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Curriculum Design of Preservice Teacher Education for Indigenization of Elementary School Science

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Abstract

This paper presents proposed changes in the pre-service teacher education program for the development of skills for indigenization of elementary school science. The proposal emphasizes the need for the development of more specific competence for teaching science to indigenous people or diverse culture. There should be conscious effort to develop awareness of one's attitude towards ethnocultural groups in the foundation courses (sociology, philosophy and psychology). Moreover, there s also a need to develop skills in designing instruction, developing instructional materials using local materials to make science teaching relevant to the indigenous people and learners of diverse culture. It is also important that field experience in schools with indigenous people and diverse culture be integrated in the program

Rationale

For several decades, improving science education in both elementary and secondary schools is one of the main concerns of the Philippine government. Dismal performance of elementary and secondary school students both in national and international levels particularly in TIMSS has been a strong driving force in focusing efforts toward the improvement of teaching science since quality science education is perceived to be related to economic development.

Reform efforts for several decades range from establishment of science high schools, enrichment of the elementary school science curriculum, training of science teachers for upgrading of knowledge and teaching skills performance competence, equipping some schools through improvisation programs and instructional materials development. In spite of all these efforts, quality science education is still as elusive as ever. Problems and issues remain to be related to unqualified teachers, lack of facilities, classrooms and textbooks, irrelevant curriculum and instruction. Of these, the issue of irrelevance of science is one major concern because science is envisioned to provide learners skills to improve their lives and become productive citizens. Science is being taught focused on the content and process with very little link to everyday life giving the students idea that science is something separate from their lives. Thus even if Filipino

students are very much interested in science, they don't find relevance of what they learn to their everyday life and science learning becomes useless in improving their lives.

This phenomenon is thought to be associated with the policy of having one prescribed curriculum for all schools in the Philippines. Teachers are bound to teach to the prescribed curriculum even if it is not relevant to the communities where they teach. The prescribed curriculum does not seem to address the local needs of every community in the Philippines. The problem is seen to be related with how the science curriculum is being taught in the classroom. Most teachers of science teach what are prescribed without attempting to provide cultural context to their science teaching. This seems to be an indication that in-service teachers lack the skills to plan instructions (lessons) that are relevant to the needs, interests and social conditions of the learners. Recent teacher training programs have integrated the development of skills for making lessons relevant to the learners.

While it is important to upgrade the competence of in-service teachers, it is equally important to look at the education of pre-service teachers who will eventually be responsible for the implementation of the curriculum. Since pre-service teacher education program defines the quality of future teachers, it is essential that appropriate reforms be incorporated into the program to make sure that future teachers are qualified to implement effectively the science curriculum.

Aware of the inadequacies of the previous teacher education curriculum, the Commission on Higher Education Technical Panel on Teacher Education (CHED-TPTE) proposed a 5-year curriculum for teacher education which is already being implemented starting this year. Does this new curriculum provide the development of skills needed in indigenizing/localizing the science curriculum? Are there explicit references to the development of skills in science teaching within the context of the local community? This study then is undertaken to determine whether the new curriculum has provisions for the development of the skills for indigenization and localization of the elementary school science curriculum as contained in the document. This study is based on the framework of curriculum development process (Print, 1990) that the intended curriculum is the main document directing and influencing the implemented curriculum. Everything that is made part of instruction should be based on the intended curriculum, which is the process known as instructional designing (lesson planning). Teacher educators, although should practice academic freedom, must try to achieve the set standards for the pre-service teachers. Included in the standards are the skills in making science teaching relevant to all including learners from diverse culture.

Statement of the Problems

This study aims to determine whether the present intended curriculum of the pre-service elementary school teacher education program leading to Bachelor of Elementary Education (BEE) has integrated the development of skills for teaching science to indigenous people and to recommend reforms for the program to address the identified gaps associated with development of these skills for elementary school science teaching.

Specifically, this study seeks to answer the following questions:

1. What are the competencies that are intended to be developed in the 5-year pre-service teacher education curriculum (PTEC) for elementary school science teachers?

    a. What is the curriculum design of the pre-service teacher education curriculum for elementary school science teachers?
    b. What are the different courses (subjects)/components required in the PTEC?
    c. What competence does each of this course intend to achieve?

2. Based on standards of prominent teacher education institutions involved in developing competence for effective science teaching to indigenous learners, results of researches on science teaching for indigenous learners (diverse culture) and standards set of teacher education associations, what are the needed competencies that should be developed among pre-service teachers?

3. Comparing the competencies in the 5-year PTEC of the Philippines and those set by prominent TEIs and professional associations and researches, what are the competencies that are lacking in the 5-year PTEC of the Philippines?

4. Considering the gap in terms of competencies, what reforms should be done in the curriculum design for the incorporation or integration of these competencies in the PTEC?

Scope and Limitation of the Study

This study covers only the examination of the intended curriculum based on a framework drawn from the standards set from different TEIs and researches. This is done based on the assumption that these standards are the results of tedious process of selection backed up by empirical data from several outstanding researches.

It is limited to the competencies for the indigenization of the elementary school science curriculum since it is the perception of the researcher that it is important to build a strong foundation of science concepts and skills from which secondary school science teaching could be anchored on. Without this strong foundation, structures for quality science education would warrant more effort to make good the teaching of science.

In this study, curriculum design refers to how the competencies are organized vertically and horizontally and competencies refer to the skills that prospective teachers are expected to be able to do.

Theoretical Framework

This study is basically anchored on two theories; one on curriculum development and the other on the different constituents that define an effective instruction. The first theory is the basis for the methodology being followed in doing the research; while the second identifies the parameters from which competence essential to effective indigenization/localization of elementary school curriculum are drawn.

The first theory is the Print's Curriculum Development Process as shown in figure 1. There are three (3) major stages in this process: (1) Curriculum Presage; (2) Development and (3) Application

In this model, a curriculum developed (intended curriculum) consists of learning intent (goals, aims and objectives), learning content, learning activities and evaluation methods to be employed. All of these elements are determined based on the results of a situational analysis. In this process, the curriculum developers decide drawing from three sources of influence – social and cultural orientation; understanding of theories of learning and philosophy of education. Print emphasized the importance of these sources of influence when the curriculum committee is being organized.

