# Comparative Competence of Science Educators on the New Licensure Examination as Basis for a Review Program

[1]Jun S. Camara

[1]College of Education & School of Advanced Studies, Pangasinan State University, Pangasinan, Philippines

Corresponding Email: *jcamara.lingayen@psu.edu.ph

**Abstract**

The demand to prepare future science educators for national board examinations necessitates teacher training institutions to assess the licensure competence of pre-service teachers. In the case of the Philippines, the Licensure Examination for Teachers or LEPT has new competencies, which have not been fully assessed on the perspective of pre-service teachers. In this, the researcher assessed and compared the self-reported competence of alumni (a, n=38) and ongoing pre-service teachers (o, n=43) of a large state university in the Philippines. To do this, the researcher developed a survey-questionnaire with contents based on the Enhanced Table of Specifications or TOS for LEPT which was first implemented in March 2023 in the Philippines, the survey was conducted during the 1st semester of S.Y. 2023-2023. Results revealed that the pre-service teachers (n=81) have high level of competence for the LEPT. Further, the level of competence of alumni is comparable to those of on-going students. However, a significant difference was found in competencies related to Challenging Activities in Science, Assessment Tools, Basic Biotechniques, and Waves and Optics, where alumni demonstrated a significantly higher competence. To provide continuity for the findings, the researcher proposes a review program for Filipino pre-service teachers based on the findings. Furthermore, the researcher recommends that a content-competency alignment will be conducted between the Enhanced TOS of LEPT and the latest relevant issuances on Policies, Standards and Guidelines (PSGs) for Education degree programs issued by the Commission on Higher Education. Moreover, a curriculum mapping is recommended between the Enhanced TOS and the MATATAG Curriculum for Science. To provide an international perspective, the researcher recommends an analysis of licensure competencies for teachers among ASEAN countries.

Keywords: Licensure Examination, Science Major, Teacher Education, Competency, Table of Specifications

## INTRODUCTION

To practice teaching and be recognized as professional educators, individuals must undergo and successfully pass a licensure examination regulated by the Philippine Regulatory Commission (PRC) following Republic Act No. 7836, also known as the Philippine Teachers Professionalization Act of 1994. Possessing a valid certification and professional license issued by the PRC is a prerequisite for individuals to practice as professional teachers in the Philippines.

According to McAllister, the licensure examination serves to identify teacher candidates who possess the essential knowledge and skills necessary for effective learning facilitation. Additionally, Esmeralda & Espinosa (2015) underscore the significance of licensing to ensure practitioners meet the minimum qualifications required for competent practice within their specific field of expertise.

As outlined in Republic Act No. 7836, the Licensure Examination for Professional Teachers is structured to cover the following areas. The examination comprises two parts for the elementary level: professional education and general education. In contrast, the secondary

level examination consists of three parts: professional education, general education, and the field of specialization. These components collectively assess the competencies required for individuals seeking to become licensed professional teachers in the Philippines.

Given the crucial importance of undertaking and completing the licensure examination, it is imperative for graduates of teacher education programs to adequately prepare themselves before entering the examination process (Alcantara & Luna, 2023). In line with this, Chua et al. (2019) underscored the significance of implementing a continuous coaching and mentoring program for fourth-year students to enhance their chances of success in the licensure examination.

Moreover, assessing the competency levels of teacher education graduates based on the Table of Specifications of the Licensure Examination for Professional Teachers is a valuable tool in gauging their preparedness for the licensure examination. This approach thoroughly explains the candidate's readiness to tackle the specific requirements and expectations outlined in the licensure examination (Alcantara & Luna, 2023).

Therefore, to assess the readiness of alumni and currently enrolled students for the licensure examination, this study investigated their level of competency aligned with the updated Licensure Examination for Professional Teachers Table of Specifications (LEPT TOS) set forth by the Professional Regulation Commission.

**METHOD**

A survey questionnaire consisting of 34 indicators extracted and adopted from the 2022 Table of Specifications in Science for the Licensure Examination for Professional Teachers (LEPT) was administered to both alumni (n= 38) and presently enrolled students (n= 81) at the College of Teacher Education in Pangasinan State University – Lingayen Campus, Pangasinan.

The survey questionnaire aimed to determine the respondents' competence level in accordance with the topic and learning outcomes included in the new TOS. The respondents rated themselves based on 1 (Not Competent) indicator as the lowest and 5 (100% Competent) as the highest.

Most of the alumni were employed during the data collection, and the enrolled students were engaged in their field study courses. Hence, they were reached out through messenger to answer the survey questionnaires.

