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Effect of Teachers Job Satisfaction and Self-Efficacy Performance in Engineering Colleges – A Study with Reference to Engineering Colleges in Ernakulam City

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Abstract **- Engineering education heavily relies on self-efficacy, or the sense and confidence in one's own ability to do a task successfully. It supports educators in developing and strengthening their teaching abilities. Multidimensional and integrated self-efficacy has been added by recent research as the primary component of learning, both theoretically and practically. In professional settings, engineering staff members appear to encounter difficulties in applying their knowledge in a meaningful way, even with extensive training and exposure to core competencies, communication techniques, multidisciplinary teamwork, and other related areas. The purpose of the paper is to examine the idea of self-efficacy and determine how it influences faculty members' engineering proficiencies. The nature of the study is descriptive. The results show that self-efficacy is crucial for enhancing the learning outcomes of engineering education. The goal of the research was to determine how employees' job satisfaction and self-efficacy related to engineering colleges. Both primary and secondary data are used in this investigation. Primary data were gathered via a questionnaire administered to faculty members employed by several engineering colleges located in Ernakulam city. The secondary data came from study papers, books, journals, websites, records, theses that had been published, and other relevant efforts. The data were analyzed using five research techniques: one-way ANOVA, "t" test, regression, and findings interpretation using SPSS.**

Keywords: **Self-Efficacy, Engineering Colleges, Faculties, Planning**

I. INTRODUCTION

Professors are supposed to control disruptive behaviors from their students, including bullying, aggressive behavior, and off-task behavior. Teachers who have to deal with disruptive actions from students often experience stress and burnout, especially if they are unable to control the conduct. Apart from the customary pressures encountered in classrooms, the current Covid-19 pandemic has exacerbated teacher stress in remote learning environments and reduced their self-assurance in their overall pedagogical skills (Haddad et al., 2016). Increasing teachers' general self-efficacy in the classroom is one strategy to reduce teacher stress (Ahmadi et al., 2014). Depression, anxiety, and overall stress are all inversely correlated with self-efficacy. Self-efficacy has a negative correlation with depressive and anxious symptoms as well as general stress. Self-efficacy influences how a person evaluates a stressful circumstance, which can have an impact on behavior. An individual may perceive stressful situations as challenges that present opportunities or as threats, contingent on their degree of self-efficacy. The person's behavior as a whole will then be impacted by these points of view since they may feel things that either improve or worsen their general feeling of mental health. Self-efficacy influences how a person evaluates a stressful circumstance, which can have an impact on behavior (Balasubramanian et al., 2021). Depending on their degree of self-efficacy, people may see stressful circumstances as opportunities for growth or as threats. The person's behavior as a whole will then be impacted by these points of view since they may feel things that either improve or worsen their general feeling of mental health. Three elements make up a teacher's self-efficacy: (a) effectiveness in engaging students; (b) effectiveness in instructional tactics; and (c) effectiveness in classroom management. These three elements can be used to conceptualize teachers' perceptions of their own abilities in the classroom (Prabahar et al., 2024). Academic learning is primarily facilitated by faculty members in all universities (Geng, 2024). Every college or university considers the need to select academic staff members who are competent in their work, since this would surely impact students' learning and knowledge acquisition. In this study, self-efficacy will be the element whose impact is being examined in an effort to show how several factors that could be used as predictors of faculty members' performance are converging (Hassan & Ehsan, 2015). Therefore, in order to better appreciate how teacher experience may impact self-efficacy, it is necessary to consider that emotional intelligence and balance are fundamental qualities that teachers must have in order to effectively handle challenging situations (Rahimabadi & Iranyar 2015). The primary goals of this paper are to clarify the Effect of Self-Efficacy on Performance of Teachers in

Engineering Colleges and to identify, analyze, and discuss the key connections between the Principal, HOD, faculty, and management professionals in Ernakulam city and higher authorities in the colleges (Chlaihawi, 2023; Azimi, 2015). The contribution of the proposed work is,

- In the first phase, Descriptive statistics were examined using the Statistical Package for Social Sciences (SPSS) software in order to ascertain the degree to which teachers' job performance is influenced by their level of self-efficacy. The mean values of all three variables were computed.
- The second phase's simple linear regression analysis determines how the instructors' opinions of their own efficacy and job satisfaction vary based on factors such as age, gender, job location, level of education, and seniority in the field. To carry out this, the mean or average value for both variables has been determined.
- The one-way ANOVA, "t" test, correlation, Garrett ranking, and multiple regression analysis were employed to examine the information in order to ascertain how self-efficacy and motivation affect teachers' academic performance, success, mental health, and overall job performance.