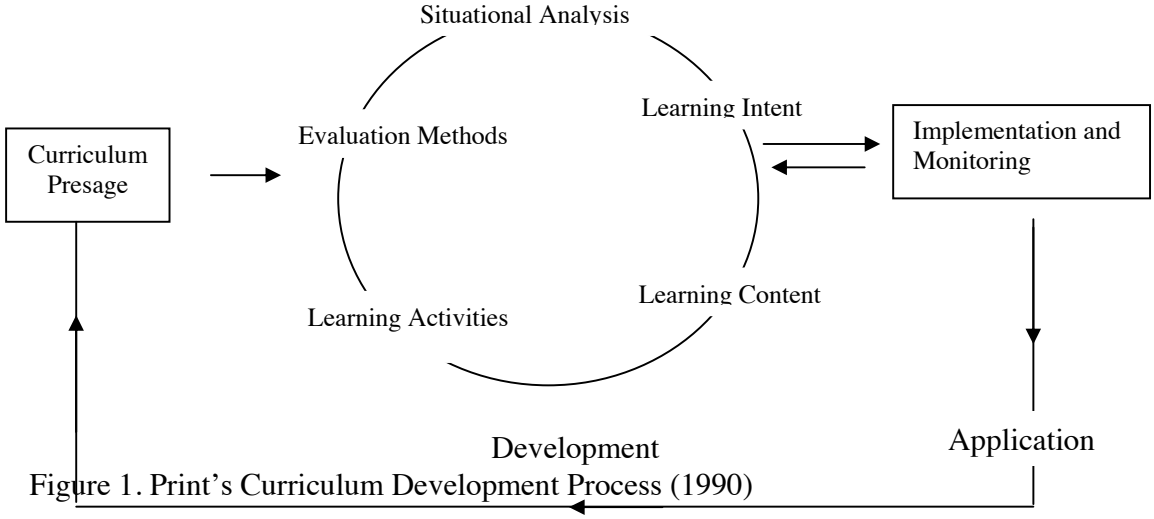

Figure 1. Print's Curriculum Development Process (1990)

As for the standards against which the PTEC is evaluated and the characteristics of a suitable curriculum integrating the development of skills for indigenization, the researcher draws from the model of Ramsey (1969) showing the parameters considered in an effective instruction. His model is the result of a meta-analysis of the different researches in science education indicating the different factors that are proven to be related. Figure 2 shows that in designing an instruction, the teacher is affected by factors like knowledge of theories of learning, personal philosophy of education, knowledge of subject matter, knowledge of teaching methods (strategies), knowledge of available instructional technologies, knowledge of expected instructional outcomes, knowledge of

nature of students, knowledge of evaluation procedures, knowledge of the educational system. All of these should be developed in the pre-service teacher education program. The main task of teachers revolves around the design of instruction that is effective and relevant. This depends highly on different skills and knowledge performance competence which should be developed in the 4 to 5 years of pre-service teacher education. When a teacher plans for instruction, s/he draws from all of these skills and competence making it important that these are learned as interrelated, one affecting the other.

From figure 2, the following curricular areas could be drawn as the main considerations in determining the standards for pre-service teacher education. The different researches in science education that were considered in the meta-analysis done by Ramsey in 1969 point to these curricular areas as the essential components in defining quality in instructional design and delivery.

- Learners. (The nature of learners – their socio-cultural-economic background, gender, age, parents' educational background and profession, interests, mental ability)
- Learning Theories. (Different theories that explain how learning takes place or happen)
- Curriculum. (Defines the expected learning outcomes, content coverage, activities and evaluation approach)
- Content knowledge (what should be taught)
- Pedagogy (Instructional strategies)
- Assessment. (Methods of knowing how much learning too place and how effective instructional strategies are)
- Instructional Materials. (Different media that can be used to effect learning)
- Other standards.

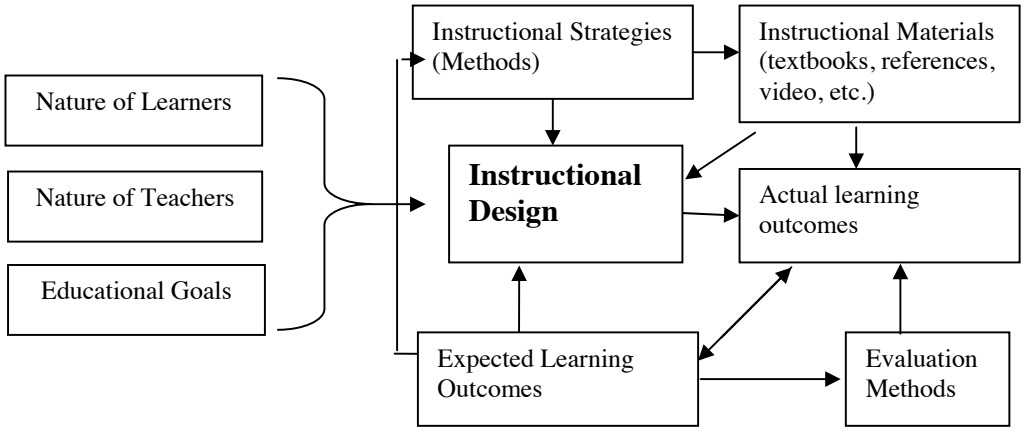

Figure 2. Ramsey's Instructional Design (factors affecting the design of instruction)

These are some curricular areas defining characteristics of effective science teaching. What are uniquely true to science teaching are those related to instructional strategies and materials and subject matter.

Methods and Research Design

The research method is descriptive with document analysis as the main data gathering technique employed. There are two components of the research, namely, curriculum evaluation and curriculum design. Figure 3 shows the research flowchart of this study.

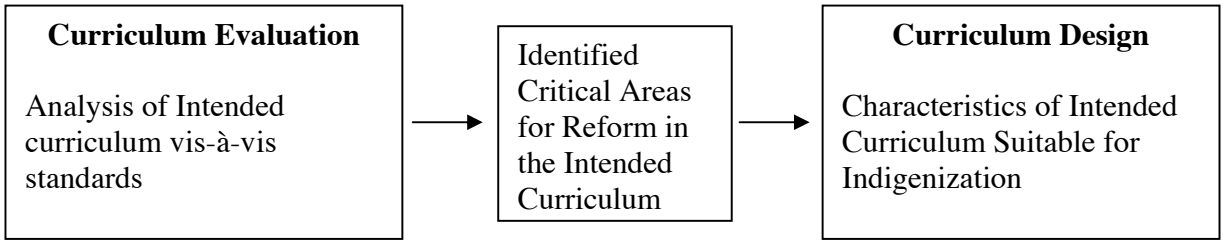

Figure 3. Research flowchart of the study

Curriculum evaluation is limited to the intended curriculum and does not include inputs and implications from instructional evaluation. In the evaluation of the intended curriculum, the following criteria are considered:

1. Presence of the elements consisting a curriculum. These elements include the competence/standards, philosophy, aims and objectives and the approaches for instruction, suggested evaluation methods.

   From the results of the meta-analysis of researches done in science teaching by Ramsey (1969), the following components essential for effective instructional design are drawn and used as bases for what should be found in an intended curriculum for pre-service teacher education. This means that standards should contain components that fall or address each area.
   - Nature of Learners.
   - Learning Theories
   - Content knowledge (what should be taught)
   - Pedagogy (Instructional strategies)
   - Instructional Evaluation
   - Instructional Materials

   These curricular components are the classification of the major standards of all the curricula that were analyzed.