## RESULTS AND DISCUSSION

### Competence of Science majors in the New LEPT TOS

Table 1. Means and Descriptive equivalent of student-reported level of competency (*n=81*)

| Topic and Learning Outcomes | WM | DE | Rank |
|---|---|---|---|
| Distinguish the three states of matter and the types of mixture. | 3.89 | 90% competent | 1 |
| Explain the interconnections of land, ocean, and atmosphere to human life on Earth. | 3.85 | 90% competent | 2 |
| Illustrate the cycles of water, carbon, rock, and other materials that sustain the inhabitants of planet Earth. | 3.81 | 90% competent | 3.5 |
| Deliberate the food chain links, which show how the organisms are related in utilizing energy and nutrients. | 3.81 | 90% competent | 3.5 |
| Demonstrate the characteristics of non–Earth bodies and phenomena such as the sun, moon, stars, planets, etc. | 3.79 | 90% competent | 5 |
| Illustrate the inter – dependence of living organisms with each other and with their natural environment. | 3.78 | 90% competent | 6 |
| Describe the benefits derived from space exploration. | 3.70 | 90% competent | 7 |
| Illustrate the transfer of energy from one place to another and from one form to another. | 3.63 | 90% competent | 8 |
| Exhibit the characteristics and functions of the cell as the fundamental unit of life. | 3.59 | 90% competent | 9 |
| Distinguish between cell and molecule. | 3.58 | 90% competent | 10 |
| Identify the uses of technology for effective outcomes in learning. | 3.53 | 90% competent | 11 |
| Discuss how bacteria, viruses, and chemicals affect human health. | 3.52 | 90% competent | 12 |
| Demonstrate the relation of heat, work, and temperature to energy, radiation, and physical properties of matter. | 3.48 | 90% competent | 13 |
| Illustrate assessment tools to measure the outcomes of learning in science. | 3.42 | 90% competent | 14 |
| Distinguish bacteria, protists, and viruses and their effects on humans. | 3.40 | 80% competent | 15.5 |
| Exhibit understanding of the functions, diseases, and care for the 12 systems of the body. | 3.40 | 80% competent | 15.5 |
| Demonstrate familiarity with classifying plants and animals and their basic survival needs. | 3.38 | 80% competent | 17.5 |
| Distinguish the characteristics and functions of waves and optics. | 3.38 | 80% competent | 17.5 |
| Demonstrate understanding of disease–causing microorganisms collectively known as microbes. | 3.37 | 80% competent | 19 |
| Lead in the exploration of challenging activities to motivate interest in science. | 3.33 | 80% competent | 20 |
| Manifest understanding of chemical formulas and chemical notations. | 3.32 | 80% competent | 21 |
| Describe the basic reactions of organic compounds. | 3.27 | 80% competent | 22 |

| Topic and Learning Outcomes | WM | DE | Rank |
|---|---|---|---|
| Show an understanding of the structure, functions, and reactions of macromolecules. | 3.25 | 80% competent | 23 |
| Relate the structural characteristics and properties of organic compounds. | 3.22 | 80% competent | 24.5 |
| Demonstrate the procedure for improvising materials for basic biotechniques. | 3.22 | 80% competent | 24.5 |
| Discuss the uses of electromagnetism for motors, generators, transformers, x–ray, etc. | 3.19 | 80% competent | 26.5 |
| Distinguish between Classical Physics and Modern Physics. | 3.19 | 80% competent | 26.5 |
| Discuss the recent inventions that have improved the health and longevity of life. | 3.15 | 80% competent | 28.5 |
| Demonstrate proficiency in interpreting graphical data presentations and conclusions drawn from inferential analysis of results. | 3.15 | 80% competent | 28.5 |
| Illustrate the roles of chromosomes and genes in genetic technology. | 3.14 | 80% competent | 30.5 |
| Identify the benefits derived from genetic technology in the fields of medicine and agriculture. | 3.14 | 80% competent | 30.5 |
| Show how plants and animals maintain homeostasis and energy acquisition for sustainability. | 3.12 | 80% competent | 32.5 |
| Manifest familiarity with the basic investigative research in science. | 3.12 | 80% competent | 32.5 |
| Characterize the basic features of Modern Physics: Planck's quantum theory and Einstein's theory of relativity. | 3.04 | 80% competent | 34 |
| Weighted Mean | 3.42 | 90% competent | |

*Legend: 1.00 - 1.80 (Not competent); 1.81 - 2.60 (70% competent); 2.61 - 3.40 (80% competent); 3.41 -4.20 (90% competent); 4.21 - 5.00 (100% competent)*

Science education students rated their competence in the licensure examination based on the new TOS. Generally, the respondents hold 90% Competence on the topics and learning outcomes included in the updated Table of Specifications of the Licensure Examination for Professional Teachers. Teacher-students are competent enough to take the licensure examination if given the chance. This implies that the teacher education program has successfully prepared and instilled a strong foundation in science concepts among the students. As emphasized in the study of Garbett (2003), the success of science education programs in preparing students for licensure examinations is evident in the high competence levels reported by science education students.

