PRE-SERVICE TEACHER EDUCATION: MEETING THE DEMANDS OF THE K-TO-12 CURRICULUM IN GRADE 8 MATHEMATICS CONTENT STANDARDS AND TEACHING PEDAGOGIES IN THE NEW NORMAL

Janneth Q. Rondina [1], Marife V. Ubalde [2]
University of Science and Technology of Southern Philippines, Lapasan, Cagayan de Oro City, Philippines
Correspondence Tel., 63 905 136 4531, E-mail: [1]janneth.rondina@ustp.edu.ph [2]marife_ubalde@ustp.edu.ph,

ABSTRACT: *The study aimed to determine whether the pre-service teacher education curriculum particularly BSEd major in mathematics of the University of Science and Technology of Southern Philippines meets the demands of the K to 12-curriculum in Grade 8 Mathematics content standards and pedagogies. The syllabi of the pre-service teacher education curriculum were evaluated and compared vis-à-vis with the grade 8 mathematics curriculum in the Department of Education. The analysis revealed that in terms of pedagogy, a minor gap was determined in fieldwork and interactive learning while a major gap was in the interview. However, the pre-service teacher's curriculum can capacitate them, pre-service teachers, with pedagogies that can address the demand of the Department of Education even in the new normal condition. With regards to content standards, the analysis revealed a very sufficient coverage of all the content standards of grade 8 mathematics under the K-12 program. Therefore, it is highly recommended that the university will continue to offer BSED-Mathematics program as it adequately prepares pre-service teachers in the field of teaching.*

Keywords*:* pre-service teacher education, k to 12 curricula, grade 8 mathematics, content standards, pedagogy and new normal

1. INTRODUCTION

Teachers are facilitators of learning. They play important roles in the students' academic achievements. All countries around the globe measured academic progress and rank every nation using a standardized achievement test. The results of the Program for International Student Assessment revealed that the Philippines ranked at the bottom [1]. Also, the National Achievement Test (NAT) of grade six obtained a national average mean percentage score (MPS) of 37.44 [2]. It was the weakest performance in the history of the standardized examination of the DepEd. Furthermore, the OECD report [1], revealed that Filipino students' average scores in mathematics were ranked 76th. The examination results can be attributed to poor engineering of curriculum and its delivery in a Teacher Education (TE) or Pre-service Education program. Others [3] contended that there is no single best way to organize the learning experiences of teachers, yet there are some common considerations in developing or enhancing TE programs. For instance, teachers could be treated as partners in the process of curriculum reform rather than mere implementers of a pre-designed given framework. Elsewhere [4], authors described re-inventing TE along the lines of social re-constructivism such that teacher educators are directly involved in curriculum design and actively support the programs of public schools.

Pre-service teachers' curriculum is vital to produce competent graduates. Theories and practices needed for the pre-service teachers must be properly defined in the curriculum. [5] stated that there seems to be difficulty in integrating theory and practice and in articulating two institutional settings such as schools and universities in the preparation of teachers. Some [6] revealed that in the teacher education program, it is necessary to develop pre-service teachers' foundation skills both in content and pedagogy as well as communication ability. They need to be taught how to articulate sound mathematical explanations and how to justify their solutions. The purposeful rehearsal of pre-service teachers in fundamental communication skills would ensure that they can guide students into mathematical fluency and flexibility [7].

TE programs that deliver are those that emphasize subject matter, especially how it is learned by students. As analyzed by others [8], it necessitates to having TE programs based on the needs of schools. The situation calls for the pre-service teachers to be trained to teach learners in the new normal condition and new learning environments. Skills in using digital technologies to support remote learning are very important. Additionally, there are students without digital devices and internet connectivity. As pointed out by others [9], teachers need to be updated on effective pedagogical methods with or without the use of online technologies. The need to strengthen the pre-service teachers' curriculum to meet the demand of the K-to-12 curriculum and the new normal is vital. Hence, this study was conducted.

2. METHODOLOGY

2.1 Research Design

The study is quantitative, which aimed to determine the gap between the pre-service teachers' education curriculum of the University of Science and Technology of Southern Philippines and the K-to-12 curriculum in the Department of Education, specifically high school Mathematics. The content and the mathematics competencies in the K-to-12 curriculum for grade 8 level were verified if they were captured in the pre-service teachers' curriculum of Bachelor of Secondary Education major in Mathematics programs offered by the University. Syllabi and the K-12 curriculum content standards and pedagogies in mathematics were compared to gather the data.

