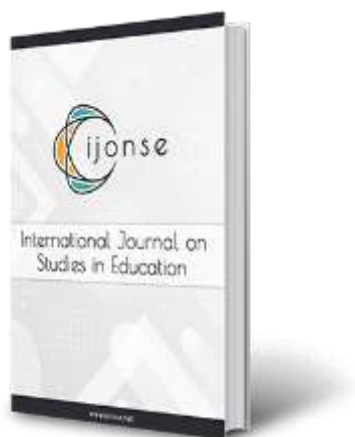




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Science Teaching Competence: Before and After the Internship Experience

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Abstract

The study assessed the teaching competence of secondary pre-service science teachers in terms of teaching knowledge, teaching skills, and attitude. Gaps between theory and practice were identified that might have huge and vital impacts on their professional growth, possible benefits, and challenges to develop and guarantee more efficient and comprehensive teaching-learning practices for all. The study made use of a mixed research approach (descriptive comparative research design and phenomenological research design). The validated instruments (Scale and Questionnaire) were distributed to the respondents (n=45; Secondary Pre-service Science Student Intern) and purposive sampling was utilized in selected Tertiary Education Institutions. Weighted means and a Two-tailed T-test of dependent means at the level of significance $\alpha = 0.05$ (quantitative data) and thematic analysis (qualitative data) were applied. The assessment of the teaching competence has shown that the pre-service teachers were competent. Results revealed that the level of knowledge was very good, the level of teaching skills was high and the attitude was very positive. Results also revealed that there was no significant difference before and after practice teaching in terms of knowledge and attitude. Yet, for teaching skills, there is a significant difference before and after practice teaching. Several gaps emerged between the theory and practice of pre-service science teachers which may have vital impacts on our future educators. Based on the results of the study, an emergent theory and a Teacher Education Development Action Plan for Pre-service Teachers were created.

Introduction

It is essential that pre-service teachers ought to be equipped with a solid understanding of theory and develop this in their classroom when they become teachers. Just as teacher education institutions have a mission of high responsibility to coach competitive educators for modification and future faculties. Authentic experiences arguably are the most powerful influence in teacher education institutions (Bullough et al., 2012). Teacher education programs have been regularly looking for the simplest potential ways in developing future instructors. It is progressively urged to specialize in ways in which of developing quality education through teacher preparation programs. The thought of student internship acknowledges pre-service teachers as key components in their skilled growth, the role of models, information constructors and distributors, and agents of improvement in students learning behavior.

Correspondingly, it is expected from the teacher education institution to shape pre-service teachers in responding to the innovations of the 21st century – implementing lifelong learning, guaranteeing the standard of education, and coaching people for prosperous skilled activities. Concerns in arguing that there are dangers in developing instructors were abundant theory and little about practice. The division between theory and practice is nearly similar to teacher training programs, with Dewey noting the problem as way back as the early 1900s (Dewey, 1904).

Achievement in the teaching profession is gotten from three principles: knowledge, competencies, and attitude. Most educationists, be that as it may, give over-the-top consideration to the learning part while disregarding the improvement of the other two (Scocco, 2006). Chances to feature the centrality of connection among theory and practice can be uncovered during practice teaching, where pre-service teachers can encounter reasonable exercises, get proficient capabilities, and create an inspirational demeanor towards teaching.

At the national level, the need to create quality teachers is stipulated in RA No. 7722, Undergraduate Teacher Education in Higher Education Institutions (HEIs) constantly prepares prospective teachers in the fundamental training area to satisfy their jobs and duties and supports quality education. In other words, teacher education institutions have the responsibility of producing globally competitive future educators who are relevant to the educational community. The primary objective incorporates a teacher education program that caters to the need for satisfaction in knowledge, skills, and attitude.

The scholastic part of teacher training is typically held in a school or university setting, where instructive theory is formed. Then again, abilities can be created alongside their skill in authentic practice yet, much as could reasonably be expected, these optional pre-service teachers should as of now be school-prepared when they will have risen in the work environment. In any case, the useful ramifications of that theory are not constantly apparent. For the most part, pre-service teachers regularly neglect to perceive the significance of their coursework to the everyday substances of classroom teaching.

