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Educational Data Utilization by the School Administrators to Improve the Students' Academic Performance

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ABSTRACT

This paper aims 1) to identify the factors that may affect the students' academic performance 2) to explore the strategic used of educational data by the school administrators to improve the students' academic performance; based on information systems, database, focusing on Malaysian primary school education data in *Student Information Systems (SIS)* and *School Examination Analysis Systems (SEAS).* The researchers acquired secondary data from the SIS and the SEAS database for the investigation purposes, consists of students' details (name, id, total siblings, address, and family income) and, mid-year exam (PT) and final year exam (PAT) students' performance.   The sample educational data have been categorized according to the students' family dependents, area of residence and family income.   The students' performance in PT and PAT on particular subjects are also being explored.   Educational data from SIS and SEAS database can be utilized either by the individual school to insight factors which contribute to the academic achievement, or by the State or Federal School Administrator which involve bigger volumes of data.   The findings can help the school administrators by showing the pattern of students' academic performance and measure the effectiveness of the program and activities which have been organized by them to enhance the students' academic performance. In addition of that, its inspire the school administrators and the educators to organize more programmes and attempts for their students' academic excellence.

Keywords: Information Systems, Data Utilization, Education, Academic Performance, School Administrator, Strategic Planning.

INTRODUCTION

The school teachers and administrators always strive to improve the academic performance of their students. School effectiveness is an indication of the extent to which school principals, teachers, parents and students can all achieve the goals which the schools have set (Lin, 2011). Various programs have been organized by the school teachers and administrator to help the students to improve their academic performance, especially for the students who will sit for
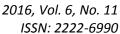
their examinations. The academic achievement of these students sometimes do not achieve as expected by the school even many programs have been organized with the involvement of a large number of teachers, parents and other agencies. There must be some analysis where the school administrator can identify factors that may affect the academic performance of these students. The analysis can be done in many ways using various types of analysis tools or software (Romero, 2007; Baker, 2009; Aghabozorgi, 2014). It depends on the knowledge and skill of the school administrator, the tools or software and budget that the school have and, many other factors.

Educational data can come from various sources (Calders, 2012; Baker, 2010; Ranjan, 2007). One of the main sources is the database from the Information Systems that being developed and used by the school itself. Database is one of the main components of Computer Based Information Systems (CBIS). The database, hardware, software, telecommunications, people, and procedures are configured in CBIS to collect, manipulate, store and process data into information (Stair & Reynolds, 2015). The components of information systems work together to produce quality information (Campbell, Freund, Frydenberg, 2016). This information systems provides the data collection, storage, and retrieval; facilitates the transformation of data into information, and manages both data and information (Coronel & Morris, 2015). Strengthening of IS has become a top priority of many national and global organizations to improve business operations. In the education sector, as in other sectors, a solid IS is crucial to store and obtain relevant data for problem-solving and decision making purpose amidst the increasingly complex education operations. This valuable data will always generate as long as the system is used, and will continue to accumulate and, it may integrate with other data in different structures and, and may create a big data phenomenon. This data is processed not only to transform it to information presented as reports, but it can also be analyzed in more detail to assist management in decision making towards organizations performance.

In Malaysian school environment, the Ministry of Education (MOE) has developed *Student Information Systems* (SIS) or *Sistem Maklumat Murid (SMM),* with a systematic database to capture and store students' personal and academic data to be used for decision making purposes (MOE,2016; Hassan, 2016, Chong, 2009). The SIS captures students' profile data such as their name, identification number, date of birth, address, siblings, family income, etc. In addition to that, the students' academic performance in every test and exams are also captured and stored by teachers in the database using *School Examination Analysis Systems (*SEAS) or *Sistem Analisa Peperiksaan Sekolah,* such as mid-year and final-year exam (MOE,2016, Fazida, 2008). The primary school subjects are Bahasa Melayu Penulisan (BMP), Pendidikan Islam (PI), Kemahiran Hidup (KH), Pendidikan Jasmani Kesihatan (PJK), Bahasa Melayu Kefahaman (BMK), Bahasa Inggeris (BI), Matematik (M3), Sains (SN), Kajian Tempatan (KT), SK, Bahasa Arab (BA), PW and Muzik (MZ). These data are valuable to the school administrators not only for students' performance analysis purposes, but also for short and long term strategic plan purposes for the students, schools and the education plan as a whole.

