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PROFILE VARIABLES OF HIGH AND LOW PERFORMING SCHOOLS: DISCRIMINATING FACTORS OF MATHEMATICS PERFORMANCE

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ABSTRACT

The study aimed to identify profile variables that can discriminate the high-performing schools and low-performing schools based on the Mathematics test of the National Achievement Test results. Ten high schools each from high and low Mathematics performance groups were the study areas. Purposive sampling was considered in the study; all the principals and teachers from the high and low-performing schools were taken as principal- and teacher-respondents; simple random sampling was performed to identify student-respondents from the classes of each teacher-respondents. The researcher personally conducted the study using the three validated questionnaires to the 10 principals, 24 Mathematics teachers, and 500 students from the schools with high mathematics performance, and 10 principals, 41 Mathematics teachers, and 589 students from the schools with low

Mathematics performance. The data gathered were analyzed using the pairwise correlation before the discriminant analysis of the SPSS. The analysis identified 18 out of 49 variables that could discriminate between the two groups of schools. Principals played big roles to attain and maintain the schools' high Mathematics performance. Teachers' number of training, attainment of Master's degrees, class size, and the provisions for Mathematics textbooks, Activity Sheets, and a functional library were associated with schools' high Mathematics performance. Educators and administrators could adopt the established discriminant function to identify the weaknesses of their schools' mathematics programs and to have scientific-based decisions and interventions. This study did not only establish how the identified variables were related to students' Mathematics performance, but it also showed how the influence of these variables to discriminate the high from low performing schools

Keywords: Discriminant Analysis, Discriminators, Math Modelling, Mathematics Performance, National Achievement Test.

INTRODUCTION

The Philippines faced a problem in Mathematics education as reported in the previous Trends in International Mathematics and Science Study (TIMSS) wherein, the Filipino first-year high school students ranked 40th out of 42 participating countries during the 1995 evaluation (Kelly, 2002). In TIMSS 1999 evaluation, Filipino learners ranked 36th out of 38 participating countries (Mullis et al., 2004). And, in TIMSS 2003 evaluation, Filipino second-year high school students placed 41st out of 45 participating countries (Bietenbeck, 2011).

The poor Mathematics performance of students is a common problem not only in the Philippines, as well as in other neighboring South East Asian (SEA) countries like Indonesia, Malaysia, and Thailand; wherein the Mathematics performance of these countries was at the bottom of PISA 2012 performance ranking (Thien et al., 2015).

This poor achievement of the students in Mathematics prompted educational researchers and the agencies of the concerned countries have acted to continuously identify factors that can bolster academic outcomes in the classroom. Several researchers have searched answers to this problem in poor mathematics and to name a few are: Mazana et al. (2020), Peteros et al. (2019), Mazana et al. (2019), Vinha et al. (2016), Banerjee (2016), Ker (2016), Bientenbeck (2011), Buddin and Zamarro (2009), Brown and Sinay (2008), Atkins (2008), and Orleans (2007). These researchers have pointed out factors emanating inside and outside the classroom that affect student's achievement like school practices, teacher's competence, student's attitude, parent's and peer's influence, and others.

In Malaysia, Alhassora et al. (2017) stated that the weak performances of Malaysian students in international and local assessments demonstrate that the intended target set by the Ministry of Education has not been fully achieved. In Indonesia, Tanudjaya and Doorman (2020) revealed that the poor Mathematics performance among Indonesian students is associated with teaching strategies used by teachers, students' familiarity with HOT problems, and the weak colleague-support in the development of HOT skills in the Mathematics classroom. And in Thailand, Tangchuan (2011) and Wiyaporn (2017) considered that the problem could be rooted in its basic education institutions wherein many schools in Thailand do not have enough teachers who possessed the required certification and teacher's training; most of the teachers who teach Mathematics have graduated and majored in Thai, Physical Education, Agriculture or Social Sciences, but not Mathematics.

Clusters of neighboring countries like the South East Asia (SEA) countries wherein the Philippines, Indonesia, Thailand, and Malaysia are included; and due to the proximity of these countries to each other, these countries together with their people share past histories, cultures, and traditions. Aside from the aforementioned histories and culture, Lee (2020) mentioned that students in this region demonstrated similarities to their non-cognitive dispositions such as learning habits, approaches to learning, motivation for school subject matters, and self-beliefs about their abilities. With these, it can be hypothesized that all the agencies or departments of education of these countries were employing similar strategies to resolve the problem in students' poor mathematics performance; if not similar, at least the strategies were not at far from each other.

