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Examining the Influence of Self-Esteem and Digital Literacy on Professional Competence Factors in Dental Education: A Cross-Sectional Study

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Abstract: This study aims to investigate the effects of digital literacy and self-esteem on dental students' perceptions of professional competence and to provide recommendations for improving educational programs in dental schools. A mixed-methods, descriptive, and relational scanning design was employed, using a questionnaire comprising demographic information, the Rosenberg Self-Esteem Scale (RSES), the Digital Literacy Scale (DLS), and the Professional Competence Scale (PCS). The sample included 427 dental students in Istanbul, Turkey. Statistical analyses included Cronbach Alpha, Confirmatory Factor Analysis, Mann–Whitney U, Kruskal–Wallis, Spearman's rho correlation, and the Generalized Linear Model (Logit Model). The majority of participants were female (65.6%), aged 21 or older (85.2%), and in their 4th grade of study (35.2%). There were no significant differences in PCS scores concerning gender, age, grade, type of residence, and residence location ($p > 0.05$). However, PCS scores were significantly higher among those who listed dentistry among their top five preferences, expressed high satisfaction with education, and demonstrated high professional interest ($p < 0.05$). A significant, positive correlation was observed between PCS and RSES (r = 0.398; $p < 0.01$), DLS (r = 0.404; $p < 0.01$), preference (r = 0.120; $p < 0.05$), education satisfaction (r = 0.298; $p < 0.01$), and occupational interest (r = 0.502; $p < 0.05$). Furthermore, the Logit Model analysis revealed that RSES (B = 0.290; $p < 0.01$), DLS (B = 0.258; $p < 0.01$), education satisfaction (B = 0.806; $p < 0.05$), and occupational interest (B = 3.825; $p < 0.01$) significantly influenced PCS. The findings underscore self-esteem and digital literacy's integral role in shaping dental students' perceptions of their professional abilities. Digital literacy is a substantial pillar supporting students' professional competency. Coupled with a genuine interest in the field and bolstered self-confidence, digital literacy proves instrumental in enhancing students' academic success in dentistry. By emphasizing and expanding upon digital literacy content within the curriculum, universities can further propel advancements in the dental domain. As such, it is pivotal for dental institutions to weave strategies into their educational fabric to elevate students' self-esteem and digital proficiency.

Keywords: dental education; dentistry students; digital literacy; self-esteem

1. Introduction

Training in dentistry is critical for enhancing the quality of public health services within a country and promoting competitiveness in global health tourism [1,2]. Evaluating professional competence and determining influential factors during education is vital for future career success, as they significantly shape an individual's work life and contribute to overall well-being [3,4].

Self-esteem has been defined in various ways, making it somewhat challenging to define precisely. Essentially, it reflects how an individual feels about themselves. Two primary types of self-esteem are recognized: trait and state self-esteem. Trait self-esteem pertains to a person's consistent level of self-worth over time and across different situations. In contrast, state self-esteem deals with day-to-day variations in one's feelings of self-worth [5]. Self-esteem influences not only one's professional life but also their overall well-being [6,7]. Especially in professions like dentistry, where expertise and self-assurance are crucial [8,9], self-esteem can significantly impact professional competence.

In 2001, Prensky introduced the term "digital natives" to describe the generation born in and after 1980, who have grown up surrounded by digital devices and exhibit distinct learning styles from previous generations. Digital natives thrive in a culture of online connection, creativity, and sharing, living a digital existence that revolves around the internet [10]. They acquire information, communicate, engage in activities such as blogging, gaming, and social media interactions, and even perform transactions online. They favor visual information over text, prefer active learning, and can multitask and process information simultaneously [11].

With technology integrating into everyday life, digital literacy has become increasingly vital, closely linked with professional qualifications [12]. The recognition of digital literacy by various international organizations has led governments to revise their educational policies, legislation, and learning environments [13]. To implement 21st-century competencies, primarily digital competence, in educational public policy, a well-articulated plan is required [14].