The article is organized as follows for the remainder of it. First, a study of the literature on employee mental health is conducted, and theoretical theories are then presented. Secondly, the techniques and findings of this investigation are proposed. We then wrap up by talking about our findings, their practical and theoretical consequences, Ultimately, we derive a study conclusion and our recommendations for further research.

II. Literature Review

According to Bandura (1995), self-efficacy is the conviction that one can plan and carry out actions that result in the desired outcome (Elrayah, 2022). People have a system that allows them to exert control over their motivations, ideas, feelings, and behaviors, according to Bandura's social cognitive theory. This system influences an individual's cognitive processes and actions to alter their environments (Bandura, 1995). Simply put, an individual's self-efficacy can heavily influence what the individual will do with the knowledge and skills they have in that situation (Bandura, 1995, Pajares, 1997). Bandura's social cognitive theory has been used to conceive a large number of studies pertaining to teacher self-efficacy (Puys et al., 2022). According to Mojavezi and Tamiz (2012), teacher self-efficacy is a gauge of an educator's confidence in their ability to improve student learning in the classroom. Effective teaching strategies are more likely to be employed by educators who have higher levels of self-efficacy, which leads to a more productive learning environment (Poulou et al., 2018) and thus an increase in academic achievement (Eberle, 2011 & Mojavezi & Tamiz, 2012). The studies below suggest the important associations between Teaching, teacher well-being, and teacher self-efficacy (Moradtalab & Jafari, 2014).

Teacher self-efficacy is an important variable as it is related to teaching approaches (Eberle, 2011; Mojavezi & Tamiz, 2012; Shahzad & Naureen, 2017). On the one hand, Effective practices are more likely to be implemented by teachers who have a higher level of self-efficacy such as teaching students class-wide and school-wide rules and reinforcing appropriate behaviors (Akin-Little et al., 2007; Han & Weiss, 2005). On the other hand, teachers who have lower self-efficacy were less likely to use skills learned in professional development, refer students to the student support team when needed, or develop students' crucial skills in reading and math (Zee & Koomen, 2016). In addition to teaching approaches, teacher self-efficacy is also related to teachers' wellbeing.

Additionally, self-efficacy may serve as a buffer against teacher stress and burnout (Kanta & Srivalli, 2019). Higher self-efficacy teachers are more likely to be passionate about their work and more committed to the field overall (Allinder, 1994; Burić & Moè, 2020), while lower self-efficacy teachers are more likely to feel worn out, depressed, and less effective (Skaalvik & Skaalvik, 2010). These findings illustrate the need to build up teachers' overall sense of self-efficacy because many of them report behavioral concerns among students, role ambiguity, work overload, lack of support from administration and parents, and general stress (Vargas Rubilar & Oros, 2021; Wu, 2020). In the first several years of teaching, stress and high attrition might make teacher self-efficacy especially crucial for new instructors. (Swan et al., 2011).

The attrition rate among the teaching profession is considerably high for novice teachers. Hughes (2012) found that the rate of attrition among teachers within their first five years ranged from 20% to 50%. Swan et al. (2011) further suggested that there is a decline in self-efficacy from a preservice teacher's student teaching year to their first year as an in-service teacher. Researchers attribute this to the sense of security that preservice teachers have in the supportive teaching environment (Swan et al., 2011); however, after graduation, when teachers do not feel confident in their ability to lead a classroom productively, they may leave the profession for a more supportive profession. However, from the first year to the second year, there is a boost in self-efficacy (Hughes, 2012), suggesting that individuals who do stay in the profession will continue to become more confident in their abilities in turn raising their overall levels of selfefficacy (Anning, 2024). Despite the growing research on this topic, the relationship between teacher experience and self-efficacy remains unclear (Guo et al., 2011; Hughes, 2012; Shoulders & Scott Krei, 2015). To have a clearer understanding of the relation, one can look at how teacher experience is associated with their overall self-efficacy. To further examine the relation, one can also investigate whether teacher experience is respectively associated with the three components.