In the case of the Philippines, poor Mathematics performance has become a challenge to the Department of Education (DepeEd). To reverse the decline in the performance of Filipino students in

Mathematics, the Philippine government gave much attention as it supported the initiatives such as conducting teachers' training in the form of In-service Enhancement for Teachers (INSET) which are focused on Content, Instructional Material Development, and Teaching Strategies; granting scholarship as initiatives to students and faculty pursuing Math-related courses; revising the curriculum from Secondary Education Development Program (SEDP) to Basic Education Curriculum (BEC). Several curriculum enhancements were likewise instituted such as adopting the Understanding By Design (UBD) framework, revisiting the Basic Education Sector Reform Agenda (BESRA), launching the ICT in education program, and the Engineering Science Education Program (ESEP), and more. All these initiatives by DepEd were done with the hope that the achievements of Filipino students in Mathematics could be improved.

The yearly conduct of the National Achievement Test (NAT) is an internal evaluation in the Philippines to monitor students' progress in all basic education subjects, and one of which is Mathematics. Consistent with the NAT reports from 2011, 2012, and 2013 (DepEd Reposts – 2011, 2012, 2013, 2018), students performed poorly in Mathematics and Science subjects. With respect to the Mathematics sub-test of the NAT reports, most of the schools consistently on the top stratum of performing schools in the previous NAT examinations maintained to be on the top-performing stratum in the latest NAT result of 2018. Similarly, most schools that consistently belonged to the low stratum in the previous NAT examinations were still in the low performing stratum in the latest NAT result of 2018. The disparities of the performances of the schools with high performing schools and low performing schools affected the overall NAT ratings in Mathematics. The average performance ratings of students from the low-performing schools pulled down the average performance ratings of students from the high-performing schools, and consequently, the national performance rating was negatively affected.

The above local scenario could somehow explain, the poor performance of Filipino learners in the latest results of PISA 2018 and TIMSS 2019. The overall performance of Filipino learners is the average ratings of the students from the high performing schools and low performing schools. The high-performance ratings of students from high-performing schools were pulled down by the low-performance ratings of students from low-performing schools.

As contained in the PISA 2018 and TIMSS 2019 reports, Filipino learners ranked at the bottom of the Mathematics performance rankings (Mullis et al., 2020; Salandanan, 2010). Thus, problem in mathematics performance of Filipino learners is still a problem. In a wider scope, this problem of poor Mathematics performance of students is still a problem to some SEA countries particularly to Malaysia, Brunei, Thailand, Indonesia, and the Philippines in which the PISA scores of these countries were significantly below the OECD average and were respectively ranked #46, #50, #56, #71 and #76 out of the 77 countries listed in the final report for a comparison of performance (OECD, 2019 and Brunogillot, 2019).

With these facts, the researcher has these questions which trigger the conduct of this study: how some schools maintained to be one of the top-performing schools in Mathematics? And also, why do some schools consistently belong to one of the low-performing schools? Giving answers to these questions lead the researcher to 1) identify factors that are discriminators of schools' mathematics performance, and 2) generate a formula that could discriminate school's mathematics performance.

