Filipino Engineering Students' Perceptions about Teaching and Motivations to Pursue Teaching Career

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Abstract *–Quality education depends primarily on the quality of teachers. This is particularly true in the case of Science, Technology, Engineering, and Mathematics (STEM) education. Understanding the factors that motivate students and professionals to choose a teaching career in STEM is crucial in teacher recruitment, retention, and performance. It is for this reason that this study sought to determine the motivation to teach among Filipino engineering students as well as their perceptions about this profession. Fifty-seven engineering students answered a questionnaire adopted from Watt and Richardson's Factors Influencing Teaching Choice (FIT-Choice) Scale. Results suggest that top motivators include altruistic-intrinsic reasons such as the desire to make social contributions, help shape the future of children/adolescents, and promote social equity. Prior experiences in learning and teaching were also determined to be influential among the respondents. At the same time, the respondents also perceived teaching as a demanding task that requires high level of expertise. Low salaries and experiences of dissuasion from others were also noted as potential barriers to choosing teaching as a career. It is recommended that more comprehensive studies be done not only with engineering students but also with students of other STEM fields. It is hoped that more support and encouragement will be accorded to these prospective STEM educators by understanding their motivations in choosing and beliefs about teaching.*

Keywords *–teacher motivation, perception, STEM education, engineers*

INTRODUCTION

Teaching is arguably a demanding yet fulfilling profession. It is regarded as a noble pursuit [1] which is crucial in maintaining an informed citizenry [2]. The impact of teaching goes beyond the educational systems to include its influence on the career choice of many people [3]. Its contribution to nation-building and the services that it provides to any society rightfully justify its title as the mother of all professions [4].

There are several views on the nature of learning and teaching. For example, the direct transmission and constructivist views have been identified by the Organisation for Economic Co-operation and Development (OECD) in their Teaching and Learning International Survey (TALIS) [5]. The former highlights the role of the teacher in ensuring the efficient communication and acquisition of knowledge and skills while the latter considers the students as active participants in inquiring and reasoning processes. Despite the differences in these views, it cannot be denied that teachers occupy a pivotal position in any academic setting. The success of the educational systems depends largely on the quality of teaching [4].

Economic success has also been correlated with the quality of education. Faster inception of new technologies, higher rates of innovations, and more robust productivity are often seen as the fruits of an educated society [6].These developments cannot be achieved without the constant support and investment in human capital such as in educational provisions [7]. Hence, teachers who are considered as key players in a knowledge-based economy must be supported by providing safe professional communities and encouraged to transform their classrooms and workplace into creative learning spaces [8]. As the need for qualified and dedicated teachers become more palpable in the global community, understanding the factors why people choose this career path becomes more critical [9].

Teaching in the Philippine Context

In the Philippines, the formal educational system has a long history and metamorphosis under colonial and imperialist rule [10]. During the Spanish colonization, learning institutions were established, operated, and maintained primarily by religious congregations [11].

This system was changed when the Americans shifted the administration of schools into the state, emphasized English as the medium of instruction, and established important higher education institutions such as the Philippine Normal School (later on renamed as the Philippine Normal University) and the University of the Philippines [10], [11]. These changes in the educational landscape of the country halted when the Japanese started their campaign in the archipelago and instituted a new curriculum. This curriculum focused on abandoning Western ideologies and embracing Japanese and Filipino cultures as part of the Greater East Asia Co-prosperity Sphere [11]. During this time, books and other teaching materials were censored to conform to Japanese propaganda. This was considered a blackout in Philippine education [12] and an interruption to what the Americans have started.

Today, the country's new K-to-12 curriculum guides the country's basic education system. The enactment of Republic Act (RA) No. 10533 or the Basic Education Act of 2013 paved the way for this new program which aims to contextualize and enhance learning, build proficiency in the mother language, integrate lessons in a spiraling progression, and prepare students for future employment [13]. The K-to-12 curriculum is hoped to raise the quality of education in the country to be at par with the rest of the world [14]. This new system, however, is not free from issues and concerns. Sergio [15] listed some of these challenges which include the need to redesign the curriculum, to train teachers, and to ensure that necessary infrastructures are ready to meet the demands of the program. Upon graduation from high school, students may then enroll in technical-vocational schools to receive non-degree certifications or in colleges or universities to earn a bachelor's degree which may normally be completed in four to five years depending on the program of study.