Through preceding batches of pre-service science teachers, some of the encounters expressed as difficulties include varied experiences such as tensions; different suppositions, convictions, and originations of instructing and learning; fundamental comprehension of the auxiliary school culture and setting for educating and learning; collaboration with understudies; familiarity with showing abilities and systems; intelligent intuition during the underlying phases of the pre-service academic program, and functional educating resources.

Further, studies on pre-service teachers are very minimal, where much attention is needed. This should be highlighted as a growing concern of teacher preparation programs as it will become useful in solving practical problems as the gap between theory and practice in the program is widening. It was constantly indistinct for a teacher training program to characterize a hypothetical element of teaching practice. The least difficult methodology was: you will learn hypothesis during lectures and will at that point apply it in practice. For this purpose, this study was done to assess the preparedness and competence of secondary pre-service science teachers in terms of knowledge, skills, and attitude. The gaps between theory and practice will also be determined as it

may have great impacts on their professional growth, possible benefits, and challenges to develop and guarantee more efficient and comprehensive teaching-learning practices for all.

Objective of the Study

The purpose of this study was to assess the teaching competence of secondary pre-service science teachers among selected laboratory schools of state universities.

Specifically, the study attempted to:

1. determine the pre-service science teachers' level of knowledge before and after practice teaching in terms of:
 - 1.1. subject matter knowledge, and
 - 1.2. pedagogical knowledge;
2. determine their level of teaching skills before and after practice teaching in terms of:
 - 2.1. lesson planning,
 - 2.2. pedagogical skills,
 - 2.3. communication skills, and
 - 2.4. classroom management;
3. determine their attitude before and after practice teaching in terms of:
 - 3.1. personal attribute, and
 - 3.2. professional attribute;
4. determine the significant difference before and after practice teaching in terms of:
 - 4.1. level of knowledge;
 - 4.2. level of teaching skills; and
 - 4.3. attitude;
5. identify the gaps between theory and practice of pre-service science teachers; and
6. produce outputs based on the findings of the study.

H₀₁: There is no significant difference before and after practice teaching in terms of:

- 1.1. level of knowledge;
- 1.2. level of teaching skills; and
- 1.3. attitude.

Method

Research Design

The study made use of a mixed research approach. To determine the level of teaching competency, a descriptive comparative research design was used. The design was appropriate because the intention is to describe the teaching competence of the pre-service science teachers before and after practice teaching.

The study also utilized phenomenological research design, specifically descriptive design using narrative analysis.

The term narrative analysis includes the procurement of data which mainly depends on collected or expressed words or visual interpretation of respondents. Narrative or stories happen when at least one speaker participates in sharing and describing an encounter or occasion. Hence, this was utilized in identifying the gaps between theory and practice.

Research Participants

The respondents for the said study were the Secondary Pre-service Science Student Intern. Purposive sampling was utilized in choosing the respondents in selected three (3) State Universities. A total of 45 pre-service science teachers were chosen from Teacher Education Institutions. The study was conducted at the selected Teacher Education Institutions in the Philippines. The selected Universities have their own Laboratory Schools which served as the training ground for the education students during their teaching internship. Ethical clearance on these procedural matters was obtained from Research Ethics Committee and the procedures were followed throughout the study. These procedures and standards safeguarded the participants' rights to informed, consent, privacy, anonymity, and confidentiality (Gay & Airasian, 2000).

Data Collection Method/Instrumentation

There were three (3) instruments used in this research. In particular, the Teaching Scale of pre-service science teachers, the Attitude Scale of pre-service science teachers, and the Learning Gaps Questionnaire.

Preliminary Procedure

Before data gathering, the validation of the instrument was done by three experts from three different universities in Cebu City. Once the clearance from the Research Ethics Committee was received, the researcher followed the proper protocol during the data gathering. First, permission from the respective Deans of the different State Universities was secured. Upon approval, this was forwarded to the office of the Supervisors of pre-service teachers of their respective universities where the study was conducted.

The researcher gathered all the secondary pre-service science teachers for a short briefing stating the purpose of the said research. Also, the consent of these PSTs was asked before gathering the raw data. In the same way, the professional education and major subject grades of the PSTs were requested. These were utilized in determining the level of teaching competence in terms of knowledge. After the short briefing: informing the respondents of the purpose of the study, source of data collection, participation risks, and benefits, voluntary participation and withdrawal, as well as its confidentiality, the researcher agreed on a schedule with the respondents on where and when to conduct the survey.