FRAMEWORK OF THE STUDY

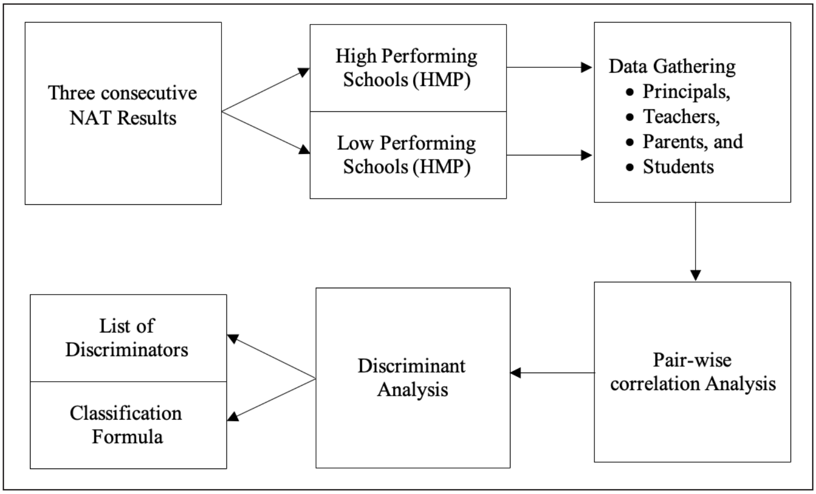
The study was anchored on the idea of Salandanan (2010) and developed by Vygotsky and Piaget as cited by Radford (2008) that environments - the school, classroom, home, and other learning environments, complement each other to strengthen the acquired learning of the students. The effect of school, classroom, and home environments are noted to have an impact on the development of each learner. The school and school-related factors have the greatest impact on the student academic growth and development as Lagon (2010) implied empowered teachers and school heads are at the heart of genuine education reform. The teachers, the administrators, and the school itself contribute to the overall student growth and development. Teacher quality appears to be the most important factor influencing student performance (Goldhaber & Anthony, 2007). While a school administrator can influence the school's academic performance by overseeing all activities of the teachers and students (Gentilucci & Muto, 2007), and teachers' and parents' dynamic partnership (Salandanan, 2010) or the collaborative efforts between the principal and the teacher, the principal and the department head, the department head and the teacher has an indirect effect on a student's academic performance. Likewise, the collaborative effort made by these three (3) keys individuals has a great influence on the student's academic performance and the school's performance in general.

METHODOLOGY

The study made use of Descriptive – Survey research design and aimed to identify the profile of public high schools in a division of the Northern Philippines that discriminated schools with consistent high Mathematics performance from schools with consistent low Mathematics performance based on the results of the National Achievement Tests for three consecutive years. The study research flow is reflected in Figure 1.

Figure 1

The Research Flow of the Study



A purposive random sampling method was used in the study to get respondents from the target group of schools; the HMP and LMP schools. Since there was only a limited number of principals and teachers from the HMP and LMP schools, all the principals and teachers were taken and form part of the principal-respondents and teacher-respondents. Pre-qualification criteria for student-respondents were laid down such as transferee students from other schools were not considered in the study, as well as those students who stopped and returned to schooling after two or more years were removed from the roster. Lastly, so that each teacher-respondents be represented by their students; a simple random sampling was performed to identify student-respondents from the classes of teachers teaching more than 50 students, while complete enumeration was considered for the classes of teachers with teaching assignments of not more than 50 students.

From the HMP schools, 10 principals, 24 Mathematics teachers, and 500 students were included as respondents. While, for LMP schools, 10 principals, 41 Mathematics teachers, and 589 students were included as respondents. On the other hand, for the schools with only one section for grade 10 and with less than 50 students, all the students were taken and these form part of the student - respondents. For the schools with only one section for grade 10 but with more than 50 students, only 50 students were randomly selected and these form part of the student - respondents. For the schools with more than one grade 10 section, only 50 students were proportionately distributed and randomly selected from the sections of the school and these form part of the student – respondents. Moreover, the data of student – respondents who were selected but were transferees from other schools during grades 7, 8, or 9 were not considered and removed during the analysis.

The researcher himself personally administered the designed profile questionnaires intended for the school administrators, mathematics teachers, and students. These questionnaires underwent face and content validations. All the profile variables included in the questionnaires were supported by two or more studies or references about its influence, relation, or effect on the academic performance of the students. The drafts of the questionnaires were presented to the expert – evaluators specifically: 1) experts from the Higher Education Institution major in the field of Mathematics Education, 2) Principals from the schools not included in the study, 3) Department Head of Mathematics from schools not included in the study, and 4) Master Teachers in Mathematics. The Content Validity Index (CVI) of the final questionnaires were all equivalent to 1.00, after removing the profile variables that were rated CVI < 1.00 by the experts. According to Polit & Beck (2006) and Polit, Beck & Owens (2007), the CVI for 3 to 5 experts should be 1.00. The final copies of the questionnaires were finalized; and as the result, there were 19 school-related variables, 7 principal-related variables, 11 teacher-related variables, and 2 student-related variables included in the said questionnaires.