Digital literacy is broadly characterized in the literature as the competencies and skills required to navigate our intricate and multifaceted information landscape, particularly when incorporating technology into academic courses [15]. At present, digital literacy encompasses three main pillars: (a) identifying and consuming digital content; (b) generating digital content; and (c) disseminating or distributing digital content. Various definitions of digital literacy exist, each intertwining different technical and non-technical facets [16].

Central to digital literacy is comprehending and decoding digital content [17,18]. This skill has become essential, especially since clinical research is predominantly available online, and digital tools are becoming standard for emerging research projects [19,20]. In the academic setting, students use digital technologies—ranging from diverse software to information hardware [21]—for numerous educational activities. These include accessing digital learning platforms, communicating via email, engaging with e-journals or e-books, and taking part in online evaluations [11].

In dentistry, precision, expertise, and patient interaction are fundamental. Self-esteem directly impacts professional performance, with confident professionals more likely to make informed decisions, communicate effectively with patients, and adapt to challenging clinical scenarios. As healthcare undergoes a digital revolution, digital literacy has become paramount, particularly as the reliance on digital tools for patient records, imaging, and procedures increases [22]. Understanding how self-esteem and digital literacy influence the perceived professional competence of dental students can provide valuable insights, leading to targeted strategies in dental education to enhance these aspects and ultimately improve patient care [23].

Given the importance of these elements in dental practice and the current gaps in understanding their role in shaping professional competence among dental students, it is imperative to further explore these interactions. This study aims to investigate the influence of dental students' digital literacy and self-esteem on their professional competence.

The potential findings from this study could significantly impact dental education and practice. By understanding the role and interplay of self-esteem and digital literacy in shaping professional competence, we can inform the design of educational strategies to foster these crucial attributes. This could result in a more competent and confident generation of dental professionals, enhance patient care, and contribute to improved oral health outcomes in the community.

2. Materials and Methods

2.1. Study Design and Sampling

This research utilized a mixed-methods design, incorporating descriptive and relational scanning models. The study aimed to shed light on specific phenomena or concepts through this integrated approach by leveraging qualitative and quantitative data sources. During the first semester of the 2022–2023 academic year, an online questionnaire was administered using Google Forms (Mountain View, CA, USA). This questionnaire comprised eight multiple-choice demographic questions, ten questions from the Rosenberg Self-Esteem Scale with scores ranging from 0 to 4, ten questions from the Digital Literacy Scale with scores ranging from 1 to 5, and eleven questions from the Professional Competence Scale, also scored between 1 and 5. The entire set, amounting to 39 questions, typically required around 15 min for completion. The survey exclusively contained closed-ended questions. Participants' ages varied from 18 to 31 years old. The utilized scales were sourced from established instruments with proven validity and reliability in Turkish.

Cohen et al. suggest that for a descriptive survey model, having at least 384 participants yields a 95% confidence interval and a 0.05 significance level when aiming to represent a population ranging from one to five million individuals [24].

Building on findings by Yu et al. [9], the effect size was determined to be 0.3097572 using G-Power 3.1.9.2. Given this effect size, a 95% confidence interval, and a 0.05 deviation level, the study required a minimum of 115 participants. However, this research gathered data from 427 dentistry students in Istanbul, offering a comprehensive perspective from both private and public institutions. This cross-sectional approach included students from all academic levels within the dentistry program. Participants were selected through a straightforward random sampling method based on their willingness to participate.

2.2. Measuring Tools

The questionnaire form includes a demographic information form, Self-Esteem Scale, Digital Literacy Scale, and Vocational Competence Scale.

2.2.1. Demographic Information Form

This form has been meticulously designed to gather a comprehensive understanding of the student participants' backgrounds. It solicits information about various facets of their personal and academic lives. Specifically, the form inquires about the student's gender and age, which offers insights into the diversity of the sample. Further, it delves into academic specifics, such as the student's current grade level and the reason behind their department choice. The form also seeks to understand their living situation, capturing details on their residence type and living arrangements before joining their current department. Additionally, it gauges their overall satisfaction and engagement level in their chosen field by inquiring about their level of education within the department and their genuine interest in pursuing the profession. Such detailed demographic data provides a richer context to interpret the results of the study.