Actual Data Gathering Procedure

During the actual data collection, the pre-service teachers were given an open-ended questionnaire to encourage

them to share details regarding their experience. In other words, it emphasized subjectivity. Should the pre-service teachers ask for further explanation on the open-ended questions, the researcher would clarify the questions or items in such cases. Also, an informal FGD was done with some of the pre-service teachers who are willing to participate and was noted by the researcher. This was done to deepen the information needed. The researcher herself presented and collected the data. To prevent any data loss, the questionnaires were directly collected from the pre-service teachers as soon as they were done. The completed questionnaires were placed into the files of the researcher. The presence of the researcher also helped the pre-service teachers ask their questions or any unclear parts. Likewise, the grades of the pre-service teachers from the Dean or Registrar were also collected. Once the subjects were identified, the average was used in determining their level of teaching competence in terms of their knowledge.

Data Analysis

The level of knowledge, teaching skills, and attitude of the secondary pre-service science teachers in the different aspects was measured using weighted means. Two-tailed T-test of dependent means at the level of significance $\alpha = 0.05$ was also used to test the significant difference before and after practice teaching in terms of knowledge, teaching skills, and attitude. In determining the gaps between theory and practice, the process of Colaizzi was used to assist in extracting, organizing, and analyzing a such narrative dataset. The following steps represent the Colaizzi process for phenomenological data analysis (Sanders, 2003):

1. Each transcript should be read and re-read to obtain a general sense of the whole content.
2. For each transcript, significant statements that pertain to the phenomenon under study should be extracted.
These statements must be recorded on a separate sheet noting their pages and line numbers.
3. Meanings should be formulated from these significant statements.
4. The formulated meanings should be sorted into categories, clusters of themes, and themes.
5. The findings of the study should be integrated into an exhaustive description of the phenomenon under study.
6. The fundamental structure of the phenomenon should be described.
7. Finally, validation of the findings should be sought from the research participants to compare the researcher's descriptive results with their experiences.

Results and Discussion

Level of Knowledge of Pre-service Science Teachers

Table 1 shows the overall level of knowledge of pre-service science teachers on theory and practice. The table shows that there was an improvement in knowledge between the theory and practice of pre-service science teachers in terms of subject matter knowledge and pedagogical knowledge. Further, both grand weighted means (1.75 and 1.28) before and after practice teaching were interpreted as Very Good. Results may imply that pre-service science teachers were able to convey the relevant constructs of content and pedagogical knowledge in a manner that they appeared in their classes well-prepared and with the well-organized lesson as rated by their mentors.

Table 1. Overall Level of Knowledge of Pre-service Science Teachers Before and After Practice Teaching

Parameters	Before	Description	After	Description
Subject Matter Knowledge	1.88	G	1.29	VG
Pedagogical Knowledge	1.62	VG	1.26	VG
Grand Weighted Mean	1.75	VG	1.28	VG

Legend:

Value	Description
1.00-1.65	Very Good (VG)
1.66-2.29	Good (G)
2.30-3.00	Fair (F)

Generally, schools may be producing competent pre-service science teachers, thus making them globally competitive and ready to face the modern and complex world of teaching. Opposing researchers exist for the legitimacy of evaluation guide normal and its relationship toward pedagogical competence. The study of Baumert et al. (2010) guaranteed that the two sorts of knowledge have appeared to influence teachers' instructional practice as well as student learning. There are additionally different studies declaring that grades are one-sided and untrustworthy markers of showing competency in teaching yet there are findings that show an ideal relationship between grade point average and competency in teaching (Ciddi, 2025 & Davy et al., 2007).

In the study of Pagaduan (2009), the expert discovered that academic excellence and teaching internship competence are essentially intertwined with each other. Hall and West (2011) confirm this by referring to that the higher the academic grade of the pre-service teacher is directly intertwined with the teaching competency. The ideal thought is that the teaching competency of the pre-service teachers, the greater the scholastic meaning of inner interest, responsibility, time management, and study atmosphere. Conversely, Kunter et al. (2013) uphold that the pre-service teachers' general scholastic ability is not directly related to their teaching effectiveness. This was upheld by Zumwalt and Craig (2015) revealing that there is no relationship between scholastic ability and teaching competence.

Unmistakably, existing literary works demonstrated the hazy areas that require a top to bottom research to investigate the irregularity of the said variable. Thus, innovative programs may be developed with the use of intentional and purposeful research to sustain and guarantee that pre-service teachers have the subject matter knowledge as well as the pedagogical knowledge needed in becoming capable teachers of science.