All the data for the schools, principals, teachers, and students were tabulated and were correlated to the high or low school's Mathematics performance. Only the profile variables that were significantly correlated with the schools' Mathematics performance were analyzed using the Discriminant Analysis. Outputs of this analysis were the list of discriminators together with the actual data averages of schools with LMP and HMP, and the Discrimination index (D_i) formula which can be used to predict the classification of the school whether LMP or HMP.

RESULTS AND DISCUSSION

The study found that 18 out of the 49 profile variables of the schools, administrators, and teachers were significant discriminators of high and low mathematics performance. Table 1 reflects the Discriminators of schools' Mathematics performance as to the Schools', Principals', and Teachers' Profiles together with the Canonical Discriminant function coefficients, and the LMP and HMP data averages.

Table 1

Discriminators of Schools' Mathematics Performance with Respect to Teachers, Principals, and School Profile

Discriminators (Teachers', Principals', and Schools' Profile)	Cannonical Discriminant (D) Function	School Data (Average)	
		LMP	HMP
Principals' eligibility as an administrator	6.05	5 - 6 (MT➔P)	7 - 8 (HT➔P)
Principals' years of experience as Department Head	0.06	5.67 yrs	2.26 yrs
Principals' years of experience as a Principal	-1.56	4.07 yrs	5.96 yrs
Teachers' average number of preparations	-6.58	1 prep	1 - 2 preps

(continued)

Discriminators (Teachers', Principals', and Schools' Profile)	Cannonical Discriminant (D) Function	School Data (Average)	
		LMP	HMP
Teachers' average teaching experience	0.14	8.24 yrs	7.35 yrs
Teachers' professional development attended	0.43	0 – 3 dev	3 - 4 dev
Combine educational attainment of Mathematics teachers from grade 7 – 10	-2.55	1 - 2 MS	2 – 3 MS
Average Math Class size	3.05	44.09 studs	40.81 studs
School has provision for Textbook in Math	27.82	0.95 pts	1.50 pts
School has provision for Module in Math	12.96	1.35 pts	1.10 pts
School has provision for LCD projector	-56.22	0.95 pts	2.15 pts
School has provision for Activity sheets in Math	8.68	2.65 pts	1.50 pts
School has provision for Library	34.81	3.40 pts	3.55 pts
Number of Teaching Staff	1.48	43.90 staffs	15.55 staffs
Number of non-teaching staff	-8.14	5.03 staffs	2.72 staffs
Percent of Mathematics majors to Non-mathematics majors who are teaching mathematics	0.13	28.32%	49.84%
Percent of Mathematics Teachers involved in mentoring pre-service and new teachers	-0.01	25.60%	8.72%
Percent of Mathematics Teachers pursuing or with advanced degrees	0.189	36.15%	46.04%
(Constant)	-159.80		

As reflected in Table 1, there were three (3) Principals' profile variables found to be significant discriminators of HMP and LMP. There were the Principals' eligibility, years of experience as Head Teacher, and full-fledged Principals. There were four (4) Mathematics teachers' profile variables found to be significant discriminators of Mathematics performance; these were the number of preparations, years of teaching experience, the number of professional developments attended yearly, and the combined educational attainment of teachers teaching in grades 7 to 10. There were three (3) schools' profiles related to teachers' profile were discriminators of mathematics performance; these were the percentage of Math major to total math teachers in the school, percentage of mathematics teachers involved in mentoring pre-service teachers, and percentage of Mathematics teachers pursuing or with advanced degrees in mathematics. There were eight (8) schools' profiles in support to instructions that were found significant discriminators of Mathematics performance; these were the schools' provision for textbooks in Mathematics, modules in Mathematics, LCD projectors, activity sheets in Mathematics, and library. School imposition of average class size, and the hiring of teaching, as well as non-teaching staffs, were likewise found significant discriminators of schools' mathematics performance.

