

**UNCOVERING SELF-SIMILARITIES OF THE NON-PASSERS
IN THE TEACHERS BOARD EXAMINATION
OF STATE UNIVERSITIES AND COLLEGES
IN THE PHILIPPINES**

Marilou M. Abatayo¹ and Luz D. Conolly²

¹*Northwestern Mindanao State College of Science and Technology, Philippines*

²*Kintore Street School Katherine, NT, Australia*

Abstract

State Universities and Colleges in the Philippines which offer teacher education programs have peculiar characteristics in terms of the outcomes of their products in the national licensure examination for teachers. The study is concerned with determining the self-similar patterns among those graduates who failed in the licensure examination by the use of fractal statistical analysis. Results revealed that self similarities are evident among the state schools with average to high volume of non-passers but such similarity ceases to be operant among the state schools with low failure rates viz large number of passers. This may entail that the State Teacher Education Institutions that are performing well in the Licensure Examination for Teachers have adopted strategies quite distinct from the strategies used by other state TEIs. Hence, state schools with high passing rates have strategically utilized their available resources to optimize their licensure examination performance.

Keywords: fractal analysis, self-similarity, licensure examination for teachers, passer, performance

1.0 Introduction

The performance of graduates in the Licensure Examination for Teachers is one measure that reflects the quality of trainings provided by Teacher Education Institutions in the country. In particular, state higher education institutions, generally, account for a large proportion of teacher education institutions. Despite the subsidies provided to these state higher education institutions by the national government, their performance in the teacher licensure examination is equivalent to the performance of private higher education institutions (PIDS, 2013). It is, then, of interest to determine whether or not the typical performance of these state schools are the same regardless of scale or whether the typical performance is unduly influenced by the performance of the schools in the larger scales. For problems of this type, self similarity measures are needed and such is facilitated by the use of fractal analysis.

Nature and natural processes are rugged, irregular, discontinuous and often characterized by complex, non-linear interactions (Palmer, 1992). Fractal is a general term used to describe both the objects (geometry) and processes which is characterized by ruggedness and persistent irregularity in features yet self-similar (Mandelbrot, 1982). The

classical development of fractal analysis, therefore, originated from Geometry to describe irregularly shaped geometric figures which have persistent pattern repetitions or self-similarities. In order to be more useful, fractal analysis have to be extended in the realm of data analysis. Padua (2015) proposed to the use of the power law distribution to model data with fractal characteristics. The power law distribution takes the form

$$f(x) = cx^{-\lambda}, x \geq \theta > 0.$$

Here, θ is the minimum value of x and λ is called the fractal dimension of x . Just as fractal objects have self-similarities, fractal densities also have self-similar patterns:

$$f(ax) = a^{-\lambda}f(x).$$

The use of such probability models for describing fractal distribution provides a convenient way to describe the pattern repetitions observed in the licensure examination data of the State Teacher Education Institutions.

While several studies have already been done on the analysis of licensure examination performance (Philippine Institute for Development Studies, 2015; Nool & Ladia, 2018 and others), none have actually attempted to do a self-similarity analysis of these results. Thus, higher education institutions which have greater volume of graduates (large scale TEIs) are expected to have, at their disposal, larger resources (human and capital) which could be used to their advantage. The presence of self-similarities, however, allow us to conjecture that such resources are not strategically utilized after all.

Hence, this study is concerned with determining the self-similar patterns among those graduates of State Universities and Colleges in the Philippines who failed in the Licensure Examination for Teachers through the use of fractal statistical analysis. Results from this study will provide valuable baseline data for making interventions and implementing practices to minimize non-passer performance among TEIs in the country.

2.0 Conceptual Framework

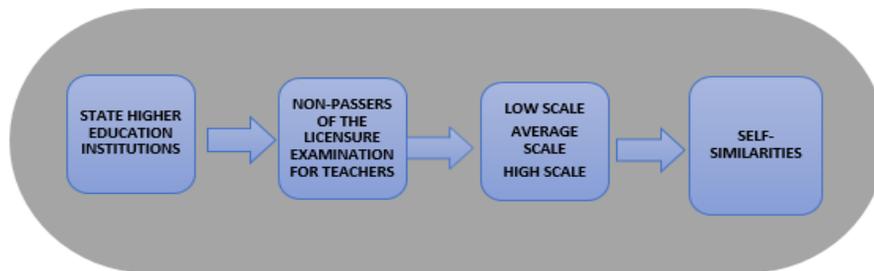


Figure 1: Conceptual Framework of the Study

This study conceptualized that the presence of self-similarities among SUCs regardless of scales in terms of non-passers performance in the Licensure Examination for Teachers, allow us to conjecture of the non-strategic utilization of their resources. These State Higher Education Institutions whether big or small regardless of levels, years of existence and

availability of human and physical resources may equally likely encounter problems of the LET non-passing performance of their BEED graduates. That is, these state schools may strategically utilize their resources or adopt potential strategies or interventions to optimize their performance.