Level of Teaching Skills of Pre-service Science Teachers

Table 2 presents the level of teaching skills of pre-service science teachers before and after practice teaching in terms of lesson planning, pedagogical skills, communication skills, and classroom management. The table shows the data on the level of teaching skills of pre-service science teachers before and after practice. It can be gleaned that among the teaching skills, only lesson planning has its unique result from High to Very High. This result may indicate that teaching internships have a substantial impact on developing pre-service teachers' lesson planning skills. The result is supported by the study of Ayres (2014), lesson planning is a central pre-requisite expected for

preparedness in classroom teaching. It is an innovative procedure that gives a system for deliberate learning. A lesson plan encourages pre-service teachers to thoroughly consider what they are going to educate and how they are going to educate the students. Educators concede to the significance of its utilization (Nesari & Heidari, 2014) and for novice instructors, knowing the "what" and the "how" of teaching gives them the beginning stage from which they can start their exercise for the appointed course (Villagran, 2014). Thus, maximizing their application through teaching internships may improve their realization of effective and efficient lesson planning outcomes.

Table 2. Overall PSTs Perceived Level of Teaching Skills Before and After Practice Teaching

Parameters	Before	Description	After	Description
Lesson Planning	3.87	H	4.23	VH
Pedagogical Skills	3.83	H	4.15	H
Communication Skills	3.54	H	4.12	H
Classroom Management	3.71	H	4.13	H
Grand Weighted Mean	3.74	H	4.16	H

Legend:

Value	Description
4.20-5.00	Very High (VH)
3.40-4.19	High (H)
2.60-3.39	Moderate (M)
1.80-2.59	Low (L)
1.00-1.79	Very Low (VL)

Also, from the table, the level of teaching skills of pre-service science teachers before and after practice teaching is High. It may imply that pre-service teachers' level of teaching skills determines the performance of every pre-service teacher in their teaching career and the number of skills they used in the classroom; It is independent of how these competencies are intertwined, modified, and remodeled to make teaching an effective tool in molding learners, explorers, and thinkers.

Teachers must dominate several competencies to manage their everyday scholastic activities (Darling-Hammond, 2006). However, some competencies seem to be more imperative compared to others in bringing out good teaching ability. Therefore, updated pre-service teacher development activities may be an effective means to achieve the desired skills and competencies among future teachers in their field of specialization.

Attitude of Pre-service Science Teachers

Table 3 presents the data on the attitude of pre-service science teachers before and after practice. From the table, the attitude of pre-service science teachers before and after practice teaching is Very Positive. It may imply that pre-service teachers have a Very Positive attitude towards teaching. Also, pre-service teachers practiced professionalism and the interdependencies between personal and professional attributes. It has been said that teachers' essential personal attributes within a professional situation help to enable effective learning (Vallance, 2010). Moreover, the study of Oliva et al. (2009) shows that pre-service teacher training should deal comprehensively with the competencies related to the organization and administration of teaching-learning, this

can be supported through the new technology in the classroom, the participation of families, teaching of values, social cognitive skills and skills for professionalism. This also agrees with the impression of Lumpkin (2008) that when pre-service teachers model reliance, equality, uprightness, reverence, and accountability, they may help learners absorb moral upbringing. As a role model, the teacher must display good conduct and inculcate proper manners (Acero et al., 2007). Therefore, teacher educators may be accustomed to the distinctive qualities of the individuals they prepare for the teaching and learning process. Additionally, human resources may be established in a unified manner through preparation, progressions, sessions, or programs to ensure that every individual can progress to their potential to the prime level, especially pre-service teachers.

Table 3. Overall PSTs Perceived Attitude Before and After Practice Teaching

Parameters	Before	Description	After	Description
Personal Attribute	4.32	VP	4.50	VP
Professional Attribute	4.26	VP	4.50	VP
Grand Weighted Mean	4.29	VP	4.50	VP

Legend:

Value	Description
4.20-5.00 – Very Positive	- VP
3.40-4.19 – Positive	- P
2.60-3.39 – Neutral	- NE
1.80-2.59 – Negative	- N
1.00-1.79 – Very Negative	- VN

The Significant Difference Before and After Practice Teaching

Tables 4 to 6 present the significance of the difference between before and after practice teaching of pre-service science teachers in terms of knowledge, teaching skills, and attitude. The t-test on paired observations was employed to determine this significance at an $\alpha = 0.05$ level of significance.