To pass the National Qualifying Examination for School Heads (NQESH) is one of the qualifications to be a principal. In addition, the Principal could also be reclassified from the Master's Teacher rank or Head Teacher's rank. About 7 – 8 principals from the HMP group of schools were reclassified from Head Teachers' rank, while about 5 – 6 Principals from the LMP group of schools were reclassified from Master Teachers' rank. On the other hand, some of the Principals from the LMP had an experience of 5.67 years on average as the Department Head before being given the Principal position. While, few of the Principals from the HMP had an experience of 2.26 years, on average as a Department Head before being given the Principal position; most of the Principals in this group were reclassified from the Head Teacher position after passing the NQESH. As referred in Table 1, at present Principals from HMP in their present position for already 5.96 years, on average. While Principals from the group of LMP are already in their position for 4.07 years. Thus, school administrators coming from the administration positions such as Head Teacher rank could cause high Mathematics performance, especially those who were given Principal position after passing the NQESH (Mangulabnan & Vargas, 2021).

Parallel to the above findings, Clark et al. (2009), and Mbatha (2009) concluded that principals' experience as an administrator and the principals' practice of instructional leadership could positively impact the school's performance. In the study of Mbatha (2009), principals' practice of instructional leadership has an indirect relationship to learners' academic achievement. Although, indirect effect, principals' practices such as formulation of school goals, enhancing academic networks between low and high achieving schools, and conducting regular discussions between learners and teachers on their progress were identified could contribute to improved academic performance.

On the other hand, Clark, Martorell, and Rockoff (2009) documented the relationship between formal principal training and professional development programs to school performance. Their findings include a statement that principal experience has a positive impact on school performance; every time principals leave their posts early, via early retirement or a move into another school, the tendency that they will be replaced by less experienced principals put the school at a disadvantage position.

The educational attainment of Mathematics teachers from grade 7 to grade 10, either MS degree holder could cause a positive effect on the school's mathematics performance (Adeoti & Olufunke, 2016). Likewise, the attendance of Mathematics faculty to professional development could cause a positive effect on school mathematics performance (Jacob et al., 2017). The basis of these statements was the data presented in Table 1, on the average of 2 to 3 Mathematics teachers per HMP school who were assigned to teach Mathematics for grades 7, 8, 9, or 10 were graduates of MS/MA degree in Mathematics. While, about 1 or 2 mathematics teachers per LMP school assigned to teach Mathematics for grades 7, 8, 9, or 10 were graduates of MS/MA degrees in Mathematics. The combined degree of Mathematics teachers from HMP is much higher than the combined degree of Mathematics teachers from the LMP group.

The average number of years in the service among the HMP teachers was quite lower than the average number of years in the service among the LMP teachers. Thus, this could imply that Mathematics teachers from the HMP group were younger than those in the LMP group. This finding is contrary to the findings of Ewetan and Ewetan (2015) that teachers' teaching experience has significantly influenced students' academic performance in Mathematics; schools having more teachers with above 10 years of teaching experience achieved better results than schools having more teachers with 10 years and below teaching experience. However, in this study, most of the HMP teachers were presently enrolled or finished MS degrees related to Mathematics as compared to the promotion of LMP teachers who were enrolled or finished MS degrees related to Mathematics. Perhaps, this could be the reason why HMP schools, although with teachers having a lesser number of years teaching had a higher impact on Mathematics performance than those schools with LMP.

The number of preparations also varied between LMP and HMP teachers; the LMP teachers generally were given just 1 preparation, while those in the MLP were given 1 or 2 preparations to teach. These, disparities in teacher preparation could be explained by the fact that most of the schools in the HMP have less than 500 enrollees, while most of the schools in the LMP cater to more than 1000 students. Gwambombo (2013) had a similar finding with the study; teachers' heavy workloads had a negative effect on students' academic performance. The finding is also corroborated by the finding of Ayeni and Amanekwe (2018) that teachers' teaching workload has an impact on learners' academic performance; the higher the teacher's teaching workload is associated with lower academic performance of the learners.

In support of classroom instruction, schools should provide learning materials and resources which can readily be accessed by students and teachers. As rated by the three groups of respondents in every school, schools from the HMP group have available and sufficient Textbooks in Mathematics than those schools from the group of LMP. There were also LCD projectors frequently used by the teachers in the HMP than those teachers in the LMP. In terms of library utilization and use, HMP respondents gave higher ratings than the LMP respondents. On the other hand, the use of modules and activity sheets in the class was more visible among the schools with LMP than those schools with HMP. Similar to the finding of the study, Akomolafe and Adesua (2016) suggested that material resources that are of high quality should be made available in public schools to motivate students towards learning. They further recommended giving more priority to the allocation of funds to make the public school conducive for teaching and learning to take place; this will improve the academic standard of public schools. As reported by Wiyaporn (2017), the Thailand government has already increased the fund allocation intended for its basic education reform to ensure that their schools are conducive for teaching and learning and uplifting the mathematics education program of the country.