2.2.2. Rosenberg Self-Esteem Scale (RSES)

The RSES, devised by Rosenberg and later adapted for Turkish audiences by Çuhadaroğlu, is a prominent tool for gauging self-esteem [25]. With its 10 items evaluated on a 4-point Likert scale, the RSES sheds light on an individual's sense of self-worth and feelings about themselves. Its reputation for reliability is confirmed by a previously reported Cronbach Alpha value of 0.81. Within the framework of this research, the scale showcased its consistent reliability with a Cronbach's Alpha of 0.882. Its extensive application and proven reliability highlight its significance as a trusted measure in psychological and sociological studies.

2.2.3. Digital Literacy Scale (DLS)

The DLS, initially crafted by Ng and subsequently adapted for Turkish audiences by Ustundag et al., offers a comprehensive assessment of digital literacy [10,26]. The tool

consists of 10 items evaluated on a 5-point Likert scale, encapsulating the unified dimension of digital proficiency. Historically, the DLS has demonstrated strong internal consistency, as evidenced by a Cronbach Alpha value of 0.86. In the context of this particular study, the instrument exhibited even higher reliability, achieving a Cronbach's Alpha of 0.894. This underscores the scale's robustness and ability to consistently gauge respondents' digital capabilities in varied settings.

2.2.4. Professional Competence Scale (PCS)

Based on expert opinions and the relevant literature, the Professional Competence Scale aims to measure perceptions of vocational aptitude. The scale comprises 11 items, utilizing a 5-point Likert-type format to gauge responses, ranging from "Strongly Disagree" to "Strongly Agree" [27,28]. Participants' total scores can range from 11 to 55, with a higher score indicating a more favorable perception of one's professional competence. The scale has demonstrated both reliability and validity in various settings. In this study, the PCS exhibited internal solid consistency with a Cronbach's Alpha value of 0.851, showcasing its appropriateness for assessing dental students' perceptions of their professional abilities.

2.3. Ethical Considerations

This study strictly adhered to ethical standards and received approval from the Ethics Committee. Before launching the cross-sectional study, participants were presented with a consent form detailing the research objectives. Their participation was entirely based on their discretion, ensuring it was voluntary. The study refrained from collecting personal identifiers to maintain confidentiality and privacy.

2.4. Statistical Analysis

Demographic details were presented using frequencies. For scale scores, means and standard deviations were the primary descriptors. Reliability was ensured through Cronbach's Alpha for internal consistency, while the Confirmatory Factor Analysis was employed to validate the data. The Kolmogorov–Smirnov test assessed the normality distribution of the study's parameters. Given that the distribution of all scale means was non-normal, nonparametric tests became the approach. The Mann–Whitney U test was chosen to highlight differences between the two groups. For identifying distinctions across more than two groups, the Kruskal–Wallis test was implemented.

Relationship analyses utilized Spearman's rho correlation for univariate nonparametric correlations and the Generalized Linear Model (Logit Model) for multivariate nonparametric regression. The Generalized Linear Model is specially designed for nonparametric regressions, making it different from typical logit models. One advantage of this model is its ability to work directly with scale parameters without strictly dividing the data into two or multiple distinct categories. However, all regression models showed some deviations [29]. With its logit assumption, the Generalized Linear Model effectively reduced deviations for nonparametric variables. All statistical analyses were conducted using the SPSS 25.0 software, with a confidence level set at 95% and a significance threshold of 0.05.

3. Results

The research encapsulates a detailed exploration of dental students' demographic and academic inclinations. Predominantly, females formed a significant segment, representing 65.6% of the study's participants. Dovetailing with this, a remarkable 85.2% were aged 21 or older, harmonizing with the observation that 35.2% were engrossed in their fourth year of academic pursuit. Delving into the socio-cultural milieu, 40% of these budding professionals cohabited with family members. Moreover, Istanbul, the city under study, was a new home for 57.8% of these students, having migrated from other provinces. In the academic realm, 57.6% expressed a definitive alignment with their current department, marking it their top academic choice.

Transitioning to their academic perceptions, the landscape is slightly variegated. While a measurable 55.7% assessed their departmental educational quality as moderate, a near equivalent 48.5% articulated an elevated zeal for their academic discipline (Table 1).