Further, results revealed "High Competence" in fundamental concepts such as distinguishing the three states of matter and the types of mixture (WM = 3.89; 90% Competence), explaining the interconnections of land, ocean, and atmosphere (WM = 3.85; 90% Competence), and illustrating cycles of essential materials on Earth (WM = 3.81; 90% Competence). This means that teacher-students are competent enough to the fundamental

principles of science, implying competence in developing representational competence. Sim (2014) highlighted the importance of understanding chemical concepts and representations in developing representational competence, which could be applied to understanding the interconnections of land, ocean, and atmosphere. However, Liu (2006) presents a different viewpoint, asserting that students' grasp of fundamental science concepts, such as the states of matter and types of mixtures, might be overestimated. He suggests further research into the factors influencing students' competence in these areas.

Furthermore, though, generally, science education students possess a high level of competence, further improvement was observed on some topics and learning outcomes as these competencies obtained a comparatively low level of competence. The competence related to describing the fundamental aspects of Modern Physics, specifically Planck's quantum theory and Einstein's theory of relativity, attained the least weighted mean, placing it at the bottom of the competency ranking. This means that some competencies need to be visited and explored to ensure a well-rounded understanding of all the competencies. This finding aligns with the findings of Hindarto (2017), whose study reported low initial competence in science subjects among master's students, specifically in Physics.

**Level of Competence between Alumni and Enrolled Science Major Students on New LEPT ToS**

Table 2. Level of competence between alumni (n=38) and presently enrolled (n=43) students

| Topic and Learning Outcomes | WM | p-value |
|---|---|---|
| Demonstrate familiarity with classifying plants and animals and their basic survival needs. | a-3.53 e-3.26 | 0.241 |
| Show how plants and animals maintain homeostasis and energy acquisition for sustainability. | a-3.32 e-2.95 | 0.366 |
| Illustrate the roles of chromosomes and genes in genetic technology. | a-3.29 e-3.00 | 0.682 |
| Identify the benefits derived from genetic technology in medicine and agriculture. | a-3.29 e-3.00 | 0.593 |
| Distinguish between cell and molecule. | a-3.84 e-3.35 | 0.055 |
| Exhibit the characteristics and functions of the cell as the fundamental unit of life. | a-3.76 e-3.44 | 0.090 |
| Demonstrate understanding of disease–causing microorganisms collectively known as microbes. | a-3.63 e-3.14 | 0.104 |
| Distinguish bacteria, protists, and viruses and their effects on humans. | a-3.74 e-3.09 | 0.077 |
| Exhibit understanding of the functions, diseases, and care for the 12 systems of the body. | a-3.47 e-3.33 | 0.566 |

| Topic and Learning Outcomes | WM | p-value |
|---|---|---|
| Discuss the recent inventions that have improved the health and longevity of life. | a-3.26 e-3.05 | 0.273 |
| Distinguish the three states of matter and the types of mixture. | a-3.97 e-3.81 | 0.180 |
| Manifest understanding of chemical formulas and chemical notations. | a-3.53 e-3.14 | 0.395 |
| Relate the structural characteristics and properties of organic compounds. | a-3.37 e-3.09 | 0.273 |
| Describe the basic reactions of organic compounds. | a-3.42 e-3.14 | 0.051 |
| Show an understanding of the structure, functions, and reactions of macromolecules. | a-3.53 e-3.00 | 0.188 |
| Discuss how bacteria, viruses, and chemicals affect human health. | a-3.76 e-3.30 | 0.280 |
| Demonstrate the relation of heat, work, and temperature to energy, radiation and physical properties of matter. | a-3.74 e-3.26 | 0.085 |
| Illustrate the transfer of energy from one place to another and from one form to another. | a-3.76 e-3.51 | 0.456 |
| Discuss the uses of electromagnetism for motors, generators, transformers, x–rays, etc. | a-3.50 e-2.91 | 0.116 |
| Distinguish the characteristics and functions of waves and optics. | a-3.74 e-3.07 | 0.023s |
| Characterize the basic features of Modern Physics: Planck's quantum theory and Einstein's theory of relativity. | a-3.16 e-2.93 | 0.743 |
| Distinguish between Classical Physics and Modern Physics. | a-3.32 e-3.07 | 0.495 |
| Explain the interconnections of land, ocean, and atmosphere to human life on Earth. | a-3.89 e-3.81 | 0.338 |
| Illustrate the cycles of water, carbon, rock, and other materials that sustain the inhabitants of planet Earth. | a-3.92 e-3.72 | 0.425 |
| Demonstrate the characteristics of non–Earth bodies and phenomena such as the sun, moon, stars, and planets, i.e., | a-3.94 e-3.65 | 0.195 |
| Describe the benefits derived from space exploration. | a-3.87 e-3.56 | 0.051 |
| Illustrate the interdependence of living organisms with each other and with their natural environment. | a-3.87 e-3.70 | 0.814 |
| Deliberate the food chain links, which show how the organisms are related in utilizing energy and nutrients. | a-3.89 e-3.74 | 0.868 |
| Lead in the exploration of challenging activities to motivate interest in science. | a-3.66 e-3.05 | 0.025s |