Knowledge

Table 4 presents the significance of the difference before and after practice teaching of pre-service science teachers in terms of knowledge.

Table 4. The Significance of the Difference Before and After Practice Teaching in terms of Knowledge

Domain	Variable	Mean	p-value	Decision	Significance
Knowledge	Before	1.750	0.151*	Accept the Null	Not significant
	After	1.275		Hypothesis	

*Significant at $\alpha = 0.05$

Table 4 presents the significance of the difference before and after practice teaching in terms of knowledge. The p-value obtained (0.151) is more than the level of significance $\alpha = 0.05$, which accepts the null hypothesis. Hence,

there is no significant difference between the before and after practice teaching in terms of knowledge. Based on the assessment of the pre-service teachers, it implies that the theory and practice in terms of knowledge are comparable. Thus, the level of knowledge of the pre-service teachers, in theory, is the same in practice.

This affirms the findings of Kunter et al. (2013) that scholastic record is not directly related to teaching competence. Zumwalt and Craig (2015) also cited that no apparent connection between grades with instructors' performance. Likewise, the result is supported by Burns and Richards (2009), that teacher learning should not be viewed as interpreting specific topics into the application but instead generating new information in addition to philosophy through contributing to specified common situations and appealing to particular types of undertakings and developments.

Clear as it is that the pre-service teachers acquired this type of knowledge over active participation in practice teaching in their comprehension. Based on the outcome of the assessment, it is safe to assume that there is no statistical gap between theory and practice in terms of knowledge. Thus, teacher education programs may cope through advancement on the strong foundations of theoretical knowledge of the pre-service teachers.

Teaching Skills

Table 5 displays the significance of the difference before and after practice teaching of pre-service science teachers in terms of teaching skills.

Table 5. The Significance of the Difference Before and After Practice Teaching in terms of Teaching Skills

Domain	Variable	Mean	p-value	Decision	Significance
Teaching Skills	Before	3.738	.005*	Reject the null hypothesis	Significant
	After	4.158			

*Significant at $\alpha = 0.05$

As shown in Table 5, the p-value obtained (0.005) is less than the level of significance $\alpha = 0.05$, which rejects the null hypothesis. Therefore, there is a significant difference before and after practice teaching in terms of teaching skills. It may imply that there was a significant change from theory to practice. Hence, practice teaching has a positive influence on pre-service teachers. Therefore, it can be supposed that there is a change in theory and practice in terms of teaching skills.

Furthermore, as stressed by Lingam (2012), the achievement of pre-service teachers does not solely come from the academic knowledge acquired but also from the authentic experiences which afford them the competencies and attitude that would enhance their positive teaching practices. This authenticates the outcomes of research done by Somblingo (2014) and Biong (2014) mentioning that pre-service teachers have boundless capabilities of teaching effectiveness.

Corroboratively, this can be credited to the rigid training of the pre-service teachers during the internship which

affords a place for the association of theories and practices aiding the pre-service teachers garnered strong basic features of teaching and to be associated with the authenticity of the real teaching-learning environment (Abao, 2013). Thus, pre-service teachers may be included in designing, implementing, and evaluating the program for them to help in the development and success of the implementation of program.

Attitude

Table 6 shows the significance of the difference before and after practice teaching of pre-service science teachers in terms of attitude.

Table 6. The Significance of the Difference Before and After Practice Teaching in terms of Attitude

Domain	Variable	Mean	p-value	Decision	Significance
Attitude	Before	4.290	.090*	Accept the null hypothesis	Not significant
	After	4.500			

*Significant at $\alpha = 0.05$

Table 6 exhibits the significance of the difference before and after practice teaching in terms of attitude. The value of the significance (0.090) is more than the level of significance $\alpha = 0.05$, which accepts the null hypothesis. Therefore, there is no significance of the difference before and after practice teaching in terms of attitude. It implies that there was no change in terms of the attitude of pre-service teachers before and after practice teaching. The same attitude was exposed by the pre-service teachers in theory and practice. Thus, it is safe to assume that there is no statistical gap between theory and practice in terms of knowledge. As shown in Zhang et al. (2016) result of the study with pre-service teachers in the phases of teacher education. It presented that pre-service teachers' proficient distinctiveness fortified the teaching performance by influencing their task, worth, assurance, and external learning drive.