In all of these stages of formal education, people who are in charge of instruction and formation must possess the required minimum qualifications and expertise. For basic education, RA No. 7836 or the Philippine Teachers Professionalization Act of 1994 mandates that only those with a valid certificate of registration and professional license from the country's Professional Regulation Commission or PRC are allowed to be appointed as teachers [16]. In higher education institutions (HEIs), instructors must have at least a master's degree and where applicable, a professional license to be allowed to teach at the undergraduate level [17], [18]. All students of bachelor's degrees in elementary education, secondary education, and some Bachelor of Arts programs are also required to render a minimum number of hours in classroom observation and practice teaching [19].

At the start of the school year 2018-2019, the Commission on Higher Education or CHED recorded a total of 653,207 enrollees in education and teacher training programs [20]. In September 2018, PRC announced that 18,409 elementary teachers and 60,803 secondary teachers passed the Licensure Examination for Teachers or LET [21]. Despite these numbers, there is still a dearth in the number of teachers in the country [22], [23]. This is particularly true in the case of Science, Technology, Engineering, and Mathematics (STEM) education.

Shortage in STEM educators in the Philippines is not an isolated case. The lack of high-quality and well-qualified STEM teachers is also felt in other countries such as in Australia and a number of OECD countries [24]. This global inadequacy of STEM teachers becomes more notable given the demands for STEM-related skills in everyday life [25]. Both developed and developing countries agree that STEM education is the key to innovation, economic progress, and skilled human resources [26].

Responding to the Need for more STEM Educators

In response to the concerns regarding the quality of STEM education in the country, the government has launched several initiatives that target the quality of teaching and learning. The Department of Science and Technology – Science Education Institute (DOST-SEI) and the University of the Philippines National Institute for Science and Mathematics Education Development published the Science Framework for Philippine Basic Education in 2011. This framework was intended to help schools, teachers, and instructional materials developers in preparing for science teaching and learning [27]. Undergraduate scholarships such as the Junior Level Science Scholarships or JLSS are also poised to address the shortage of quality STEM teachers in high schools [28]. Graduates of this program are given priority in job placement and will be allowed to teach without a license for five years provided that the grantee will take the LET within five years from the date of hiring. Teacher scholarship programs and graduate scholarships have also been in place as early as 2007 as cited by former DOST Sec. Estrella Alabastro [29]. Today, DOST's Capacity Building Program in Science and Mathematics Education (CBPSME) provides financial aids to qualified master's and doctorate students in science and mathematics

education who are viewed to form a critical mass of STEM education experts in the country [30].

One of the potential solutions identified to solve the burgeoning need for qualified STEM educators is to attract students and professionals from different STEM fields to consider teaching. The JLSS is an example of how students in priority science and technology programs are encouraged to render service as high school STEM teachers for a duration equivalent to the duration of their scholarships. Some of these priority undergraduate courses include engineering programs. In the Netherlands, the Natk4all project was implemented to help engineers who are preparing to become physics teachers [31]. This project consists of physics courses for engineers based on actual high school physics curricula [32]. Given their strong theoretical background in engineering and its application, engineers and engineering students are in a unique position to help in STEM education especially that engineering is sometimes neglected in STEM pedagogical models and interdisciplinary learning [33].

Factors Affecting Choice to Teach

Teaching, however, is often seen as a less lucrative profession compared with other disciplines [1]. In the case of STEM, the opportunities offered by other high-status and salary careers render relatively few STEM professionals choosing to teach [24]. Given the impact of teachers in the beliefs, learning, and success of students [34], it is timely to explore the reasons of those pursuing to teach in STEM and their motivations to stay in this field [24].