3.0 Methodology

This study employed a fractal statistical analysis of the September 2017 LET result in Bachelor of Elementary Education of different SUCs in the country specifically considering the non-passers performance. The data were then group according to the scales namely:

| Scale | Interpretations |
|---------------|---|
| Low Scale | Low % of Non-Passers or High % Passers |
| Average Scale | Average % of Non-Passers or Average % Passers |
| High Scale | High % of Non-Passers or Low % Passers |

The three identified scales were then subjected to fractal test that is, establishing their fractal characteristics. If some smaller values occur than higher values then self-similarity patterns exist among the three scales. The fractal dimension was analyzed through the formula and we can estimate λ as:

$$\lambda_{est} = 1 + \frac{1}{ave(\frac{\log x_i}{\theta})}$$

4.0 Results and Discussion

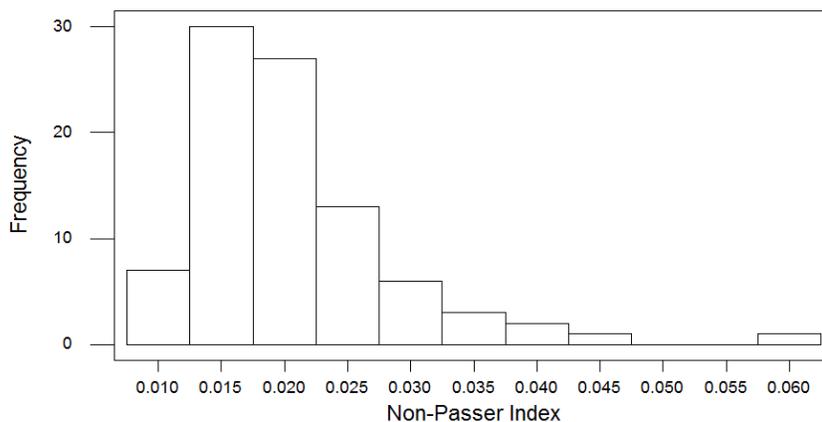


Figure 2: Histogram of the Non-Passer Index

The features of the histogram in Figure 2 evidently manifests the fractal characteristics of the non-passer index in the Licensure Examination for Teachers. It can be observed from the graph that more smaller values occur than higher values. That is, numerous state higher education institutions in the country reveal self-similarity measures in terms of their non-passer performances. These state schools have typical performances regardless of scales whether high, medium or low. This is supported by its fractal dimension of 2.82183.

This indicates that SUCs whether big or small regardless of levels, years of existence and availability of resources have encountered similar problems of the LET passing performances of their Teacher Education graduates.

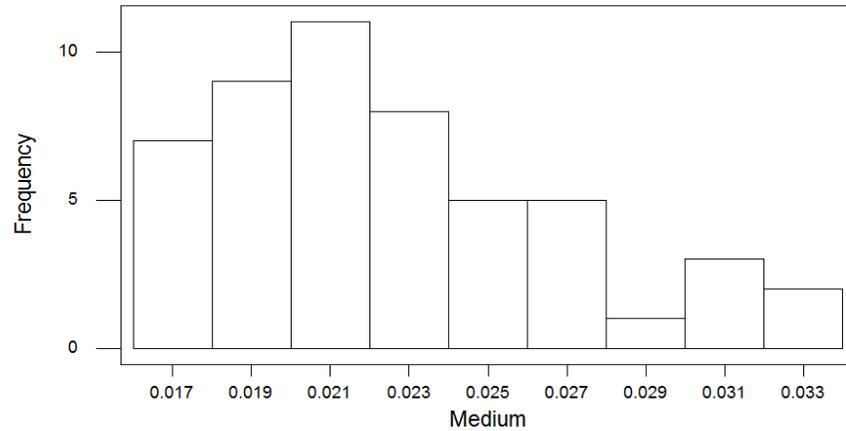


Figure 3: Histogram of High Scale Non-passer Index

The state teacher education institutions in the country having high percentage of failure in the September 2017 licensure examination for Bachelor of Elementary Education most likely experience similar problems. The figure shows a positively skewed distribution which indicates that self-similar patterns exist in the data set with a corresponding fractal dimension of 6.60538. The fractal dimension is high, this may indicate that these low performing SUCs irrespective of their status in normative financing, their human and physical resources, accreditation and others in all likelihood have comparable strategies or schemes in preparing their graduates for the LET challenge. Nonetheless, there are only few SUCs were having such a high scale of failing the examination.