2. Presence/absence of the competence for indigenization. These competencies are based from the standards set by prominent TEIs implementing the teaching of

science for diverse culture and used as bases in determining what is/are lacking in the PTEC of the Philippines.

3. Results of researches on teaching diverse cultures are also culled from which implications to pre-service teacher education are drawn and related reforms are suggested.

B. Based on the results of the evaluation of the intended curriculum, reforms to bridge the identified gap in the pre-service teacher education curriculum are suggested.

Data and Findings

Competencies in the Pre-service Teacher Education Curriculum

In the Philippines, higher education is under the jurisdiction of the Commission on Higher Education. Under this office is the Technical Panel on Teacher Education (TPTE) which oversees the implementation of teacher education programs in all of the more than 800 teacher education institutions nationwide.

The move for the curricular reforms in teacher education was in response to the problem of unqualified and ill-prepared beginning teachers as shown by studies done by Pedro (1996), PNU-RC, 1999) and the rate of passing in the licensure examination for teachers (LET) which ranges from 20 to 30% per year. Thus, TPTE recommended a 5-year teacher education curriculum which is being implemented this year. CHED Memo Order No. 30, series 2004 contains the competencies and list of courses for this new curriculum.

The aim of the pre-service teacher curriculum is to **prepare professional teachers for practice in primary and secondary schools in the Philippines**. The memo enumerated the 11 competence expected of graduates of the Bachelor of Elementary Education or BEEd and Bachelor of Secondary Education or BSE. Elementary school teachers are trained to be generalists, meaning they should be able to teach all the 5 prescribed learning areas (or subjects) of the basic education curriculum; while secondary school teachers are trained to be specialists in one of the 5 prescribed learning areas (or subjects).

The Competency standards are:

Graduates of the BEEd (and BSEd) program are teachers who

1. *Have the basic and higher level literacy, communication, numeracy, critical thinking, learning skills needed for higher learning;*

2. *Have a deep and principled understanding of the learning processes and the role of the teacher in facilitating these processes in their students;*

3. *Have a deep and principled understanding of how educational processes relate to larger historical, social, cultural and political processes;*

4. *Have a meaningful and comprehensive knowledge of the subject matter they will teach;*

5. *Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development, educational assessment, and teaching approaches);*

6. *Have direct experience in the field/classroom (e.g., classroom observations, teaching assistance, practice teaching);*

7. *Can demonstrate and practice the professional and ethical requirements of the teaching professions;*

8. *Can facilitate learning of diverse types of learners, in diverse types of learning environments, using a wide range of teaching knowledge and skills;*

9. *Can reflect on the relationships among the teaching process skills, the learning processing in the students, the nature of the content/subject matter, and the broader social forces encumbering the school and educational processes in order to constantly improve their teaching knowledge, skills and practices;*

10. *Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and evaluate the effectiveness of such approaches in improving student learning; and]*

11. *Are willing and capable to continue learning in order to better fulfill their mission as teachers*

Curricular components of the Pre-service Teacher Education Program for BEEd.

How are these competencies intended to be developed? Table 1 presents the curriculum for BEEd. The Memo 30 describes the curriculum as "***also designed so that the curricular components are integrated – the interweaving of foundational, theoretical, methodological and experiential knowledge in the various learning experiences in the curriculum."*** This statement means that each course should be taught integrated with all concepts drawn from other courses on foundation, theories, methods and experiences so that students can see how each one is related to one another and how can these can be applied in actual teaching situation.

The courses are classified into three components, namely, general education courses, professional education courses and specialization/content courses. General education courses provide basic knowledge in broad fields which provide the foundation on which professional courses are anchored. This is to compensate for knowledge, skills

and attitudes that are not developed and taught during the short pre-collegiate or pre-university level (only 10 years). Table 1 shows the courses and the number of units required for each. (In the Philippines, each course is generally equivalent to 3 units, 3 hours a week class.) The 63 units required for general education courses is actually equivalent to 21 courses.

Professional education courses aim to develop the range of knowledge and skills needed in the practice of the teaching profession. There are three categories of courses in this component: (1) theory and concept courses; (2) methods and strategies courses and (3) field study courses.

The last component course is the specialization and content courses which provide basic but essential knowledge in the 5 prescribed learning areas in elementary school education.

Looking at the distribution of units, professional and specialization courses have almost the same number of units as compared with general courses with at least 9 units more than the two components.

All teacher education institutions (TEIs) except for state colleges and universities are required to abide with this minimum requirement (in terms of units). However, TEIs have the leeway to add courses which are needed to address their schools' philosophy and vision-mission.

Table 1. CHED Curriculum for Pre-service Teacher Education

Components	**Number of Units (BEEd)**
General Education Courses	63 units
➢ English (grammar)	9 units
➢ Filipino (grammar)	9 units
➢ Mathematics	6 units
➢ Science (Gen Sci)	6 units
➢ Social Sci (Socio, Philo, Psych)	9 units
➢ Humanities (Arts, Music)	6 units
➢ Literature (English)	6 units
➢ ICT (computer literacy)	3 units
➢ Rizal (legislated course)	3 units
Professional Education Courses	54 units
● Theory/Concept Courses	12 units
➢ Child & Adolescent Development	
➢ Facilitating Learning	
➢ Social Dimensions of Education	
➢ The Teaching Professions	
● Methods/Strategies Courses	27 units
➢ Principles of Teaching 1	

➢ Principles of Teaching 2 ➢ Assessment of Leaning 1 ➢ Assessment of Learning 2 ➢ Educational Technology 1 ➢ Educational Technology 2 ➢ Curriculum Development ➢ Developmental Reading 1 ➢ Development Reading 2 ● Field Study Courses ➢ Field Study 1 ➢ Field Study 2 ➢ Field Study 3 ➢ Field Study 4 ➢ Field Study 5 ➢ Field Study 6 ➢ Practice Teaching ● Special Topics Courses	12 units 3 units
Specialization/Content Courses ➢ Science ➢ Mathematics ➢ English ➢ Filipino ➢ Social Studies ➢ Music, Arts and Physical Education ➢ Home Economics and Livelihood Education ➢ Values Education ➢ (Special Education and Preschool Education)	57 units
Total Units	174 units

Competency standards the curricular components. Just looking at the listing of the 11 competency standards and the curricular components would not show which competency is being addressed by what curricular component. Table 2 shows the result of analysis of the researcher matching the curricular components with the competency standards. The matching is based on how these courses are generally taught in the different TEIs. It should be noted that although the memo emphasizes that all these courses should be taught interwoven with one another, the reality remains that these courses are generally taught separately; although some teacher educators have consciously attempt to interweave foundational, theoretical, methodological and field experience courses together.

Some educators question the prescription of standards because they think it could suppress academic freedom. On the other hand several educators believe that standards can be used as basis for interaction among teacher educators and guidance and focus on what should be expected of graduates of the program. The researcher agrees with the latter idea. Table 2 is made to see areas that need to be focused on for the development of the competency standards.