Table 1. Baseline characteristics of participants.

		Count	Percentage (%)
Gender	Female	280	65.6
	Male	147	34.4
Age	20 and above	63	14.8
	21 and higher	364	85.2
Grade	1st grade	2	0.5
	2nd grade	82	19.2
	3rd grade	81	19.0
	4th grade	150	35.2
	5th grade	111	26.1
Residence type	Dormitory	69	16.2
	With friends	120	28.1
	With family	171	40.0
	Other	67	15.7
Preference	First five	246	57.6
	Second five	108	25.3
	Other	73	17.1
Residence location	Istanbul	180	42.2
	Outside	247	57.8
Education evaluation	Very little	5	1.2
	Little	23	5.4
	Moderate	238	55.7
	High	140	32.8
	Very high	21	4.9
Occupation interest	Very little	3	0.7
	Little	12	2.8
	Moderate	97	22.7
	High	207	48.5
	Very high	108	25.3

Upon assessing the Professional Competence Score (PCS), an intricate exploration revealed that several factors, such as gender, age, academic tenure, residential category, and geographic origin, did not yield any discernible statistical divergence ($p > 0.05$). Contrastingly, students exuding high academic satisfaction and those ranking their department in the top echelons showcased significantly elevated PCS scores ($p < 0.05$) (Table 2).

Table 2. PCS score differences according to the demographic properties of participants.

		Mean	Std. Deviation	Test Value	*p* Value
Gender	Female	42.00	7.20	18,449.500 (U)	0.078 [a]
	Male	40.67	7.24		
Age	20 and above	42.30	6.66	10,832.500 (U)	0.483 [a]
	21 and higher	41.41	7.33		
Grade	1st grade	31.50	2.12		
	2nd grade	42.87	6.85		
	3rd grade	42.11	7.05	8.297 (X^2)	0.081 [b]
	4th grade	40.86	7.43		
	5th grade	41.22	7.27		

Table 2. *Cont*.

		Mean	Std. Deviation	Test Value	*p* Value
Residence type	Dormitory	42.43	7.10		
	With friends	40.09	7.56	6.296 (X^2)	0.098 [b]
	With family	42.17	7.41		
	Other	41.64	5.98		
Preference	First five	42.26	7.29		
	Second five	40.83	7.19	6.196 (X^2)	0.045 [b]
	Other	40.18	6.89		
Residence location	Istanbul	42.17	7.14	20,687.500 (U)	0.220 [a]
	Outside	41.09	7.28		
Education satisfaction	Very little	34.80	9.55		
	Little	36.61	7.74		
	Moderate	40.56	7.07	39.819 (X^2)	0.000 [b]
	High	43.44	6.58		
	Very high	47.10	5.49		
Occupation interest	Very little	28.67	11.24		
	Little	30.33	6.33		
	Moderate	36.80	6.98	110.891 (X^2)	0.000 [b]
	High	42.29	5.94		
	Very high	45.97	5.50		

[a]. Mann–Whitney U Test (U); [b]. Kruskal–Wallis Test (X^2).

Spearman's rho correlation analysis further accentuates the statistical robustness of the study. This methodological tool substantiated that PCS shared a positive synergy with self-esteem (RSES, r = 0.398; $p < 0.01$), digital literacy (DLS, r = 0.404; $p < 0.01$), departmental preference (r = 0.120; $p < 0.05$), satisfaction with the quality of education (r = 0.298; $p < 0.01$), and an intrinsic occupational fervor (r = 0.502; $p < 0.05$) (Table 3).

Table 3. Spearman's rho correlation analysis results between PCS, SES, DLS scores, and significantly different parameters for PCS scores.

	r	*p*
RSES Total	0.398 **	0.000
DLS Total	0.404 **	0.000
Preference	0.120 *	0.013
Education satisfaction	0.298 **	0.000
Occupation interest	0.502 **	0.000

* $p < 0.05$ ** $p < 0.01$ RSES: Rosenberg Self-Esteem Scale; DLS: Digital Literacy Scale; PCS: Professional Competence Scale.