Literature suggests that intrinsic, extrinsic, and altruistic motivations provide the impetus for those who choose to teach [1]. Previous studies reported that teacher candidates often consider altruistic and other service-oriented goals such as working with children and adolescents and making social contribution to be influential in their career choice [35].

Altruistically motivated teachers see teaching as a means to contribute to society, enhance social equity, and guide young students in their growth and development [2]. These altruistic motivations are found to be compelling in a number of studies [36]. Intrinsic motivations, on the other hand, tend to emphasize teaching as a genuinely enjoyable and interesting task [2]. Lastly, extrinsic reasons for choosing to teach include the economic, social, and external benefits and rewards accompanying the profession [2], [9].

To understand the motivations of teachers to teach, the Factors Influencing Teaching Choice or FIT-Choice Scale [37] was developed by Watt and Richardson and was determined to be psychometrically valid in its initial usage among Australian preservice teachers [37], [42]. This scale provides an integrated and theoretically-grounded framework [24] which is grounded on expectancy-value and self-determination theories [25], [38]. An international study revealed that the FIT-Choice scale exhibits strong factorial invariance andcould, therefore, be used in other socio-cultural contexts [38]. The present study aims to employ the FIT-Choice scale in describing the reasons why Filipino engineering students consider teaching as a career option. Improving the quality of STEM education depends primarily on the quality of its teachers. Teacher retention, recruitment, and performance can be guided by understanding their motivations in choosing this profession [24].

OBJECTIVES OF THE STUDY

This study aimed to determine the reasons for choosing to teach as a professional career among engineering students. It also explored the respondent's beliefs about teaching and the influences that affected these beliefs. Specifically, this research sought to to determine the factors that motivated the respondents to choose to teach as a career and the respondents' beliefs about the teaching profession.

MATERIALS AND METHODS

Research Design

This study employed the survey research method. Quantitative data were gathered through an online survey. Responses to the open-ended questions in this survey provided the qualitative data for this research.

Participants

A total of 57 engineering students answered the online survey based on the FIT-Choice Scale developed by Watt and Richardson [37]. The survey was conducted in the first semester of the school year 2019-2020. These respondents wereidentified using convenient sampling. Link to the survey was shared with engineering majors and social media groups with engineering students as members. While there are advantages in using online platforms to conduct surveys such as accessibility, cost-efficiency, and time-independence, it is acknowledged that several disadvantages are also attributed to it [39]. This study is limited to the information gathered from its respondents.

An explanatory note asking for the consent and indicating the voluntary nature of the respondents'

participation was included at the start of the survey. The purpose of the survey was also stated as well as the necessary contact information of the researcher. It was explicitly mentioned that all information gathered will be treated with utmost confidentiality.

Research Instrument

To determine the factors influencing the choice of engineering students to pursue a teaching career, the FIT-Choice scale [37] was adopted upon the permission granted by its developers – Profs. Helen Watt and Paul Richardson. The first part of the online survey sought to collect biographical and demographic data which include sex, age, major/program, year standing in the program, type of university (public or private), household's monthly income (based on [43]), and first language. The next four sections were from the FIT-Choice Scale. Responses to each item in these sections range from 1 (not at all) to 7 (extremely).

The FIT-Choice Scale is composed of 12 motivation factors and six perception factors about teaching. This instrument looks into different intrinsic, altruistic (*shape future of children/adolescents, enhance social equity, make social contribution, work with children/adolescents*), and personal utility (*job security, time for family, job transferability*) values in relation to the choice to teach [36]. Perceptions about teaching such as task demand (*expertise, high demand*), task return (*social status, salary*), social dissuasion, and satisfaction with the choice to become a teacher are also explored in this scale.

The second part of the questionnaire asked the willingness of the respondent to teach and the reasons behind this decision. The third, fourth, and fifth sections looked into the factors that influence the respondents' choice to teach, the respondents' beliefs about teaching, and the respondents' experiences of social dissuasion from teaching, respectively [37],[38]. When only the responses of those who expressed their intent to teach were considered, the Cronbach alpha coefficient of this survey was determined to be 0.90. This is lower than the 0.96 coefficient computed from all the responses, including those who said no to teaching. Nonetheless, both values are suggestive of excellent internal consistency.