A. Problem Statement

Teachers' perceptions of their capacity to manage student behavior, engage students, and apply successful teaching techniques in order to establish productive learning environments are influenced by their level of self-efficacy (Paydar & Ghahremani, 2019). Teachers will observe improvements in students' behavior and academic performance when they have high levels of self-efficacy (AlHasni, 2017). Furthermore, self-efficacy is a protective factor for teachers and mediates stress within the profession. A majority of studies within the current research have examined teacher self-efficacy concerning differing styles of teaching, effects on certain groups of individuals, or student academic success (Corry & Stella, 2018; Jamil et al., 2012; Savolainen et al., 2013). Few studies, if any, strictly look at how teacher experience is associated with self-efficacy and its three factors according to Tschannen-Moran & Hoy (2001). Therefore, in this study, Effect of Self Efficacy on Performance of Teachers in Engineering Colleges.

- **Research Questions**
  - What is the relationship between teachers' self-efficacy and job performance, and how much does it affect their performance on the job?
  - How do teachers' evaluations of their own efficacy and job satisfaction vary according to their age, gender, place of employment, level of education, and professional seniority?
  - Is work satisfaction among instructors meaningfully predicted by their assessments of their own efficacy?
  - How do students feel about their professors' job performance, and how does this relate to their study environment, workload perceptions, and academic self-efficacy?
  - What effects do motivation and self-efficacy have on teachers' achievement, mental health, and general job performance?

III. METHODOLOGY

This study using a single-methods technique to identify the sources of engineering teaching efficacy in an engineering unit and whether or not different sources of efficacy information significantly affect PSTs' perceptions of engineering teaching efficacy. A simple-methods design approach was selected due to the exploratory nature of the study and the complexity of the self-efficacy notion (Morse and Niehaus 2009). This method combines quantitative data from a self-efficacy teaching tool with qualitative data from written comments on the learning experiences and instructional components that enhance teaching self-efficacy (Okoye & Okike, 2021). While the quantitative data offered direction and a glimpse of patterns in the current study, the qualitative component enabled us to identify the sources of engineering teaching efficacy associated with the change in PSTs' opinions regarding engineering teaching efficacy. The study was conducted in the Ernakulam district (Geetha & Sripirabaa, 2017). A carefully crafted questionnaire was used to collect 75 sample responses from professors and higher-ups working for several engineering schools in Ernakulam, Kerala (Ismayilova & Klassen, 2019). The results of the current study show a strong relationship between the degree of self-efficacy among teachers and their performance at engineering institutions (Abun et al., 2022). A population is a distinct group of people, whether it be a country or a group of people who have something in common. It is the population that the statistical sample for a study is drawn from. Consequently, any group of people who are united by a shared trait can be referred to as a population. This study focuses on "Various Engineering colleges," and the 250 employees who work for this company make up the study's population.

A. Research Location and Rationale

Kerala is situated on the southwest coast of the Indian subcontinent. Kerala has a rich history of international trade as well as artistic and cultural legacy (Minnich, 2019). India's most literate state is renowned for its accomplishments in the areas of social justice, education, health, gender equality, and law and order (Rosalina, 2023). Furthermore, the state has the nation's lowest newborn mortality rate. Kerala, which occupies 38863 square kilometers, is located between the Western Ghats (Sah & Srivastava, 2021) in the east and the Arabian Sea in the west. It is one of the five states that comprise the linguistic and cultural region known as South India. Kerala's adjacent states are Tamil Nadu and Karnataka. Mayyazhi (Mahe/Mahe) is in Kerala and is a part of Pondicherry (Puducherry). Despite being a part of the Union Territories, the Lakshadweep in the Arabian Sea is closely associated with Kerala's linguistic and cultural legacy (Jang et al., 2023). Ernakulam is a blend of a rich history and the expansion of industry and trade worldwide. It shares borders with the Lakshadweep Sea to the west, Alappuzha and Kottayam to the south, Idukki to the east, and the Thrissur district to the north. In Keralan history, Kochi is referred to be the Queen of the Arabian Sea, and Ernakulam is a component of this city (Preechawong et al., 2024). An excellent illustration of Kerala State's achievements in trade, commerce, industry, and literacy is the densely populated Ernakulam District. With its inclusive culture, relatively high per capita income, and residents' unwavering desire to stay up to date on local and international political, economic, social, and cultural developments, Ernakulam is a prime example of Kerala society's high modern phase. Numerous engineering institutes, including prestigious BTech, mechanical, and civil engineering schools, can be found in Ernakulam, India. In addition to offering the finest employment prospects, engineering schools teach students how to tackle the most important issues facing society. Without any official instruction, college students learn how to think like problem solvers. By using their knowledge, skills, and creativity, engineers design, develop, and maintain buildings, systems, and technologies that improve our quality of life. Engineering has a significant impact on the world we

live in, from producing clean water and electricity to developing life-saving medical treatments.