A subsequent evaluation using the Generalized Linear Model (Logit Model) further buttressed these findings, unequivocally emphasizing the statistical significance of variables such as RSES (B = 0.290; $p < 0.01$), DLS (B = 0.258; $p < 0.01$), educational contentment (B = 0.806; $p < 0.05$), and notably, professional zeal (B = 3.825; $p < 0.01$) in influencing PCS. (Table 4).

Table 4. Generalized linear model (logit model) analysis results for correlated factors with PCS.

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Lower	Upper	Wald X^2	*p*
(Intercept)	9.298	1.82	5.74	12.86	26.221	0.000
[Preference = First five]	1.199	0.70	−0.18	2.58	2.913	0.088
[Preference = Second five]	0.000	0.79	−1.56	1.56	0.000	>0.05
[Preference = Other]	0 [a]	.	.	.	.	.
RSES Total	0.290	0.05	0.20	0.38	38.193	0.000
DLS Total	0.258	0.03	0.20	0.33	53.396	0.000
Education satisfaction	0.806	0.38	0.05	1.56	4.399	0.036
Occupation interest	3.825	0.33	3.17	4.48	130.654	0.000
(Scale)	27.478 [b]	1.88	24.03	31.42		

Dependent Variable: PCS Total; Model: (Intercept), Preference, SES_Total, DLS_Total, Education satisfaction, Occupation interest; [a]. Set to zero because this parameter is redundant; [b]. Maximum likelihood estimate; RSES: Rosenberg Self-Esteem Scale; DLS: Digital Literacy Scale; PCS: Professional Competence Scale.

The core findings of this study highlight the critical role of both self-esteem and digital literacy in shaping dental students' perceptions of professional competence. Notably, significant positive correlations were observed between self-esteem and professional competence (RSES: r = 0.398; *p* < 0.01), as well as between digital literacy and professional competence (DLS: r = 0.404; *p* < 0.01). In addition, professional interest (r = 0.502; *p* < 0.05) and education satisfaction (r = 0.298; *p* < 0.01) showed significant positive correlations with professional competence. The analysis also revealed that the influence of professional interest on professional competence (B = 3.825; *p* < 0.01) was the most robust among the factors evaluated. It is important to note that these relationships held even after adjusting for other influential factors in the Logit model analysis.

These findings show that self-esteem and digital skills play a significant role in shaping how dental students think about their professional abilities. Impressively, the students' genuine enthusiasm for their field is the main factor, even when set against other elements in the Logit model analysis. The data therein underscore the indispensability of both self-esteem and digital literacy in shaping and potentially enhancing professional competence perceptions among dental students.

4. Discussion

This study investigated the impact of digital literacy and self-esteem on dental students' perceptions of their professional competence. A questionnaire was administered to 427 dentistry students, and the collected data were analyzed. The results demonstrated a positive correlation between digital literacy and self-esteem with students' perceived professional competence.

The literature on professional competence presents varying findings. Some studies report that professional competence differs according to demographic and social characteristics [30–32], while others propose the contrary [33]. In single-centered studies, where demographic characteristics are generally similar, the perception of professional competence does not vary based on these factors. However, in multicenter studies, professional competence levels significantly differ based on demographic characteristics [34–36].

In this study, the perception of professional competence significantly differed only in relation to the order of preference. It is noteworthy that this research was conducted on a specific group of dentistry students at a single center, which may have influenced the results. Different outcomes might be found in various departments or occupational groups and larger samples or multicenter studies.

Factors affecting the perception of professional competence include an individual's professional characteristics and interest in their chosen profession. Individuals who choose their profession willingly and have a high level of interest tend to possess higher professional competence and experience greater life satisfaction [37–39]. In line with this, both educational satisfaction and interest in the profession were found to positively and significantly impact professional competence. Atalayin et al. found that dentistry students residing away from their hometowns exhibited lower academic proficiency compared to those living in their native cities [40]. However, in this study, the educational success of students from other cities was statistically similar to those who resided in Istanbul.