Looking at table 2, professional courses seem to be tasked with the development of almost all of the 11 competencies; although ideally and as emphasized in the memo each competency should be developed in one way or another in each of the curricular components. It is the intention of the researcher to highlight the main focus of each particular curricular component without undermining the fact that each competency is also developed in all of the components. No curricular component is left out.

Table 2. Competency standards and the curricular components of the BEEd program

Competency	Courses (components)	Specific courses and number of units
1. Have the basic and higher level literacy, communication, numeracy, critical thinking, learning skills needed for higher learning	General education courses* Professional courses Specialization courses	English (9 units) Filipino (9 units) Mathematics (6 units) Science (6 units) Social Sci (9 units) Humanities (6 units) Literature (6 units) ICT (3 units) Rizal (3 units)
2. Have a deep and principled understanding of the learning processes and the role of the teacher in facilitating these processes in their students	Professional courses	Theory and concepts courses (Child and Adolescent Development (3 units), Facilitating Learning (3 units), Social Dimensions of Education (3 units), The Teaching Profession (3 units
3. Have a deep and principled understanding of how educational processes relate to larger historical, social, cultural and political processes	Professional courses	Theory and concepts courses (Child and Adolescent Development (3 units), Facilitating Learning (3 units), Social Dimensions of Education (3 units), The Teaching Profession (3 units
4. Have a meaningful and comprehensive knowledge of the subject matter they will teach	Specialized courses	Content courses (Science (12 units), Mathematics (12 units), English (12 units), Filipino (6 units), Social Studies (6 units), Music, Arts, and Physical Educ (3

		units), Home Economics and Livelihood Educ (3 units), Values Education (3 units)
5. Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development, educational assessment, and teaching approaches)	Professional Courses	**Methods and strategies courses** (Principles of Teaching 6 units), Assessment of Student Learning (6 units), Educational Technology (6 units), Curriculum Development (3 units), Developmental Reading (6 units) **Field Study Courses** (12 units)
6. Have direct experience in the field/classroom (e.g., classroom observations, teaching assistance, practice teaching	Professional Courses	**Field Study Courses (12 units)**
7. Can demonstrate and practice the professional and ethical requirements of the teaching professions	Professional Courses	**Field Study Courses (12 units)**
8. Can facilitate learning of diverse types of learners, in diverse types of learning environments, using a wide range of teaching knowledge and skills	Professional Courses	**Methods and strategies courses** (Principles of Teaching 6 units), Assessment of Student Learning (6 units), Educational Technology (6 units), Curriculum Development (3 units), Developmental Reading (6 units) **Field Study Courses** (12 units)
9. Can reflect on the relationships among the teaching process skills, the learning processing in the students, the nature of the content/subject matter, and the broader social forces encumbering the school and educational	Professional courses Specialization/content courses	**Methods and strategies courses**

processes in order to constantly improve their teaching knowledge, skills and practices;		
10. Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and evaluate the effectiveness of such approaches in improving student learning;	Professional courses	**Methods and strategies courses** **Field study courses**
11. Are willing and capable to continue learning in order to better fulfill their mission as teachers	Professional courses Specialization/content courses	

Classifying Philippine pre-service teacher education standards into curricular areas (based on Ramsey model)

Using curricular areas drawn form the model of Ramsey, the standards defined in the Philippine pre-service teacher education program were classified. Some standards contain (refer) to more than one curricular areas so these are written in more than one curricular areas. Two standards do not fall in any of the curricular areas, so they are just classified under "other standards."

- Learners. *Can facilitate learning of diverse types of learners, in diverse types of learning environments, using a wide range of teaching knowledge and skills;*

- Learning Theories. *Have a deep and principled understanding of the learning processes and the role of the teacher in facilitating these processes in their students;*

  Have a deep and principled understanding of how educational processes relate to larger historical, social, cultural and political processes

- Curriculum. *Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development, educational assessment, and teaching approaches);*

- Content knowledge (what should be taught) *Have a meaningful and comprehensive*

knowledge of the subject matter they will teach;

- Pedagogy (Instructional strategies)*; Have direct experience in the field/classroom (e.g., classroom observations, teaching assistance, practice teaching);*

  Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and evaluate the effectiveness of such approaches in improving student learning; and

  Can demonstrate and practice the professional and ethical requirements of the teaching professions;

- Assessment. *Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development, **educational assessment**, and teaching approaches)*

  Can reflect on the relationships among the teaching process skills, the learning processing in the students, the nature of the content/subject matter, and the broader social forces encumbering the school and educational processes in order to constantly improve their teaching knowledge, skills and practices;

  *Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and **evaluate the effectiveness of such approaches in improving student learning**; and*

- Instructional Materials. *Can apply a wide range of teaching process skills (including curriculum development, lesson planning, **materials development**, educational assessment, and teaching approaches)*

- Other standards.

  Have the basic and higher level literacy, communication, numeracy, critical thinking, learning skills needed for higher learning;

  Are willing and capable to continue learning in order to better fulfill their mission as teachers

Standards of Different Pre-service Teacher Education Programs

Different pre-service teacher education programs were examined and compared vis-à-vis standards for effective teachers and standards for teachers for culturally diverse students. The first subsection presents three standards for effective practice of teaching. Only the major curricular components and subsequent standards are presented. The second subsection is about the identified characteristics of teachers of culturally diverse students in addition to the general competencies for an effective teacher.

A. **Competency and standards for effective teachers.**

Three samples of competency standards for effective teachers are presented below.

A.1 Sample 1. Kim and colleagues (2004) list 13 competency areas and standard for pre-service teacher education. The list competency areas already include diversity which is known to be related to multicultural education.

1. *Learner*. Effective teachers understand and value similarities and differences among individual learners to develop each learner's potential. (Diverse learners may include gifted students, students with learning disabilities, and students with ethnic cultural backgrounds.)
2. *Learning*. Effective teachers understand and apply the theoretical foundations of learning and human development.
3. *Content*. Effective teachers understand and apply disciplinary structures, concepts, and tools of inquiry to create learning experiences within and across disciplines.
4. *Curriculum*. Effective teachers create, with their students, experiences that support their intellectual, social and personal development.
5. *Instruction*. Effective teachers create a safe learning environment that encourages self-motivation, active inquiry, and positive social interaction.
6. *Assessment*. Effective teachers use a variety of strategies to monitor student progress and facilitate the learner's continuous development.
7. *Management*. Effective teachers use a variety of strategies to manage their classroom within the school and community context.
8. *Diversity*. Effective teachers encourage students to value the commonalities and differences of our pluralistic world.
9. *Professionalism*. Effective teachers engage in professional, ethical practices.
10. *Reflection*. Effective teachers reflect upon all dimensions of their work.
11. *Inquiry*. Effective teachers focus their efforts as teachers and their students' efforts as learners on inquiry.
12. *Communication*. Effective teachers communicate clearly with students, families, colleagues, and the community.
13. *Technology*. Effective teachers understand the role and influence of technology on learners, learning and society.