B. Data Collection and Sampling

Both primary and secondary data are used in this investigation. The questionnaire was used to gather primary data from higher-ranking officials at different engineering universities (Granziera et al., 2019). A pre-test was carried out prior to conducting the final poll. It was discovered during the pre-test that various adjustments were required, including rearranging the questions, adding and removing questions, making some of the questions simpler, and shortening their duration (Abdullah et al., 2022). The questionnaire was updated to reflect all of these modifications. The possible practical issue with data collecting was identified with the aid of the pre-test. Records, books, journals, websites, research papers, published theses, and other relevant endeavors were the sources of the secondary data.

The study's questionnaire is well-structured and helpful. The questionnaire's questions underwent pre-testing. Additionally, tests and verifications were conducted on its validity and reliability. Content, criterion, and consistency are all included in the validity elements. The dependability value (Cronbach Alpha 83.9%) is 0.839. The questions were evenly spaced out to address the demographic background, work-life balance, and job satisfaction of the respondents. The questions were designed to be multiple-choice, closed-ended, and open-ended.

- **Hypothesis**
  - H1: Teachers' job performance and self-efficacy are significantly positively correlated, with stronger self-efficacy translating into better job performance.
  - H2: There are notable differences in teachers' judgments of their own efficacy and job satisfaction based on their gender, workplace, age, educational background, and professional seniority.
  - H3: Teachers' job happiness is significantly predicted by their beliefs of their own efficacy, with higher self-efficacy resulting in better job satisfaction.

C. Statistical Tool

ANOVA, the "t" test, Garrett ranking, multiple regression, and correlation are used in data analysis and interpretation. The data was analyzed using these methods, and SPSS was used to interpret the findings. This approach looks for connections between job happiness and self-efficacy. The results provide important new information about workers' self-efficacy and how it affects burnout and work-life balance in the current administrative environment.

IV. EXPERIMENTAL ANALYSIS

It is assumed that the majority of respondents are in the 25–50 age range and have worked in a healthcare facility, while the largest proportion of respondents (52%) are married and have worked in a college. Additionally, the majority of respondents (60%) live in nuclear families. The majority of sample responses are assumed to be faculty members Table I.

TABLE I PARTICIPANTS OVERVIEW

Characteristics	Variables	No. of Respondents	Percentage
Gender	Female	36	48
	Male	39	52
	Total	**75**	**100**
Age	Below 25 years	28	37.3
	25-35 years	35	46.7
	36-45 years	6	8.0
	Above 45 years	6	8.0
	Total	**75**	**100**
Marital Status	Married	39	52
	unmarried	36	48
	Total	**75**	**100**
Designation	HOD	57	76
	Staffs	18	24
	Total	**75**	**100**
Monthly income	Below Rs.15,000	31	41.3
	Rs.15,000-20,000	25	33.3
	Rs.20,001-25,000	5	6.7
	Above Rs.25,000	14	18.7
	Total	**75**	**100**
Experience	Less than 5 years	31	41.3
	5-10 years	25	33.3
	11-15 years	5	6.7
	Above 15 years	14	18.7
	Total	**75**	**100**
Number of hours in a day	Less than 2 hours	21	28.0
	2-4 hours	21	28.0
	5-6 hours	18	24.0

	More than 6 hours	15	20.0
	Total	**75**	**100**
Way of spend leisure time	Canteen	25	33.3
	Library	17	22.7
	Doing pending works	20	26.7
	Take extra classes	13	17.3
	Total	**75**	**100**
Day having additional work	Below 1 hour	49	65.3
	1-2 hours	16	21.3
	2-3 hours	5	6.7
	More than 3 hours	5	6.7
	Total	**75**	**100**
Level of work load	Increased	60	80.0
	Decreased	1	1.3
	No change	14	18.7
	Total	**75**	**100**
Working hours per week	7 hours	09	12.0
	5 hours	17	22.7
	4 hours	22	29.3
	below 3 hours	27	36.0
	Total	**75**	**100**
Source: Primary data			

At the (0.05) level, the balance of healthcare workers' various marital statuses is important. Multiple linear regression and correlation were two parametric tests employed in the current investigation to test the advanced hypotheses.