2.2 The Instruments

All recent syllabi in the professional education and major courses of the BSED-Mathematics program were examined. The competencies for Mathematics in Grade 8 of the K-to-12 curriculum were also used in the study.

The Respondents

The respondents consisted of all professors/instructors handling the subjects of the BS Mathematics Education Program in the Department of Mathematics Education of the College of Science and Technology Education at USTP CDO.

2.3 Data-Gathering Procedure

The Syllabi and the mathematics competencies in the K-to-12 curriculum for grade 8 level were verified if these were captured in the pre-service teachers' curriculum of Bachelor of Secondary Education major in Mathematics program offered by the University. Syllabi and the K-12 curriculum content standards and pedagogies in mathematics were compared to gather the data.

In addition, teaching competencies that address the new normal environment brought about by the COVID-19 pandemic were likewise determined to generate a complete

picture of what pre-service teachers truly need before they are deployed to the classrooms. This approach responds to the recommendation of authors especially by [5] who stated that the design of teacher education should be responsive and appropriate to the unique needs of the educational system.

The evaluation of syllabi was done by the researchers. An evaluation of the instructors who handled the courses was done separately. Rubrics were used to determine the extent of the sufficiency of the coverage concerning the content standards and teaching pedagogies of the syllabi and the mathematics competencies in the K-to-12 curriculum for grade 8 level mathematics.

3. RESULTS AND DISCUSSIONS

TABLE 1. Coverage of the Major Courses Topics in BSED Mathematics Syllabi vis a vis with the K-to-12 Curriculum Grade 8 Content Standards as Evaluated by Researchers and Instructors

Content Standard	Researcher Evaluation (Courses = 27)	Coverage	Instructor Evaluation (Courses = 27)	Coverage
Demonstrates understanding of key concepts of factors of polynomials, rational algebraic expressions, linear equations and inequalities in two variables, systems of linear equations and inequalities in two variables, and linear functions	6	Very Sufficient	13	Very Sufficient
Demonstrates key concepts of linear inequalities in two variables, systems of linear inequalities in two variables and linear functions	6	Very Sufficient	10	Very Sufficient
Demonstrates understanding of key concepts of logic and reasoning.	6	Very Sufficient	12	Very Sufficient
Able to communicate mathematical thinking with coherence and clarity in formulating and analysing arguments.	6	Very Sufficient	9	Very Sufficient
Demonstrates understanding of key concepts of inequalities in a triangle, and parallel and perpendicular lines.	5	Very Sufficient	9	Very Sufficient
Demonstrates understanding of key concepts of probability	3	Very Sufficient	3	Very Sufficient

Based on the researchers' evaluation of syllabi, there is very sufficient coverage of all content standards in Grade 8 mathematics. The result is confirmed by the instructors who handle the subject. The least coverage reflected in the evaluation of both researchers and instructors is 3. It means that out of 27 major courses in BSED Mathematics; at least three of them cover the competencies written in the K-12 content standards in Grade 8 mathematics.

TABLE 2. Coverage of the teaching pedagogies in BSED Mathematics Syllabi vis a vis with the K-to-12 Curriculum Grade 8 as Evaluated by Researchers and Instructors

Teaching and Learning Approach	Researcher-Evaluation (Courses 39)	Description	Instructor Evaluation (Courses 39)	Description
Discussion	38	Very sufficient	39	Very sufficient
Collaborative Learning	37	Very sufficient	39	Very sufficient
Reading and writing	33	Sufficient	39	Very sufficient
Library Work	32	Sufficient	38	Very sufficient
Lecture	34	Sufficient	38	Very sufficient
Exercises/ Demonstration	34	Sufficient	37	Very sufficient
Technology integration	28	Partially sufficient	39	Very sufficient
Reporting	26	Partially sufficient	37	Very sufficient
Multimedia Presentation	20	Partially sufficient	31	Sufficient
Interactive Learning	17	Partially sufficient	26	Partially sufficient
Fieldwork	15	Partially sufficient	21	Partially sufficient
Interview	14	Insufficient	24	Partially sufficient