Statistical Analysis

Quantitative data were summarized using descriptive statistics such as means, standard deviations, frequencies, and percentages.Pairwise comparisons were done using *t*-test.

RESULTS AND DISCUSSION

Out of the total number of respondents (n = 57), 57.9% are male while 42.1% are female. Mode age was determined to be 20. Twenty-eight of them are currently studying in state universities while 29 are enrolled in private universities. Table 1 summarizes the demographic profile of the respondents which include their family's household income, program of study, and first language.

Table 1.Demographic Profile of the Respondents

	f	%
Sex		
Male	33	57.9
Female	24	42.1
Age		
18	17	29.8
19-22	34	59.6
≥23	6	10.5
Year Level		
First	18	31.6
Second	9	15.8
Third	9	15.8
Fourth	5	8.8
Fifth	15	26.3
Beyond fifth	1	1.8
Type of University/College		
Public	28	49.1
Private	29	50.9
Program		
BS Civil Engineering	14	24.6
BS Chemical Engineering	12	21.1
BS Materials Engineering	6	10.5
BS Computer Engineering	5	8.8
BS Industrial Engineering	5	8.8
BS Electrical and Communications Engineering	4	7.0
BS Geodetic Engineering	4	7.0
BS Metallurgical Engineering	4	7.0
BS Electrical Engineering	1	1.8
BS Mining Engineering	1	1.8
Graduate School (M.Sc. or Ph.D.)	1	1.8
Average Household Monthly Income		
<PhP 7,890	2	3.6
PhP 7,890 – PhP15,780	5	8.8
PhP 15,780 – PhP31,560	12	21.1
PhP 31,560 – PhP 78,900	12	21.1
PhP 78,900 – PhP 118,350	10	17.5
PhP 118,350 – PhP 157,800	6	10.5
≥PhP 157, 800	10	17.5
First Language		
Filipino	31	54.4
English	11	19.3
Local language (e.g. Bicol)	15	26.3

Thirty-four out of the 57 respondents expressed their openness to teaching. The remaining 23 (40.4%) turned down the idea due to reasons such as poor classroom management skills, impatience towards students, and low salary. One of the respondents added that she does not consider her way of explaining as value-adding as how a teacher ought to explain certain lessons or concepts. Another respondent mentioned the heavy workload and stress that are usually associated with this profession.

In contrast to the respondents who said no to teaching, those who signified their inclination towards teaching recorded high altruistic-intrinsic motivations as their main reasons for such a decision. This observation is similar to Bakar et al.'s findings among Malaysian student teachers who were intent to continue a teaching career [2]. These student teachers recorded higher averages in altruistic, intrinsic, and extrinsic factors compared to those who said they will no longer pursue teaching. This is reflected by the scores shown in Table 2.

Table 2.Descriptive statistics for motivations to teach and perceptions about teaching of the respondents

	Yes to Teaching		*No to Teaching*	
	M	*SD*	*M*	*SD*
Motivations				
Make social contribution	6.31	0.73	4.30	1.86
Shape future of children/adolescents	6.21	0.67	3.87	1.83
Enhance social equity	5.66	0.94	3.90	1.83
Prior teaching and learning experience	5.63	1.15	4.22	1.78
Intrinsic career value	5.18	1.02	2.46	1.15
Ability	4.69	1.11	2.37	1.38
Work with children/adolescents	4.68	1.30	1.80	1.22
Social influences	4.09	1.32	1.80	1.22
Job security	4.06	1.01	2.14	1.14
Time for family	3.99	1.03	2.62	1.11
Job transferability	3.92	0.98	2.55	1.14
Fallback career	2.98	1.18	2.78	1.34
Perceptions				
High demand	6.17	0.73	5.81	1.00
Expert career	5.95	0.69	5.75	1.39
Social dissuasion	5.25	1.19	4.10	1.91
Social status	5.02	0.99	4.43	1.40
Satisfaction with choice	4.84	1.05	2.17	1.07
Salary	3.09	1.30	2.72	1.28