Understanding the factors influencing one's job decision is crucial because it shapes future expectations and could influence career satisfaction. While some people join the workforce with substantial knowledge and reasonable expectations, others might end up in jobs they have yet to learn. Some people choose their careers based on the strategy of least resistance, such as pursuing a career path that their parents have recommended or imitating an older sibling [40]. According to the results of our study, people who choose a job consciously and voluntarily tend to have higher educational performance and self-esteem. Research findings reveal a pronounced positive correlation between self-esteem levels in individuals who placed dentistry among their top five university preferences and those with very high occupational interests. Consistent with these results, a systematic review also identified a significant positive relationship between professional awareness and self-esteem [5].

While the literature contains studies on digital literacy and self-esteem, research examining the effects of these two factors on professional competence is scarce [41,42]. This study found that both digital literacy and self-esteem positively influenced professional competence, with self-esteem having a greater impact.

The findings of this study highlight a positive correlation between students' self-esteem and their educational success. Enhanced psychological well-being can elevate self-esteem among students. This observation aligns with prior research underscoring the pivotal role of psychological health in influencing self-esteem [43,44]. Moreover, it was found that students' positive emotions are directly linked to their self-esteem. Students experiencing positive feelings often maintain a robust and favorable self-esteem, affirming their self-worth and recognizing the respect they merit [45].

Digital literacy also augments one's esthetic perception [46]. Consequently, digital literacy might bolster the esthetic judgments of dentists and dental students engaged in aesthetic dental procedures, amplifying their professional self-assuredness.

Dozic et al. [47] noted a preference among dental students for digital systems over visual and conventional ones, suggesting a shift toward digital literacy. In a separate study, Shooriabi and Gilavand [48] observed that dental students in Iran frequently employ smartphones and digital media for educational endeavors. Similarly, Rung et al. [49] reported dental students' prevalent use of digital and social media for educational activities in Australia.

The incorporation of smartphones as a staple in daily life and as an adjunct tool in many professions is especially relevant in the realm of dentistry. Dentists, predominantly from the digital native generation, can capitalize on the multifaceted utilities presented by smartphones, such as capturing visuals and facilitating text exchanges with patients during diagnostic and treatment phases [50].

A key limitation of this study, and others in the field, is the lack of a specific scale for dentistry, despite the proven validity and reliability of the scales used. Additionally, the single-centered nature of the sample with a similar demographic structure is another notable limitation.

The main contribution of this research to the literature and the field lies in its applicability and pragmatism. By incorporating self-perception and digital literacy education into university curricula, high professional gains can be achieved at very low costs. Another

contribution is the multi-disciplinary nature of the study, which covers both professional development and dentistry.

Given the significant impact of self-esteem and digital literacy on dental students' professional competence, further research in these areas is warranted. Future studies might explore specific interventions to enhance these factors among dental students and their impact on professional competence. Moreover, expanding the research to include students from various demographic backgrounds and multiple centers would provide a more comprehensive understanding.

The implications of this study extend beyond dental education, potentially influencing the broader field of healthcare education and practice. Given the significant correlations between self-esteem, digital literacy, and perceptions of professional competence, these findings underscore the need to prioritize these factors within the curriculum across healthcare disciplines. By incorporating strategies to enhance self-esteem and digital literacy, future healthcare professionals can be better prepared to adapt to the increasingly digital healthcare environment. Thus, these findings underscore the importance of focusing on holistic development in healthcare education.

5. Conclusions

The findings of this study highlight the significant influence of both self-esteem and digital literacy on dental students' perceptions of professional competence. Recognizing these factors, dental schools should integrate methods into their curriculum that boost students' self-esteem and digital skills. By doing this, we can enhance professional competence and attract more students to the field, even those who might have initially shown less enthusiasm.

In today's fast-changing environment where healthcare meets digital technology, the importance of self-esteem and digital literacy cannot be understated. They play a crucial role in preparing the next generation of skilled dental practitioners. Therefore, it is vital for educational institutions to consider these insights when shaping the future of dental education and practice.

Overall, the research emphasizes that digital literacy greatly impacts students' professional competence. This impact, combined with a student's passion for the profession and their confidence, creates a better educational journey for dentistry students. Increasing focus on digital literacy within universities can positively change the domain.

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