Quite the reverse, one study settled that the pre-service teachers appreciated teaching as an important line of work, and later, would regard their career with pride. Also, the pre-service students gave great significance to being dynamic in their performance where their capabilities are exposed to enhance their sense of achievement whenever a certain task is accomplished. The pre-service teachers had not expected a good working environment and accessibility in the profession. Since the pre-service teachers are already aware that teaching is a challenging job. Attitude in terms of teaching and ethics are autonomous of each other. Whatever the pre-service teacher experience during the education preparation, their attitudes toward teaching and their work ethics could be similar (Torres & Ballado, 2014). Thus, teaching internships may be extended, as little time and deferment in engaging in an internship delimit pre-service teachers' competencies of the teaching profession.

Gaps between Theory and Practice of Pre-service Science Teachers

Six gaps emerged from the responses of the pre-service science teachers concerning the gaps between theory and practice.

Lesson Planning

Results revealed that primary pre-service teachers are aware of the importance of lesson planning; though, some difficulties were found during the planning. It may indicate that even if pre-service teachers have gained theoretical knowledge about lesson planning, it does not necessarily mean that such knowledge is translated into practice. The transition of the theories and principles into the application, planning, and implementation requires experience by the pre-service teachers.

Also, pre-service teachers claimed that access to instructional materials, students' interests and abilities, and teacher experience proved crucial to lesson planning skills development. As claimed, literature cited that lesson planning is a challenging and demanding process that comprises contextual understanding and pedagogical skills, including the capacity in using critical thinking skills (Setyono, 2016). Consequently, when a theory is to be transformed into best practice over the long term, feedbacking, sharing, and observing by experts are essential (Wallace et al., 2008). Therefore, mentor teachers and teacher educators may collaborate in helping pre-service teachers prepare competent lesson plans by letting them optimize teaching experiences toward transformative learning outcomes.

Pedagogical Skills

Results show that pre-service teachers were challenged to use a variety of pedagogical skills to teach. While their central undertaking is to simplify learning, pre-service teachers must organize information as well as manage several challenges concerning the learners. Also, pre-service teachers considered the learners' diversity; such as the distinction of teaching approaches to students' diverse necessities, and specific modifications on different learning strategies, to include their manifold dimensions. It may be deduced that pre-service teachers ideally distinguish and were capable of using the theoretical foundations of pedagogy and of course, familiar specific instructional techniques in a real classroom scenario. They were able to translate these sets of competencies into actual teaching activities and that classroom experience and reflection on practices lead to teaching effectiveness.

In light of the foregoing, learners have distinctive learning methods, various attitudes about instructing and learning, and various dimensions of scholarly improvement (Felder & Brent, 2015). It is extremely hard for any instructor to adjust his or her encouraging styles to the students' learning methods, however on the off chance that the person succeeds, the scholastic execution will rise, bit by bit getting steady after some time (Lurea et al., 2011). Thus, understanding how best to support the pre-service teachers' pedagogical skills development in teacher education may perhaps be necessary to produce quality teachers and improve student outcomes.

Communication Skills

Based on the responses, aside from gaining confidence, pre-service teachers were cautious about the appropriate words that were used, the association between means of communication, the suitability of their presentation, and the level of learners they are teaching. Likewise, pre-service teachers transform the usage of everyday language

that may bring students to communicate in and out of the classroom. It may imply that pre-service teachers not only have the satisfactory communication skills needed but also have the ability to hold discussions that allow students to learn.

Also, pre-service teachers learn and applied adaptive strategies to overcome challenging situations. The effectiveness of teacher communication has been seen to be connected with teacher integrity and supposed that teacher competence as well as influence student performance (Rink, 2010). Effective communication has been correlated with a minimum need for disciplinary interruption (Gillies, 2014). Thus, programs for developing communication competence to skill enhancement may be arranged for pre-service teachers.

Classroom Management

The comments showed that the pre-service science teachers tried in maintaining the proper order and proper classroom conduct by using various methods considering the differences of the learners. Additionally, from the reactions of the pre-service teachers, it may be inferred that classroom management approaches vary in the ways they perceive students' behavior and in the style they approach teaching and adjusting student behavior. As reported, it is recognized that for effective learning environments to happen, classroom management may be interwoven with effective teaching that is appealing and significant (Gore et al., 2007). Thus, some form of training in classroom management for pre-service teachers, especially research-based classroom management practices may be established.