Gender, workplace, age, education, and professional seniority all have a substantial impact on teachers' evaluations of their own efficacy and job happiness.

Assessments of self-efficacy and job satisfaction vary significantly depending on workplace, professional seniority, gender, age, and educational attainment. The one-way ANOVA was used to test the null hypothesis. The comparison of job satisfaction and self-efficacy views by gender, workplace, age, education level, and professional seniority is displayed in Table II.

TABLE II SIGNIFICANT DIFFERENCE AMONG DIFFERENT AGE GROUP OF HEALTHCARE WORKERS WITH RESPECT TO THE WORK LIFE BALANCE DURING PANDEMIC

Self-Efficacy	Extremely Confident	Quite Confident	Somewhat Confident	Slightly Confident	F Statistics	**p Value**
If I don't give up, I can do well on practically all of my engineering homework.	3.2000	4.0480	3.8136	4.0000	2.324	0.078
I am able to grasp the material in the engineering-related classes I'm enrolled in this semester.	3.0000	3.1200	3.8475	3.8889	2.786*	0.044
I believe I can think like a professional engineer.	3.5000	3.7889	3.6102	3.5848	4.717*	0.004
I feel enough confident to ask any questions in the class hours?	2.6000	2.9091	3.6441	3.2222	3.372*	0.021

The results indicate that the degree of job satisfaction varies statistically significantly between the age group of workers and the expectation that they will work long hours to meet goals and that rigid work schedules will lead to neglect of family and home matters, among other things. There is a substantial difference between the views of self-efficacy and work satisfaction because the significant value of these components is less than 0.05. As a result, there are notable differences in job satisfaction and self-efficacy views based on gender, workplace, seniority in the workplace, age, and educational background.

Teachers' self-efficacy and job performance are significantly positively correlated, with more self-efficacy translating into better job performance.

Employees' perceptions of work-life balance vary depending on their level of self-efficacy. The null hypothesis was tested using the "t" test. Table III displays the comparison of perceptions of instructors' work performance and self-efficacy.

TABLE III TEACHERS' JOB PERFORMANCE AND SELF-EFFICACY ARE SIGNIFICANTLY POSITIVELY CORRELATED, WITH MORE SELF-EFFICACY TRANSLATING INTO BETTER JOB PERFORMANCE.

Job performance	Extremely confident	Quite confident	Somewhat confident	Slightly confident	t Statistics	p Value
I believe I can overcome obstacles in my teaching	4.3400	3.8136	4.0000	3.8400	4.160*	0.000
I'm confident in my ability to adapt to new teaching methods	3.6400	3.8475	3.8889	3.6267	0.082	0.935
I am confident in my ability to handle challenging students	3.6177	3.6102	3.5848	3.7800	1.004	0.318
I believe I can persist in my research even when facing setbacks	3.8200	3.6441	3.2222	3.9200	0.743	0.459
I am confident in my ability to publish research in high-impact journals	3.9000	4.2000	4.0000	4.0533	1.238	0.218
I can manage my time effectively to balance teaching and research demands	4.2000	3.8400	3.8889	3.8904	0.066	0.947
I am confident in my ability to put in the effort required to excel students in their academics	3.8400	3.7600	3.5848	3.7600	3.202*	0.002
I believe I can invest the necessary effort to reach my career goals.	3.7600	3.9800	3.2222	3.5467	1.770	0.079
I am confident in my ability to put in sustained effort to complete challenging projects.	3.9800	4.0200	4.2000	3.6667	0.592	0.555
I believe I can expend the effort required to maintain a healthy work-life balance.	4.0200	3.8475	3.8400	3.7337	1.849	0.067
I am confident in my ability to invest effort in learning new skills or technologies.	3.9000	3.6102	3.7600	3.7067	2.205*	0.029
I believe I can exert the effort needed to overcome personal challenges and obstacles.	3.9400	3.6441	3.9800	3.6000	2.202*	0.030
I believe I can make well-informed choices in managing my time and workload.	3.9200	3.8136	4.0200	3.6933	1.862	0.065
I am confident in my ability to choose the most effective assessment methods for my students	3.9400	3.8475	3.8889	3.8667	0.361	0.718
I believe I can make sound decisions regarding my research directions and priorities.	4.2800	3.6102	3.5848	4.0267	1.640	0.104