The result of the analysis by both the researchers and instructors is shown above. With regards to students' exposure to different teaching pedagogies, the analysis revealed that discussion and collaborative learning are very sufficiently used. In addition, there was enough exposure of students to library work, lectures, and exercises or demonstrations which were described as sufficient and very sufficient by both researchers and instructors, respectively. Technology integration, reporting, and multimedia presentation as evaluated by instructors were very sufficient but partially sufficient by the researchers. Fieldwork was found to be the less percentage of all the strategies which labeled as partially sufficient hence, it was considered to have more emphasis. Also, the interview was found to have insufficient coverage among the teaching pedagogies as evaluated by the researchers, however partially sufficient upon the validation of the instructor who actually handles the subject. In general, of all the teaching pedagogies required in the K-12 curriculum, the BSED-Mathematics program has a minor gap in fieldwork and interactive learning and a major gap in interviews.

In summary, based on the researchers' evaluation of syllabi and validation of instructors teaching the subjects/courses, it appears that in terms of content standards of Grade 8 Mathematics under the K-to-12 program in the Department of Education, are emphasized and discussed repeatedly in at least three (3) major courses in BSED-Mathematics

curriculum. In terms of the teaching pedagogies, DepEd recommended teaching pedagogies were used in at least fourteen (14) courses in the BSED-Mathematics curriculum. Through this, the pre-service teachers in the said program will be capacitated to teach the mathematics subjects. Further, the BSED-Mathematics curriculum addressed the demand of the Department of Education with regard to proficiency and mastery in teaching the subject under the K-to-12 curriculum.

4. CONCLUSIONS AND RECOMMENDATIONS

From the analysis of the data as the BSED-Mathematics and the K-to-12 grade 8 high school mathematics curriculums are compared, the researchers claimed that with regard to content standards, no gap was found of all the content standards of mathematics in Grade 8 level. With regard to pedagogy, a minor gap was only found in the interview. Hence, the BSED teacher education program major in mathematics adequately prepares and capacitates pre-service teachers for teaching grade 8 mathematics in the Department of Education in any condition. It is therefore recommended that the program will continuously be offered, however, the curriculum must be regularly updated to maintain high-quality standards.

5. REFERENCES

[1] OECD. (2013). PISA 2018 Results. Combined Executive Summaries. Journal of Chemical Information and Modeling, 53(9), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004

[2] Year Report National Achievement Test 2019. https://www.google.com/search?q=national+achievement+test+results+2019&oq=National+Achievement+&aqs=chrome.5.69i57j0i512l9.14648j0j7&sourceid=chrome&ie=UTF-8

[3] Darling-Hammond, L., Hammerness, K., Grossman, P., Rust, F. & Shulman, L. (2005). The design of teacher education programs. In L. Darling-Hammond & J. Barnsford (Eds.). Preparing teachers for a changing world, pp. 390-441. San Francisco: Jossey-Bass.

[4] Sachs, J. (2010). Teacher professional identity: Competing discourses, competing outcomes. Journal of Education Policy. March 1. 149-161. 10.1080/02680930116819.

[5] Flores, M.A. (2016). Teacher education curriculum. In J. Loughran & M.L. Hamilton (Eds.). International book of teacher education, pp. 187-230. Dordrecht: Springer Press. https://repositorium.sdum.uminho.pt/bitstream/1822/52318/1/Flores.pdf

[6] Lomibao, L. S. (2016). Enhancing mathematics teachers' quality through Lesson Study. SpringerPlus, 5(1). https://doi.org/10.1186/s40064-016-3215-0

[7] Hunter, R. (2004). Reforming communication in the classroom: One teacher's journey of change, pp. 451–458.

[8] Musset, P. (2010). Initial teacher education and continuing training policies in a comparative perspective: Current practices in OECD countries and a literature review on potential effects (OECD Education Working Papers No. 48). OECD Publishing.

[9] Rapanta, C., Botturi, L., Goodyear, P. et al. Online University Teaching During and After the COVID-19 Crisis: Refocusing Teacher Presence and Learning Activity. Postdigit Sci Educ (2020).