Personal Attribute

It can be observed that pre-service teachers are acquainted with the relationship and the specific social interaction approach to be established with the students. Overall, pre-service teachers in this study reported positive personal attributes. This apparent attitude of passionately positive individuals is promising for the profession. In addition, it may be deduced that pre-service teachers' character traits, when used suitably, may become advocates for optimal student learning, and thus are vital to the teaching-learning process and teacher-student communication. As conveyed, personality is related to job satisfaction and, in certain circumstances, also correlates with job performance (Judge, Heller & Mount, 2012). Thus, teacher education may need more emphasis on the personal developments involved in producing a professional pre-service teacher; to which, teacher training programs may include well-grounded stability concerning the intellectual and emotional scopes of the pre-service teachers.

Professional Attribute

Based on the responses, pre-service teachers reported considerable confidence in creating and maintaining a professional and ethical learning environment. Most of them were equipped with useful skills, particularly from authentic experiences with the teaching internship, which can be associated with the situation prevailing in a real teaching-learning situation. It has been claimed that clear self-esteem and possession of a developing professional identity are essential circumstances that may help pre-service teachers commendably apply strong theoretical

knowledge acquired from teacher education programs to actual situations in the future (Bennett, 2013). And that professionalism is the outcome of a process of action-reaction in refining professional competence, principles, character, and knowledge (Evetts, 2013). Thus, the practice of teacher professionalism may be seen as an essential requirement for pre-service teachers as such awareness of the rapid changes in the educational system and their roles to be played to produce qualified teachers in the future. At the pre-service teacher level, allowing pre-service teachers to self-report their learning may add to this evidence.

Indeed, the theories determine the strategies and techniques based on the belief on how pre-service teachers learn and consequently, affect the choice of teaching methods. However, there are certain learning during their practice teaching that are most likely to take place because it happens either when there is the practice of knowledge in real-life situations or through authentic experience. According to Peercy (2012), the theory-practice gap in the teaching profession is linked to a varied understanding of teacher education among teachers. These student-teacher complaints are associated with short teaching practice and a mismatch between what is taught at the university and what they ought to do during their practical training (Gießler, 2009). Therefore, practice with research-based theories in the teaching profession may culminate in constructive effects.

Theory Generated

With the entire proposition presented, the generated theory on pre-service teachers' theory to practice states that:

"A pre-service science teacher who can translate strong theoretical foundations on the diversity of learners to actual practice, acquire competence grounded on authentic experiences and possess a positive attitude towards teaching can deliver instruction effectively."