It can be noted that in all of the 12 motivation and six perception components of the FIT-Choice Scale, those who did not consider teaching scored lower compared to those who stated their intent to teach. Significant differences (significant at $p< 0.05$) between their responses were observed except for the factors *fallback career*($t(55)=0.58$, $p=.28$), *expert career*($t(55)=0.70$, $p=.24$), *difficulty*($t(55)=1.52$, $p=.07$), and *salary*($t(55)=1.05$, $p=.15$). Thus, it can be inferred that for both groups, teaching is viewed as a demanding albeit undercompensated profession that requires high level of expertise. It is also interesting to note that for social dissuasion, those who were open to teaching recorded a higher mean ($M=5.25$, $SD=1.19$) compared to those who were not ($M=4.10$, $SD=1.91$), although not significant at $p<0.05$.

The top three motivations stated in Table 2 corroborate with the findings of Kılınç, Watt, and Richardson among preservice teachers in Turkey [36]. Altruistic reasons highlight one's desire to make a difference in society and in the lives of the students. Previous studies in western countries alsofound out that people are drawn to become teachers because of intrinsic and altruistic motives [40]. In a study among Filipino Grade 10 students, Mangaoil et al. [1] observed the same sentiments. These high school students perceived teaching as a socially worthwhile job that can bring about positive changes in society [1].

Prior learning and teaching experiences ($M=5.63$, $SD=1.15$) also scored among the top motivators of the respondents. This result is similar to the Australian and Turkish contexts which suggest the impact of teachers as good role models [36]. A study among Estonian students also revealed that positive experiences with teachers in schools and having a teacher in the family have positively influenced them to consider becoming a teacher [41].

Intrinsic career value sub-scale included items on the respondents' interest, desire, and affinity towards teaching. These intrinsic motivations are considered instrumental in the success of future teachers. Studies suggest that intrinsically motivated teachers demonstrate greater goal attainment, are more self-driven, and enthusiastic in task involvement [2].

Unlike in the Australian context where the FIT-Choice was first validated [42], perceived teaching ability ($M=4.69$, $SD=1.11$) was not among the top three motivators in the present study. This can be explained by the respondents' lack of or minimal access to formal teacher training programs as engineering majors. As in the case of Dutch engineers mentioned earlier [31],

engineers who are thinking of becoming teachers need specialized programs that could equip them with sound foundations on pedagogy and classroom management.

Working with children/adolescents and social influences moderately rated while trailing in the list of motivation factors are the personal utility values of teaching such as job security (*M*=4.06, *SD*=1.01), time for family (*M*=3.99, *SD*=1.03), and job transferability (*M*=3.92, *SD*=0.98).

The respondents likewise perceived teaching as a demanding work that requires high level of expertise. This is consistent with the findings of similar studies in countries like Turkey [36], Estonia [41], Australia [42], and South Africa [25]. At the same time, they moderately rated teaching in terms of social status and lowest in terms of the salary that comes with the profession. This is particularly apt in the Philippine context where teachers are seen as exemplars in sharing their knowledge and experiences even in the face of meager salaries [1]. This could account for the social dissuasion against teaching experienced by the respondents. Finally, the level of satisfaction in the respondents' choice to teach was rated moderately.

CONCLUSION AND RECOMMENDATION

This study aimed to determine the motivations to teach and the beliefs about teaching of engineering students. As in the case of previous studies (e.g. [36], [38], [42]), altruistic and intrinsic motivations positively affected the respondents' openness to teaching. They also perceived teaching as a profession that requires hard work and a high level of expertise.

The results of this study may serve as a baseline for future researchers who would investigate further the choice to teach not only among engineers but also of other STEM professionals. It is recommended that future studies should involve more respondents in a wider geographic coverage to improve the generalizability of their findings. The effects of gender and other socio-economic factors on the different factors enumerated in the FIT-Choice Scale may also be explored.

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