Source: Primary data

*-Significant at five per cent level

According to the research, teachers' perceptions of their own effectiveness are a major indicator of how satisfied they are with their jobs, with higher levels of self-efficacy being associated with higher job satisfaction. The significant value of the perception of self-efficacy in these categories being less than 0.05 indicates that teachers' perceptions of their own self-efficacy are a major predictor of their job pleasure, with higher self-efficacy translating into greater job satisfaction. As a result, teachers' assessments of their own effectiveness serve as a reliable gauge of their job satisfaction, with higher levels of self-efficacy corresponding to higher levels of job satisfaction.

Job satisfaction among teachers is significantly predicted by their judgments of their own efficacy, with higher self-efficacy translating into better job satisfaction.

Table IV below illustrates the connection between employees' self-efficacy and job happiness.

TABLE IV PROFESSIONAL SENIORITY OF THE RESPONDENTS AND SUBJECT VARIABLES – "T" TEST

Sl. No	Characteristics	Self-efficacy		Job satisfaction	
		Mean %	S.D	Mean %	S.D
1.	I have faith in my abilities to engage students in my classes and give captivating presentations.	90.82	7.68	119.66	11.23
2.	I believe I can design and conduct research projects that yield meaningful results.	88.27	9.41	116.90	11.64
Total		**8.55**	**89.54**		**118.33**
"t" Values for Statistical Results		2.169		2.244	
Degree of Importance		p<0.005		p<0.005	

Source: Primary data

It is clear from Table IV that workers with more education have greater levels of job satisfaction (90.82) and self-efficacy (119.66). The t values of work satisfaction and self-efficacy, as well as the perceptions of self-efficacy and job satisfaction, vary significantly by educational level, and professional seniority is statistically significant. An attempt was made to ascertain the level of self-efficacy and work satisfaction assessments. The degree of job satisfaction and self-efficacy assessments have been categorized into five groups for analytical purposes: There are several levels of confidence: very, quiet, somewhat, somewhat, and not at all. Quite confident level self-efficacy perceptions and job happiness are indicated by score values between $(\bar{x} + SD)$ and $(\bar{x} - SD)$, whereas high level self-efficacy perceptions and job contentment are indicated by score values > $(\bar{x} + SD)$ and < $(\bar{x} - SD)$, respectively.

TABLE V JOB SATISFACTION AND SELF-EFFICACY PERCEPTION SCALE

Variables	**Statistics**		**Scale**				
	Mean ($\bar{x}$)	SD	Extremely confident	Quite confident	Somewh at confident	Slightly confident	Not at all confident
Self-efficacy perceptions	117.78	11.02	128.80<	106.76	115.76	128.80	<106.76
Job satisfaction	89.54	8.55	98.09<	80.99	85.96	98.09	<80.99

Source: Primary Data

The mean ($\bar{x}$), standard deviation (SD), and scale used to gauge work satisfaction and self-efficacy views are displayed in table V. According to the data, there is no discernible relationship between college instructors' work happiness and their evaluations of their own efficacy. All things considered; the new engineering design self-efficacy measure is a useful tool that can provide teachers with knowledge about students' views to supplement their understanding of their academic performance.

V. Conclusion

In the discipline of engineering, self-efficacy is a new concept. Understanding a person's self-efficacy and how it influences their learning broadens the scope of what may be determined by academic performance alone. There are several advantages to developing more precise student perceptions of self-efficacy in engineering settings, which should help lower obstacles to entering the field. In engineering degree programs, self-efficacy has been connected to advancement, motivation, and academic achievement. These correlations vary depending on the environment, and knowing the origins of self-efficacy is essential for directing improvements in practice and policy. Teaching self-efficacy is a potent notion that has been linked to instructors' instructional methods. Thus, the current study highlighted the foundations of engineering teaching self-efficacy beliefs and ways for integrating the engineering unit into a teaching techniques course. Teachers who are looking for ways to include engineering management into their technique's courses will find our study useful in that regard. The results of these studies could help engineering teacher educators better integrate engineering into elementary teacher education curricula. A new and validated engineering design self-efficacy tool has been created based on the study's findings. The three validation processes provide assurance that self-efficacy was logically connected, respondents were correctly identified and aggregated, and engineering design was adequately represented.

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