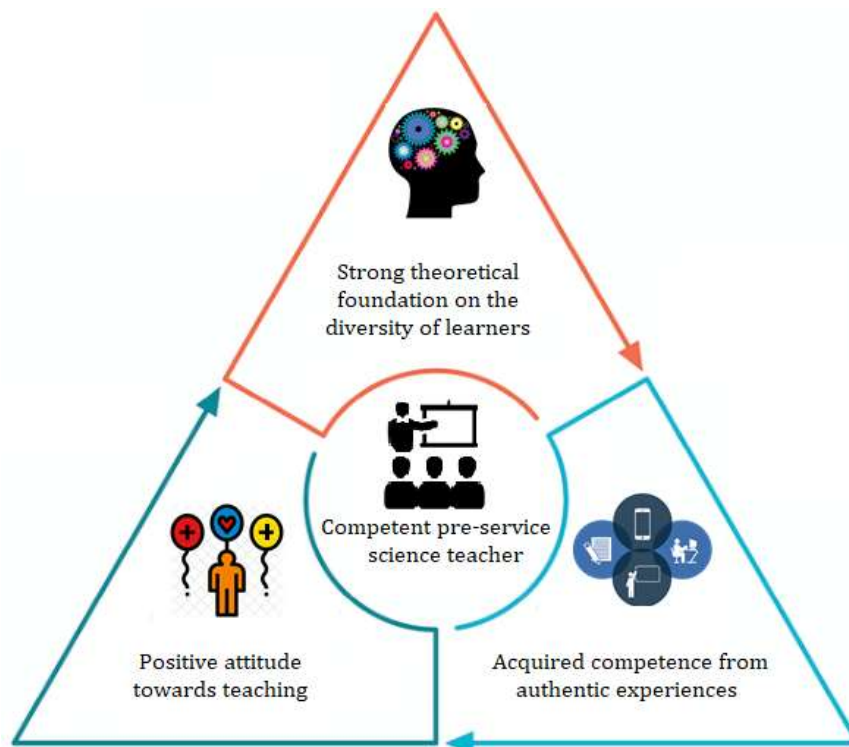


Figure 1. iRamirez (2019) Model on Pre-service Science Teaching Competence

Teacher Education Development Action Plan for Pre-Service Teacher

Rationale

Teachers are the most important resource in the teaching-learning process. To develop exceptional educators, institutions must carefully hire the best and then rigorously train them to be better. Teachers must also possess a high degree of expertise in knowledge, teaching skills, and attitude for them to teach effectively in the future. Teaching competence has been a concern in the past years regarding how the Teacher Education Institutions may be improved as different experiences and practices have been encountered by diverse pre-service teachers. Teacher Education Institutions are the main lead in the development and enrichment of the theoretical foundation coursework to practice teaching pre-service teachers. Thereby, also ensuring all efforts of the teacher education program that facilitate the transition stage, that pre-service teachers will have substantial theory-practice experiences and in that way, help them avoid the ill-effects of undesirable experiences.

The Teacher Education Development Action Plan for Pre-service Teachers is based on the results of the assessment of the teaching competence in terms of knowledge, teaching skills, and attitude of the secondary pre-service science teachers among selected state universities. Such assessment may contribute to the improvement of the Tertiary Education Institutions' teacher education program, particularly in terms of knowledge, teaching skills, and attitude of the secondary pre-service teachers. The recommendation also attempts to alleviate the theory-practice dilemma besetting pre-service education programs and to improve and ensure more effective and comprehensive teaching-learning experiences for all. To ensure the success of the action plan, Teacher Education Institutions need to support the process and the recommendations according to the needs assessment of the pre-service teachers. Teachers Education must also oversee that pre-service teachers participate in the action as well as the time of teaching internship.

Conclusion

The assessment of the teaching competence of the secondary pre-service science teachers among selected state universities has presented that the pre-service teachers are very competent. It is revealed from the findings that the level of knowledge was Very Good, its level of teaching skills was High and the attitude was Very Positive. Results also revealed that a competent pre-service science teacher can translate a strong theoretical foundation on the diversity of learners, has acquired competence grounded on authentic experiences, and possess a positive attitude towards teaching.

Furthermore, these findings also produced noteworthy implications particularly for the teacher education institutions as well as for the forthcoming pre-service teachers. The use of the Teacher Education Development Action Plan for Pre-service Teachers may somehow afford a practical guide that may greatly inspire the teacher education institutions, precisely curriculum experts and the teacher education admiration, and integrate more approaches into actual teaching and learning frameworks.

The study, however, has also several limitations. Initially, considering that the sample size was very few per

Teacher Education Institution, it did not essentially represent the cluster of pre-service science teachers where the results were generalized. Only three (3) particular state universities were also included, its findings may not generally match the viewpoints of the pre-service teachers about the teacher Education programs in other Tertiary Education Institutions. Also, the study was not able to provide a richer picture of the implementation of the program and the factors affecting the teaching competence, as the instruments used in the study, were perceived to have only composed the superficial facts and not the deeper nuances that have also emerged and have been experienced by the pre-service teachers.

Recommendations

While the overall findings revealed favorable insights of the pre-service teachers toward the teacher education program, it cannot be repudiated that the findings have also provided significant inputs that can be used to enhance the implementation of the teacher education program, thus the following are the recommendations:

1. Existing strategies and policies of the teacher education program of the Teacher Education Institutions may be revisited and improved with the utilization of the Teacher Education Development Action Plan for Pre-service Teachers to make the curriculum more responsive to the needs of the profession and for its effective and efficient implementation.
2. Pre-service teachers may also be involved in crafting, implementing, and assessment of the program for them to develop a sense of ownership and accountability in the implementation of the program. They may also be given comprehensive support during their tenure for them to be fully equipped and competitive in their respective teaching careers.
3. For future researchers, another study may be conducted to investigate the factors that influence pre-service teachers' teaching competence. Also, a further investigation on the same aspect may be done with a wider scope of respondents which include the different field of specialization.

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