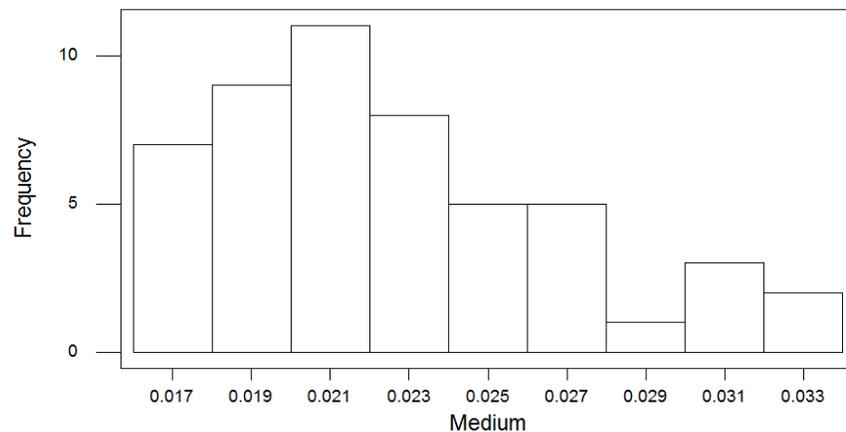


Figure 4: Histogram of the Medium Scale Non-passer Index

The graph in Figure 4 shows that lower values dominated much than higher values which signifies the emergence of fractal characteristics of the data set. This reveals that self-similar patterns are also evident among the State TEIs with average volume of non-passer graduates or average number of passers in the September 2017 BEED licensure examinations. This

result implies that state schools with average performance in the examination have adopted quite similar strategies in preparing their graduates for the board examination. The data is supported by its fractal dimension value of 4.593244. The fractal value is quite high, this may signify that such state teacher education institutions in the country with average volume of passers had applied similar pedagogies and interventions in preparing their BEED graduates to pass the board examination.

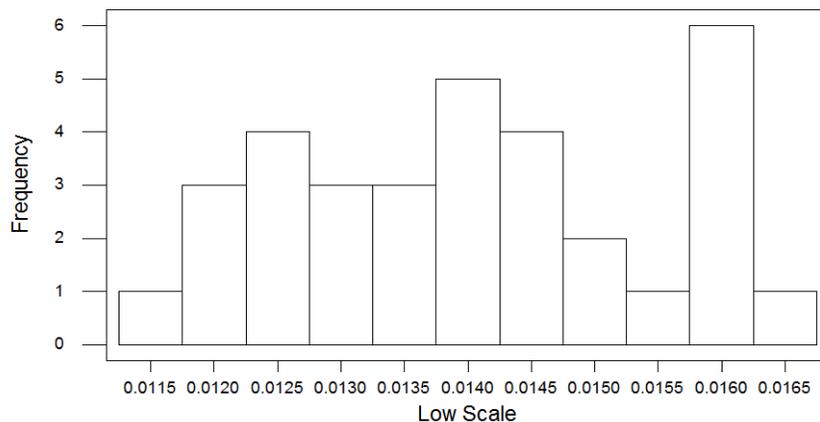


Figure 5: Histogram of the Low Scale Non-passer Index

Figure 5 shows that self-similarities cease to be operant among the state schools with low scale non-passer index or low failure rates viz institutions with large number of passers. This result implies that state schools that are performing well in the National Licensure Examination for Teachers have adopted strategies quite distinct from the strategies used by the other types of state higher education institutions. Since, this cluster is composed of several TEIs, they may vary in terms of the availability of their existing resources like financial, manpower, physical and other resources and through these they probably had implemented different interventions in preparing their graduates for the board examination.

5.0 Conclusion

Self-similarities are manifested among the state schools with average to large volume of non-passers but such similarity ceases to be operant among the state schools with low percentage of non-passers or low failure rates viz large number of passers. This result implies that the state schools that are performing well in the national teachers licensure examination have adopted strategies quite distinct from the strategies used by the other types of state higher education institutions. State schools with high passing rates, therefore, have strategically utilized their available resources to optimize their licensure examination performance.

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