A. 2 **Sample 2.** Polly Ulichny (2005) presents seven standards to ensure teacher quality for pre-service teacher education. For each standard indicators of the development of the competencies are described in details (which are not included in this paper). Below are the different standards identified by Ulichny.

Standard 1. *Roles and Relationships* (with students, colleagues and school community). Teachers can establish and maintain routines and a classroom atmosphere that students understand and respect which organizes them for instruction; carry out classroom activities that reflect careful thought, takes into account differences in students' cultural background, home language, developmental

levels and learning styles; demonstrates clearly leadership in the classroom, guiding and directing activities and interaction in ways that contribute to a positive and safe learning environment; consistently model appropriate decorum, relate personally to all students and their families and establish a safe, orderly and democratically based classroom in which high expectations for student engagement and learning are consistently demonstrated.

Standard 2. *Student as Learner*. Teachers consistently demonstrate through their planning and instruction that students are considered as individuals with a variety of strengths, talents and specific needs.

Standard 3. *Planning*. Teachers consistently and carefully plan lessons and entire units of study from clearly identified content and skill objectives that are set with appropriately high expectations for learner outcomes through a series of specific, well-planned, sequential lessons.

Standard 4. *Classroom Practice (teacher presentations, collaborative activities, questioning/discussion, development of student skills)*. Teachers effectively use instructional time to present students with a variety of tasks and activities that engage them in constructing new knowledge while building on their prior knowledge, skills and abilities.

Standard 5. *Assessment*. Teachers consistently rely on assessment data to inform differentiated instruction in the classroom.

Standard 6. *Professional knowledge and growth*. Teachers act on the knowledge that the teaching profession is a complex understanding that requires continual learning and the practice of good judgment.

Standard 7. *Elementary Subject Matter*. Teachers demonstrate a high level of comfort and precision in presenting and explaining concepts in all the elementary disciplines.

A.3 **Sample 3.** This is the Minnesota standards of effective practice for teachers. There are 9 standards under which are the different specific competencies that effective teachers are expected to do.

Standard 1. *Subject Matter*. A teacher must understand the central concepts, tools of inquiry and structure of the disciplines taught and be able to create learning experiences that make these aspects of subject matter meaningful for students.

Standard 2. *Student Learning*. A teacher must understand how students learn and develop and must provide learning opportunities that support a student's intellectual, social and personal development.

Standard 3. *Diverse Learners*. A teacher must understand how students differ in their approaches to learning and create instructional opportunities that are adapted to students with diverse backgrounds and exceptionalities.

Standard 4. *Instructional Strategies*. A teacher must understand and use a variety of instructional strategies to encourage student development of critical thinking, problem solving and performance skills.

Standard 5. *Learning Environment*. A teacher must be able to use an understanding of individual and group motivation and behavior to create learning environments that encourage positive social interaction, active engagement in learning, and self-motivation.

Standard 6. *Communication*. A teacher must be able to use knowledge of effective verbal, nonverbal and media communication techniques to foster active inquiry, collaboration and supportive interaction in the classroom.

Standard 7. *Planning Instruction*. A teacher must be able to plan and manage instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

Standard 8. *Assessment*. A teacher must understand and be able to use formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the student.

Standard 9. *Reflection and professional development*. A teacher must be a reflective practitioner who continually evaluates the effects of choices an actions on others, including students, parents, and other professionals in the learning community, and who actively seeks out opportunities for professional growth.

Standard 10. *Collaboration, ethics and relationships*. A teacher must be able to communicate and interact with parents or guardians, families, ,school colleagues, and the community to support student learning and well-being.

All three samples on standards for effective teachers include standards on learner, planning instruction, assessment, instructional practice (implementation), professional growth and relationship with students, colleagues and community. It is evident in the standards that concern for addressing cultural diversity is referred to (sometimes implicitly). These standards are parallel with those curricular areas drawn from Ramsey's model.

B. Studies on Competency and standards for effective science teacher education for diversity

Before anyone becomes an effective beginning elementary school science teacher, s/he needs to possess all competency of an effective teacher; in addition, s/he needs to

possess other characteristics to be an effective elementary science teacher. To be an effective elementary school science teacher for diverse culture, added characteristics are warranted.

There are several studies on educating science teachers for diversity, from which the researcher drew implications to standard setting. Zeichner (1993) identifies 16 key elements for educating teachers for diversity. From these 16 elements, Shaw (2000) chose 12 (twelve) to provide organizational framework for "educating teachers for diversity." According to Shaw, each element is a piece of the jigsaw of multicultural teacher education which must be completed to see the big picture, the education of teachers for diversity must be addressed in a holistic manner.

Below are the 16 elements of Zeichner; those in bold style are the elements chosen by Shaw.

1. "Admissions procedures screen students on the basis of cultural diversity sensitivity and a commitment to the education of all students, especially poor students of color who frequently do not experience success in school.

2. **Students are helped to develop a clearer sense of their own ethnic and cultural identities.**

3. **Students are helped to examine their attitudes toward other ethnocultural groups.**

4. **Students are taught about the dynamics of prejudice and racism and about how to deal with them in the classroom.**

5. **Students are taught about the dynamics of privilege and economic oppression and about school practices that contribute to the reproduction of societal inequalities.**

6. **The teacher education curriculum addresses the histories and contributions of various ethnocultural groups.**

7. **Students are given information about the characteristics and learning styles of various groups and individuals and are taught about the limitations of this information.**

8. **The teacher education curriculum gives much attention to sociocultural research knowledge about the relationships among language, culture and learning.**

9. **Students are taught various procedures by which they can gain information about communities represented in their classrooms.**

10. **Students are taught how to assess the relationships between the methods they use in the classroom and the preferred learning and interaction styles in their students' homes and communities.**

11. **Students are taught how to use various instructional strategies and assessment procedures sensitive to cultural and linguistic variations and how to adapt classroom instruction and assessment to accommodate the cultural resources that their students bring to school.**

12. **Students are exposed to examples of the successful teaching of ethnic- and language minority students.**

13. Students complete community field experiences with adults and/or children of other ethnocultural groups with guided reflections.

14. Students complete practicum and/or student teaching experiences in schools serving ethnic- and language minority students.

15. Students live and teach in a minority community (immersion).

16. **Instruction is embedded in a group setting that provides both intellectual challenge and social support.**

Shaw apparently did not choose those elements related to field experience (direct exposure and policy on admission. It is the perception also of the researcher that these 12 elements can cover the other 4 elements (no. 1, 13, 14, & 15) and that there is no need to explicitly mention them.

