20 people were assistant lecturers, accounting for 20%; 21 people were lecturers, accounting for 21%; 45 people were associate professors, accounting for 45%; 14 people were professors, accounting for 14%. The basic personal information of teachers who participated in the questionnaire survey is shown in the following table:

Table. 1: Basic personal information of teachers

Background variable	classification	N	%
Gender	Male	51	51
	Female	49	49
Education background	Associate degree	15	15
	Bachelor degree	23	23
	Master degree	46	46
	Doctor degree	16	16
Teaching experience	5 years or less	26	26
	6 to 10 years	23	23
	11 to 15 years	47	47
	16 years or more	4	4
Professional title	Assistant lecturer	20	20
	Lecturer	21	21
	Associate professor	45	45
	Professor	14	14

(1) In comparing professional competence and professional identity among computer science teachers of different genders, corrected independent-sample t tests showed no significant difference in professional competence ($t = 0.3896$, $p = 0.698$, Cohen's $d \approx 0.08$) or professional identity ($t = 0.2998$, $p = 0.765$, Cohen's $d \approx 0.06$). Therefore, gender was not interpreted as a source of difference in this sample, and the following discussion avoids causal or stereotyped explanations.

(2) In comparing teachers with different educational backgrounds, the LSD multiple comparison showed significant educational-background differences in professional competence ($F = 8.995$, $p < 0.001$, $\eta^2 \approx 0.219$) and professional identity ($F = 7.985$, $p < 0.001$, $\eta^2 \approx 0.200$). In general, teachers with doctoral and master's degrees reported higher mean scores than those with lower degrees, suggesting that advanced study and research training may support both competence and identity development.

(3) In comparing teachers with different teaching experience, the p values of total professional competence and professional identity were 0.001, which are less than 0.05. Mean scores generally increased with teaching years, indicating that accumulated classroom practice, curriculum experience, and participation in disciplinary work may strengthen teachers' competence and identity. However, because the group with 16 years or more of experience contained only four teachers, this result should be interpreted cautiously.

(4) In comparing teachers with different professional titles, the p values of total professional competence and professional identity were less than 0.05. Professors and associate professors reported higher mean scores than lecturers and assistant lecturers. This pattern may be related to differences in research resources, teaching experience, mentoring opportunities, and institutional recognition rather than to professional title alone.

(5) Pearson correlation analysis showed that professional competence was positively correlated with professional identity ($r = 0.433$, $p < 0.001$). The dimensions of professional competence were also positively related to dimensions of professional identity: academic guidance competence showed low-to-moderate correlations ($r = 0.318$ – 0.466), professional growth competence showed moderate correlations ($r = 0.480$ – 0.501), work innovation competence showed moderate correlations ($r = 0.411$ – 0.510), and technical application and development competence showed low-to-moderate correlations ($r = 0.411$ – 0.463). The previously listed value of 1.00 was a diagonal self-correlation and was not used in interpretation.

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The researcher currently studies in MEA Program, Graduate School, Stamford International University. His research interest is in the fields of educational administration, school management and educational leadership.