| Topic and Learning Outcomes | WM | p-value |
|---|---|---|
| Illustrate assessment tools to measure the outcomes of learning in science | a-3.79 e-3.09 | 0.015**s** |
| Identify the uses of technology for effective outcomes in learning. | a-3.76 e-3.33 | 0.104 |
| Demonstrate the procedure in improvising materials for basic biotechniques. | a-3.68 e-2.81 | 0.009**s** |
| Manifest familiarity with the basic investigative research in science. | a-3.32 e-2.95 | 0.433 |
| Demonstrate proficiency in interpreting graphical data presentations and conclusions drawn from inferential analysis of results. | a-3.45 e-2.88 | 0.082 |
| *Weighted Mean (Alumni)* | 3.62 | |
| *Weighted Mean (Enrolled)* | 3.24 | |

*Legend: 1.00 - 1.80 (Not competent); 1.81 - 2.60 (70% competent); 2.61 - 3.40 (80% competent); 3.41 -4.20 (90% competent); 4.21 - 5.00 (100% competent)*

Table 2 compares the competence of the alumni and presently enrolled Science students about the topic and learning outcomes of the new LEPT TOS. Results revealed that Alumni generally have higher competence (WM = 3.62) compared to currently enrolled students (WM = 3.24). This means that those who have completed the program may retain a higher level of proficiency in the assessed topics.

Further, alums and currently enrolled students showed comparative competencies among the competencies and learning outcomes of the ToS. These competencies include "understanding of living organisms, discussing recent interventions in science, and explaining the interconnections of land, ocean, and atmosphere.

Furthermore, four topics and learning outcomes among the ToS competencies showed significant differences. Alums showed a significantly higher level of competence in the following topics and learning outcomes compared to currently enrolled students, namely, Challenging Activities in Science (p = 0.025), Assessment Tools in Science (p = 0.015), Basic Biotechniques (p = 0.009) and Waves and Optics (p = 0.023).

**CONCLUSION**

The assessment of the level of competence among science education students and alums based on the updated Table of Specifications (TOS) for the Licensure Examination for Professional Teachers (LEPT) showed the readiness of the teacher-respondents and alums to take the licensure examination. Generally, a 90% competence among the respondents showed a high degree of readiness to take the examination exam. This suggests that the teacher education program at Pangasinan State University effectively equipped and prepared the alums and students for the challenges presented by taking the examination. Moreover, the university's

science education program showed successful implementation in delivering and instilling fundamental science concepts.

## REFERENCES

Esmeralda, A., & Perez-Espinosa, J. (2015). Teacher Education Graduates' Performance as Predictor of Licensure Examination for Teachers Results. *JPAIR Multidisciplinary Research,* 21(1), 90-106.

Alcantara, F. L., & De Luna, M. C. E. Readiness of Technology and Livelihood Education Students in Taking the Licensure Examination for Teacher.

Chua, C. H. M., Jiang, Y., Lim, D. S., Wu, V. X., & Wang, W. (2019). Effectiveness of cognitive behaviour therapy-based multicomponent interventions on fear of falling among community-dwelling older adults: A systematic review and meta-analysis. *J Adv Nurs,* 75(12):3299-3315. doi: 10.1111/jan.14150

Garbett, D. (2003). Science education in early childhood teacher education: Putting forward a case to *enhance student teachers' confidence and competence. Research in science education,* 33(4), 467-481.

Liu, X. (2006). Student competence in understanding the matter concept and its implications for science curriculum standards. *School Science and Mathematics,* 106(5), 220-227.

Sim, J. H., & Daniel, E. G. S. (2014). Representational competence in chemistry: A comparison between students with different levels of understanding of basic chemical concepts and chemical representations. Cogent Education, 1(1), 991180.

Hindarto, N. W., & Iswari, R. S. (2017). Strengthening the basic competence of sciences for master students of science education program. *International Journal of Environmental & Science Education*, *12*(10), 2261-2273.