Villegas and Lucas (2002) identified 6 salient characteristics of a culturally responsive teacher. They suggested that these characteristics should be the basis for curriculum revision in pre-service teacher education toward infusion strategy. This suggestion is an alternative approach to the prevailing practice of adding one or two courses in multicultural education or urban education (Goodwin, 1997) which are not as effective since students have the option to take or not these courses.

The 6 salient characteristics identified by Villegas and Lucas are:

1. The teacher is socio-culturally conscious, that is, recognizes that there are multiple ways of perceiving reality and that these ways are influenced by one's location in the social order.

2. The teacher has affirming views of students from diverse background, seeing resources for learning in all students rather than viewing differences as problems to be overcome.

3. The teacher sees himself or herself as both responsible for and capable of bringing about educational change that will make schools more responsible to all students.

4. The teacher understands how learners construct knowledge and is capable of promoting learners' knowledge construction.

5. The teacher knows about the lives of his and her students.

6. The teacher uses his or her knowledge about students' lives to design instruction that builds on what they already know while stretching them beyond the familiar.

The Washington University College of Education presented program principle related to teaching cultural diversity and the associated quality indicators to each program principle; these principles are based on the Missouri Standards for Teacher Education. (Sept., 1999).

Program Principle	**Quality Indicators**
Ability to create a learning environment and learning experiences that promote inclusion and taps diverse experiences to support learning for all	• Create positive classroom environments where individual differences are respected, supported and encouraged • Create a caring and rich learning atmosphere where all students have the opportunity to learn both cooperatively and individually • Know when and how to access specialized services to meet students' needs • Create lessons and activities that recognize individual needs of diverse learners and variations in learning styles and performance
Appreciation for cultural, ethnic, religious, gender and individual differences	• Use awareness of diversity to enhance student learning; identify prior experience, learning styles, strengths and needs to support student learning • Meet individual student's needs by using a variety of instructional strategies that are responsive to the social and cultural contexts of the communities in which students live • Demonstrate sensitivity to cultural, gender, intellectual, and physical ability differences in classroom communication and in responses to students' communications • Model effective verbal.non-verbal communication skills; support and expand learner expression in speaking, writing, listening and other media and use a variety of media communication tools • Talk with and listen to students, sensitive and responsive to signs of distress, and seek appropriate help as needed to solve all students' problems
Knowledge of and	• Present the subject in multiple ways and use knowledge of

appreciation for the humanities, sciences, mathematics, social studies, and technology and the interrelatedness of disciplines	content to design appropriate learning experiences • Relate research to practice in helping students develop their content competencies • Create interdisciplinary learning experiences • Strengthen prior knowledge with new ideas and encourage students to take responsibility for their own learning • Demonstrate an understanding of the social, ethical, legal, and human issues surrounding the use of technology in OK-12 schools and apply that understanding in practice
Knowledge of and expertise in teaching the concepts, underlying structures, and tools of inquiry in the subjects or materials taught	• Create opportunities for students to use the tool of inquiry of content for many purposes • Articulate a philosophy of teaching which is based on critical characteristics of the content • Know and use child/adolescent development and theories of learning to create meaningful learning experiences • Select and create learning experiences that are appropriate for curriculum goals, relevant to learners, and based upon principles of effective instruction • Use motivation theories and behavior management strategies and techniques to effectively manage time, space, transitions, and activities to engage students in productive learning opportunities and to engage students' decision making • Engage students in active learning that promotes the development of critical thinking, problem solving and performance capabilities • Select alternative teaching strategies, materials and technology to achieve multiple instructional purposes and to meet student needs • Plan and design effective learning environments and experiences supported by informational and instructional technology • Implement curriculum plans that include methods and strategies for applying informational and instructional technology to maximize student learning
Skill in utilizing a variety of inquiry strategies based on careful, informed and ongoing reflection	• Use a variety of ways to monitor the effects of teaching on student learning • Conduct research in the classroom which assists in improving practice • Apply a variety of self-assessment and problem-solving strategies for reflecting on practices, their influences on students' growth and learning, and the complex interactions between them
Commitment to pursuing opportunities for	• Understand how professional organizations, conferences, advanced course work, and other professional opportunities contribute to professional growth

professional growth	• Participate in continual personal and collegial reflection on practice • Use technology to enhance personal productivity and professional practice • Use resources available for professional development • Practice professional ethical standards • Participate in collegial activities designed to make the entire school a productive learning environment • Seek opportunities to develop relationships with parents and guardians of students, and seek to develop cooperative partnerships in support of student learning and well-being • Identify and use appropriate school personnel and community resources to help students reach their full potential

The above standards cover all that curricular areas that are essential in a program for effective teachers in addition to the standards that are important in teaching for diversity. Although the above standards do not explicitly mention unique competencies for science teachers, these are implicitly referred to in the content knowledge standards and explicitly within the standard for the development of problem-solving and critical skills. These cover all aspects referred to in the Ramsey model.

The researcher finds the need to emphasize the following points that should be remembered in designing and implementing pre-service teacher education program for science teachers for indigenization and localization of the prescribed curriculum:

- Pre-service teacher education program should integrate lessons on developing a clearer sense of one's own ethical and cultural identities. Villegas (2002) emphasized the importance of sociocultural consciousness of student teachers because "without this insight, teachers are unable to cross the sociocultural boundaries that separate them from their students." Zeichner & Hoeft (1996) mentioned that for teachers to understand their future students, student teachers must be able to appreciate their own sociocultural identities.

- Pre-service teacher education program should provide for opportunities for student teachers to examine their attitudes toward other ethnocultural groups. Irvine (1990), Pang and Sablan (1998) found out that teachers' attitudes toward students significantly shape the expectations they hold for student learning, their treatment of students and what students ultimately learn. Studies of Ladson-Billin (1994), Nieto (1996) show that positive attitudes of teachers support student achievement. Further, Delpit (1995) reported that teachers who respect cultural diversity tend to perceive that students from other culture can learn as well as those from dominant groups.

- Pre-service teacher education program should integrate the development of skills on knowing the culture of the community where teachers teach; and the appreciation of the culture. Villegas (2002) emphasized the need for teachers to

know their students, their experiences outside the school. Moll and Gonzalez (1977) reported that teachers who are knowledgeable about their students' experiences can use these in classroom activities bridging what happens in school and house and community. This practice brings relevance to classroom learning and teaching.

- Pre-service teacher education program should not only include field experience in schools in a community with dominant culture but also exposure to schools serving communities with diverse culture. These field experiences can provide better integration of theories learned in the classroom and putting into practice these theories. Better appreciation of theories can be achieved.

- Pre-service teacher education program should incorporate into all the courses the achievement of standards peculiar to science teaching to diverse culture. Villegas (2202) emphasized the need for the "concept of diversity" to be engrained in all the courses and not just taking as a separate course.