As practiced in the Philippines, even those graduates who neither specialized nor majored in Mathematics were allowed to teach the subject for high schools so long as they passed the licensure examination for teachers and their undergraduate degree is closely related to Mathematics. As presented in Table 1, there was a higher percentage of HMP teachers who were major/specialized in mathematics as compared to the percentage of LMP teachers whereas there was a lower percentage of Mathematics majors. Moreover, a higher percentage of Mathematics teachers from HMP were pursuing or already have advanced degrees in Mathematics, as compared to the percentage of Mathematics teachers from the LMP group. Several researchers like Ogundele et al. (2014) and Olanipekun and Aina (2014) concluded in their studies that content - knowledge of the teachers on the subject could lead to the poor academic performance of the learners.

To summarize the characteristics of schools with HMP: generally, the Principals' profile from the schools with HMP were NQESH passers and Head Teachers reclassified to Principal rank; some have experienced as Department Head of more than 2 years before given the Principal rank; and on the average, Principals from the HMP groups were in the position for almost 6 years. Mathematics teachers from this group had 1 - 2 teaching preparations, attended 3 – 4 professional development, a higher percentage of Math majors from the total Math teachers, not so much involved in mentoring pre-service teachers, and a higher percentage were pursuing or already have an advanced degree in Mathematics. Moreover, the school assigned teachers to teach mathematics in such a way that the students undergo 2 – 3 teachers who are MS/MA graduates in Mathematics. School administrators also showed strong support to the teaching-learning process of the HMP schools; as such the HMP schools sufficiently provided Math textbooks and LCD projection for teachers' and students' use. The use of the library was also maximized to cater to the needs of teachers and students. HMP administrators also hired Teaching staff and non-teaching staff sufficient enough to assist the works of the teachers. The average class size was 40.81.

On the other hand, the Principals' profile of the LMP schools were NQESH passers and Master Teachers reclassified to Principal rank; most have experienced as Department Head of more than 5 years before given the Principal rank; and on the average, Principals from this group were in the position for more than 4 years. Mathematics teachers from this group had 1 teaching preparation, attended less than 3 professional development, low percentage of Math majors from the total Math teachers, so much involved in mentoring the pre-service teachers, and a lower percentage of the teachers were pursuing or already have an advanced degree in Mathematics. Moreover, the school assigned teachers to teach mathematics in such a way that the students undergo 1 – 2 teachers who are MS/MA graduates in Mathematics. School administrators also showed strong support to the teaching-learning process of the LMP schools; as such the LMP schools sufficiently provided Math modules, and activity sheets for students' use. The use of the library was also maximized to cater to the needs of teachers and students. HMP administrators also hired Teaching staff and non-teaching staff sufficient enough to compensate the big number of enrollees. The average class size was 44.09.

The school principals, as well as teachers, could design an intervention program that is suited to their school needs; to make an evaluation of their school and to adopt the identified characteristics of HMP schools to improve their schools' Mathematics ranking. Alternatively, the school Principal or the teacher may use the derived Discrimination Index (D_i) to determine and predict the probable classification of their school. The derived Discrimination Index formula is presented below:

$$\begin{aligned} D_i = {} & 6.05 * x_1 + 0.06 * x_2 - 1.56 * x_3 - 6.58 * x_4 + 0.14 * x_5 + 0.43 * x_6 \\ & -2.55 * x_7 + 3.05 * x_8 + 27.82 * x_9 + 12.96 * x_{10} - 56.22 * x_{11} \\ & +8.68 * x_{12} + 34.81 * x_{13} + 1.48 * x_{14} - 8.14 * x_{15} + 0.13 * x_{16} \\ & -0.01 * x_{17} + 0.19 * x_{18} - 152.33 \end{aligned} \tag{1}$$

where:

x_1 - Principal's eligibility (1 - MT ➔ P, 2 – HT ➔ P)