Curricular Gap in the Philippine pre-service teacher education program for elementary school science teachers for indigenous people

Curricular elements. The Philippine pre-service teacher education contains the aims of the program, 11 standards (what teachers can do), the courses (in the three categories) and the number of units required for each course and per category, description of the approach in teaching the course. In addition, it has a sample of what courses are to be taken each year (for five years).

Are these elements sufficient for the different teacher education institutions to implement the intended curriculum? The present pre-service teacher education program document may contain information necessary in the development and design of specific courses; however, the information may be subject to different interpretation because the listing of courses does not provide description of each course (in terms of content coverage, expected learning outcomes). For example, there are two separate required courses for Principles of Teaching – Principles of Teaching 1 and Principles of Teaching 2 (see table 1). If a teacher educator is assigned to develop the syllabus for these two courses, what will be the bases and major consideration to define the differences between the two? If there are 20 different teacher educators doing the syllabus, then it is possible that there will be 20 different syllabi on the same course title. In the absence of a more specific description and substandards of competency for each course, it will be difficult for teacher education institutes to implement the intended curriculum to meet standards. Moreover, it will also be a guessing game for teacher education institutions what to focus on for the licensure examination.

The document does not also specify the standard competency for the different 5 learning areas to be taught. Although the elementary school teachers are trained to be generalists, it is not clear how much so they know and what to do for each learning areas. For elementary school science teachers, how much content knowledge should they know;

how much pedagogical knowledge should they know to be an effective beginning teacher. These things are not defined in the document. As for science teaching for diversity, the standard competencies are not also defined.

The absence of more definite standards (level of expected performance) is the subject of debate among teacher educators in the Philippines. Some heads of teacher education institutes believe that the documents (CHED Memo 30) is enough but others believe that a more specific listing of quality indicators (quality performance) of effective beginning teachers can help provide a better guidance to teacher educators in designing, implementing and assessing their courses. The question of academic freedom is raised. Some posit that the presence of detailed and specific standard competence can stifle their academic freedom. Other teacher educators (Ulchiny, 1999) contend that these defined standards can be the springboard for debate and subject for research and reform. The researcher takes the same stand and feels that there is a need for a more defined and specific standards of competence as basis for the design of the pre-service teacher education program for elementary school science teachers for diversity.

Proposed Curriculum Design

Drawing from the identified curricular gaps and implications from competence standards benchmarked from other institutions and the results of different studies on science teaching for cultural diversity, the following features of a pre-service teacher education program for elementary school science teachers for indigenizing/localizing the curriculum:

1. Have more specific competence for teaching science to indigenous people or diverse culture particularly the inclusion of developing awareness of one's attitude towards ethnocultural groups in the foundation courses (sociology, philosophy and psychology); developing skills in designing instruction, developing instructional materials using local materials to make science teaching relevant to the indigenous people and learners of diverse culture.
2. Have general description of each course to include knowledge and skills needed for teaching science to indigenous people
3. Have field experience in schools with indigenous people and diverse culture

Appendix A presents the competences that are proposed to be included to develop skills in teaching science to indigenous people and the description of the specific courses that can help achieve these competence/

It has been mentioned in the limitation of this study that the proposed reforms are thought in such a way that there could be easily incorporated and integrated in the current curriculum.

Recommendation for future research

The proposed reforms are for the intended curriculum of the pre-service teacher education for elementary school science teachers and the effectiveness and adequacy of the reforms can be measured only when the reforms are actually implemented. Thus, it is suggested that a follow-up research be done to measure the effectiveness of the reforms in designing implemented curriculum. The results of the follow-up research can be used to better improve the existing intended curriculum of the pre-service teacher education for elementary school science teachers.

In addition to this, it is also helpful to determine how the qualities of teacher educators affect the design of the implemented curriculum. Are the teacher educators qualified to implement the reforms? What should the qualification of teacher educators be so that the reforms can be properly implemented?

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APPENDIX A. Proposed Curriculum Design for Pre-service Teacher Education of Elementary School Science Teachers of Communities with Diverse Culture and Indigenous People

Aim: To prepare professional teachers for practice in elementary school science for indigenous people or diverse learners in the Philippines

Curricular Areas	**Competence Standards (based on current PTEC)**	**Additional Competence Standards for Indigenization and Localization**	**Courses (Proposed Coverage to include those related to indigenization)**
Learners and Learning Environment	*Can facilitate learning of diverse types of learners, in diverse types of learning environments, using a wide range of teaching knowledge and skills;*	*Create positive classroom environments where individual differences are respected, supported and encouraged* *Create lessons and activities that recognize the individual needs of diverse learners and variations in learning styles and performance* *Create caring and rich learning atmosphere where all students have the opportunity to learn both cooperatively and individually* *(Embedded in these standards are the skills in knowing the student teachers' personal attitudes toward other ethnocultural groups, histories and*	*Professional Courses* ● *Socio-cultural foundations (sociological theories and applications of these theories to effective instructions; awareness and understanding of the unique culture of each group of people and the relationship among language, culture and learning; skills in studying social behavior necessary to design effective instruction)* ● *Philosophical foundations of education (philosophy concepts and its implications to understanding the role and functions of philosophy to education and instruction)* ● *Learning environment*

		contributions of these various ethnocultural groups; and skills in various procedures on how to get information about communities represented in their classroom. Emphasis should also be given to sociocultural research knowledge about the relationships among language, culture and learning)	*(understanding of the role of the different elements and factors that contribute to conducive learning environment)* ● *Psychological foundation (understanding of human behavior relevant to learning)*
Learning Theories	*Have a deep and principled understanding of the learning processes and the role of the teacher in facilitating these processes in their students;*	*Use awareness of diversity to enhance student learning; identify prior experience, learning styles, strengths and needs to support student learning;* *Articulate a philosophy for teaching which is based on critical characteristics of science* *Know and use child/adolescent development and theories of learning to create meaningful learning experiences* *Use motivation theories and behavior management strategies and techniques to effectively manage time, space, transitions and technique to effectively manage time, space, transitions, and activities to engage students to productive learning opportunities and*	*Professional Courses* ● *Educational psychology – understanding of the different learning theories describing and explaining how different groups of people learn and different factors affect how they learn.*

		to engage students' decision making *(Included here are the information about the characteristics and learning styles of various groups and individuals and the limitations of this information)*	
Curriculum	*Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development, educational assessment, and teaching approaches)*	*Create interdisciplinary learning experiences* *Relate research to practice in helping students develop their content competencies* *Present the subject in multiple ways and use knowledge of content to design appropriate learning experiences* *Select and create learning experiences that are appropriate for curriculum goals, relevant to learners and based upon principles of effective instruction* *Implement curriculum plans than include methods and strategies for applying informational and instructional technology to maximize student learning*	*Professional Courses* ● *Curriculum theory and development (identification of learning needs as defined and affected by philosophy of education, social conditions and theories of learning; identification of competencies that need to be developed and sequencing of these competencies according to the nature of the learners and content* ● *Instructional Design (translation of intended learning outcomes to effective instruction in consideration of the nature of learners, available materials, and learning environment)*
Content Knowledge	*Have a meaningful and*	*Demonstrate an understanding of the*	*Content courses*

	comprehensive knowledge of the subject matter they will teach;	*social, ethical, legal and human issues surrounding science and apply that understanding in practice*	● *Comprehensive background knowledge, process skills and attitudes on science to design effective instruction*
Pedagogy (Instructional Strategies)	*Have direct experience in the field/classroom (e.g., classroom observations, teaching assistance, practice teaching);* *Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and evaluate the effectiveness of such approaches in improving student learning; and* *Can demonstrate and practice the professional and ethical requirements of the teaching professions;*	*Meet individual student's needs by using a variety of instructional strategies that are responsive to the social and cultural contexts of the communities in which students live* *Demonstrate sensitivity to cultural gender, intellectual and physical ability differences in classroom communication and in responses to students' communications* *Present the subject (Science content) in multiple ways and use knowledge of content to design appropriate learning experiences* *Engage students in active learning that promotes the development of critical thinking, problem solving and performance capabilities* *(Embedded in this set of standards is the knowledge on the use of various instructional strategies and assessment procedures sensitive to*	*Professional Courses* ● *Teaching Methods in Science (cover different instructional design, instructional strategies particularly those that are found effective in teaching indigenous people or diverse students)*

		cultural and linguistic variations and how to adapt classroom instruction and assessment to accommodate the cultural resources that students bring to school)	
Assessment	*Can apply a wide range of teaching process skills (including curriculum development, lesson planning, materials development,* ***educational assessment****, and teaching approaches)* *Can be creative and innovative in thinking of alternative teaching approaches, take informed risks in trying out these innovative approaches and* ***evaluate the effectiveness of such approaches in improving student learning****;*	*Use a variety of ways to monitor the effects of teaching on student learning* *Apply a variety of self- assessment and problem-solving strategies for reflecting on practices, their influences on students' growth and learning and the complex interactions between them* *(Emphasis on this group of standards is the knowledge on how to assess the relationships between the methods they use in the classroom and the preferred learning and interaction styles in their students' homes and communities)*	*Professional Course – Test and measurement (principles and different methods of assessing learning; proper use of formative and summative evaluation techniques in measuring learning and using the results in improving instruction; using evaluation results in instructional materials development and curriculum development)*
Instructional Materials	*Can apply a wide range of teaching*	*Select alternative teaching strategies, materials and technology to achieve*	*Professional Courses (Educational Technology – covers principles in*

	*process skills (including curriculum development, lesson planning, **materials development**, educational assessment, and teaching approaches)*	*multiple instructional purposes and meet the students needs*	*instructional materials development and how these are used properly in instruction)*
Professional Development	*Are willing and capable to continue learning in order to better fulfill their mission as teachers*	*Understand how professional organizations, conferences advanced course work, and other professional opportunities to professional growth* *Practice in continual personal and collegial reflection on practice* *Use technology to enhance personal productivity and professional practice* *Practice professional ethical standards* *Seek opportunities to develop relationships with parents and guardians of students, and seek to develop cooperative partnerships in support of student learning and well-being*	
Other Areas	*Have the basic and higher level literacy, communication, numeracy, critical*	*(Field experience is given much importance and significance by a lot of teacher educators. The field experience should provide exposures*	*(Field Study – to start from 2nd year to 5th year; gradual increase in exposure from observation of different in-service experienced teachers,*

	thinking, learning skills needed for higher learning;	*to student teachers on examples of successful teaching of indigenous people; exposure to adults and/or children of indigenous groups with guided reflections)*	*consultation on designing and planning instruction to actual implementation of own planned instruction.*

The three components of the pre-service teacher education are maintained; namely:

1. General Education (to provide basic knowledge in broad fields which provide the foundation on which professional courses are anchored)

   English (grammar) – 9 units
   Filipino (grammar) – 9 units
   Mathematics – 6 units
   Science (General Science) – 6 units
   Social Science (Sociology, Philosophy and Psychology) – 9 units
   (Sociology should include understanding of different communities in the Philippines – culture, practices, values, etc; Philosophy should include understanding of the way of thinking of different communities in the Philippines; Psychology should include understanding of the human behavior of different cultural communities in the Philippines. In the teaching of these three courses, lessons on awareness of one's attitude toward other cultures should be integrated.)
   Humanities (Arts, Music) – 6 units **(The Arts and Music of local communities and indigenous people in the Philippines should be studied for better understanding of these groups of people.)**
   Literature (English) – 6 units **(The local literature should also be included)**
   ICT (Computer Literacy) – 3 units
   Rizal (legislated course) – 3 units

2. Professional Education Courses (to develop the range of knowledge and skills needed on the practice of the teaching profession)
    a. Theory and Concept courses
        i. **Child & Adolescent Development (Focus is suggested to be on the individual difference on development and how different cultural factors affect development.)**
        ii. **Facilitated Learning (Integration of different socio-cultural factors that affect (facilitate/delay) learning.)**
        iii. **Social Dimensions of Education (Inclusion of the different social situations within which educational systems function from rural to urban and of communities of indigenous people; perceptions of different people on the importance and role of education)**
        iv. **The Teaching Professions (Role of teachers in the achievement and realization of national goals of education and individual goals of education; and how the teachers should focus within the context of socio-cultural background of the school)**

    b. Methods and Strategies Courses
        i. Principles of Teaching 1 – 3 units **(General principles of teaching to all types of learners; exposure to different types of teaching strategies and methods effective to different groups of learners; how to plan effective instruction within the context of the social milieu of the community where the school is located)**
        ii. Principles of Teaching 2 – 3 units **(Principles behind development of effective instruction to meet the needs of individual learners and particular group of learners like indigenous people; exposure to different effective instruction for teaching each particular learning areas particularly science.)**
        iii. Assessment of Learning 1 – 3 units
        iv. Assessment of Learning 2 – 3 units
        v. Educational Technology 1 – 3 units

vi. Educational Technology 2 – 3 units
vii. Curriculum Development – 3 units
viii. Developmental Reading 1 – 3 units
ix. Development Reading 2 – 3 units

c. Field Study Courses
    i. Field Study 1 – 2 units
    ii. Field Study 2 – 2 units
    iii. Field Study 3 – 2 units
    iv. Field Study 4 – 2 units
    v. Field Study 5 – 2 units
    vi. Field Study 6 – 2 units

d. Special Topics
    i. Science
    ii. Mathematics
    iii. English
    iv. Filipino
    v. Social Studies
    vi. Music, Arts and Physical Education
    vii. Home Economics and Livelihood Education
    viii. Values Education

3. Specialization/Content Courses (to provide basic but essential knowledge in the 5 prescribed learning areas in elementary school education)