x_2 - Principal's years of experience as Department Head (actual year)

x_3 - Principal's years of experience as Principal (actual year)

x_4 - Teacher's number of preparation (1, 2, 3)

x_5 - Teacher's teaching experience (actual year)

x_6 - Teacher's number of professional developments attended per year (1 - 5)

x_7 - Combine education attainment of Mathematics teachers from grade 7 to grade 10 (0 – all BS, 1 -exactly1 MS, 2 – exactly 2 MS, 3 – exactly 3 MS, 4 – all MS)

x_8 - School's average math class size (actual class size)

x_9 - Provisions for Math textbooks (1 – 5 based on the assessment of the rater)

x_{10} - Provisions for Math module (1 – 5 based on the assessment of the rater)

x_{11} - Provisions for LCD projector (1 – 5 based on the assessment of the rater)
x_{12} - Provisions for Math activity sheets (1 – 5 based on the assessment of the rater)
x_{13} - Provisions for the library (1 – 5 based on the assessment of the rater)
x_{14} - Number of hired teaching staff (actual number)
x_{15} - Number of hired non-teaching staff (actual number)
x_{16} - Percentage of Math major against total math teachers (actual percentage)
x_{17} - Percentage of Math teachers involved in mentoring pre-service teacher (actual percentage)
x_{18} - Percentage of Math teachers pursuing or with advanced degrees in Math (actual percentage)

Group Centroids:

LMP Group Centroid: 22.50
HMP Group Centroid: -26.56

The group centroid for the LMP is 22.50, while -26.56 for HMP. These groups' centroids determine the predicted classification of the school. After substituting the actual data of the school in the given equation 1, and if the computed Discriminant index (D_i) is closer to the group centroid of 22.50, the school is more associated with LMP. On the other hand, if D_i is closer to the group centroid of -26.56, the school is more associated with HMP.

Schools that were classified to the HMP should maintain the profile variables that have advantageous effects to them; these were the profile variables that have negative coefficients. In addition, HMP schools should pay attention to the profile variables with positive coefficients; these profile variables have a disadvantageous effect on them. Thus, HMP schools should aim to increase the influence of those profile variables with negative coefficients, and to lessen, if possible, the effect of those profile variables with positive coefficients to retain the schools' present classification.

In the same way, schools who were classified to the LMP should reassess their existing school profile and maintain the profile variables that have advantageous effects on them; these were the profile variables that have negative coefficients. In addition, LMP schools should pay attention to the profile variables with positive coefficients;

these profile variables have a disadvantageous effect on them. Thus, LMP schools should aim to increase the influence of those profile variables with negative coefficients, and to lessen, if possible, the effect of those profile variables with positive coefficients to shift from LMP to HMP school's classification.

CONCLUSIONS AND RECOMMENDATIONS

School administrators who are NQESH passers reclassified from either from Head Teacher or Master Teacher rank and who have experience in performing administrative functions could efficiently run the school and direct the school to attain high Mathematics performance. Thus, the Department of Education who oversees selecting and assigning principals to different schools may consider the present school standing *vis-à-vis* with the principal's qualifications.

The teachers' number of preparations, teaching experience, and professional development be it the number-of-trainings attended or finishing an MS/MA degree in Mathematics could positively impact the schools' Mathematics performance. Thus, the principal should consider giving 2 teaching preparations per teacher, allowing teachers to attend not less than 3 in-service training per year, and encouraging teachers to finish master's degrees in Mathematics.

The school principal may consider hiring Mathematics teachers who are majors in Mathematics, limits the number of teachers to be involved in mentoring pre-service teachers, and strategically assign teachers with MS/MA degrees in such a way that the optimum number of students will undergo tutelage of these teachers.

The school principal may consider maintaining or reducing the average class size to 40 students per class, hire enough teachers to address students' needs, hire non-teaching staff enough to assist teachers and students, and provide sufficient provisions for Mathematics textbooks, Activity sheets, and functional library.

Some of the principals' characteristics, teachers' characteristics, and schools' practices could positively impact the students' and schools' mathematics performance. Thus, DepEd policymakers and school principals may consider the findings of the study when developing policies for hiring teachers, assigning teaching loads to teachers, assigning principals to schools, and prioritizing projects to be developed in the school.

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