Although the SIS is there to assist teachers, school administrators, and the higher authority of MOE to make informed decision making and future planning, not much is known

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on how the data from the database is utilized for these purposes. Past studies, Szajna (1993), Nutley and Reynolds (2013) have reported on inadequate or inconsistent use of IS for problem solving or decision making purposes. Nutley and Reynolds (2013) cite that good quality and timely data are the foundation for any business operation. However, in many situations, data are left to sit on reports, shelves, and even in information system databases. These data are not being sufficiently utilized in policy, program development, improvement, strategic planning and advocacy. The previous studies show that too much attention has been given on information systems construction and validation, while database utilization seems to be neglected in these studies. More recent research (Nutley & Reynolds, 2013) and books authors' (Coronel & Morris, 2015; Stair & Reynolds, 2015) are emphasizing on data utilization of an IS, citing that it is the systems usage that decides the success or failure of a systems. The data from information systems database can be used in a variety of ways, not only to present a descriptive data to show numbers and percentage. The data can be further analyzed. Educational data analysis can provide an insight into what students know, what they should know, and what can be done to meet their academic needs. Less study showed the strategic used of educational data whereby the researcher (Lewis, 2010) stressed out that appropriate analysis and interpretation of data can be used by the educators to make decisions and it positively affects student outcomes. In addition, school administrator generally collects enormous amounts of data on students' attendance, behavior, performance; administrative data and perceptual data from surveys and focus groups. But all those data not been utilized for further analysis that relate to student academic performance in which (Hamilton et al., 2009) mentioned that the quality of data may not be measured by the quantity, but how the information is used. The skill in identifying the data which is required by the stakeholders and data utilization to meet the requirement still be the main deficiency in the industry. Hence, this paper aims 1) to identify the factors that may affect the students' academic performance 2) to explore the strategic used of educational data by the school administrators to improve the students' academic performance; based on information systems database, focusing on Malaysian primary school education data in *Student Information Systems (SIS)* and *School Examination Analysis Systems (SEAS)*.

METHODOLOGY

The researchers acquired secondary data from the SIS and the SEAS database for the pilot test purposes. A primary school from suburban area has been selected randomly. An approval has been obtained from the school headmaster to use some of their secondary data as the sample of the data. The 70 student data samples used in this study are; a) student profile data from the SIS database and b) the student performance (mid-year exam's and final-year exam's results) from the SEAS database. The specific data downloaded by the Administrator in Microsoft Excel format are as follows:

1. Students' details (name, id, total siblings, address, family income)
2. Mid-year exam students' performance (PT)
3. Final-year exam students' performance (PAT)

The subjects involved are Bahasa Melayu Penulisan (BMP), Pendidikan Islam (PI), Kemahiran Hidup (KH), Pendidikan Jasmani Kesihatan (PJK), Bahasa Melayu Kefahaman (BMK), Bahasa Inggeris (BI), Matematik (M3), Sains (SN), Kajian Tempatan (KT), SK, Bahasa Arab (BA), PW and Muzik (MZ). This data are being analyzed using SPSS V20 software, such as:

1) comparison between the students' achievement in the mid-year examinations (PT) and final year examination (PAT) for all subjects
2) comparison between students' area of residence and students' achievement in mid-year examinations (PT) for all subjects
3) comparison between students' area of residence and students' achievement in the final year examination (PAT) for all subjects
4) comparison between the students' family income and students' achievement in mid-year examinations (PT) for all subjects
5) comparison between the students' family income and students' achievement in the final year examination (PAT) for all subjects
6) comparison between the number of students' family dependents and students' achievement in mid-year examinations (PT) for all subjects
7) comparison between the number of students' family dependents and students' achievement in final year examination (PAT) for all subjects.

ANALYSIS AND FINDINGS

1) Comparison between the students' achievement in the mid-year examinations (PT) and final year examination (PAT) for all subjects

Test Statistics[a]

	patBMP-ptBMP	patBMK-ptBMK	patBI-ptBI	patM3-ptM3	patSN-ptSN	patKT-ptKT	patPSK-ptPSK
Z	-.676[b]	-3.273[c]	-2.041[b]	-4.399[c]	-6.726[c]	-5.589[b]	-4.967[c]
Asymp. Sig (2 tailed)	0.499	0.001	0.041	0.00	0.00	0.00	0.00

Test Statistics[a]

	patP1-ptP1	patBA-ptBA	patPW-ptPW	patKH-ptKH	patPMZ-ptPMZ	patPJK-ptPJK	patGPS-ptGPS
Z	-2.09[b]	-3.049[c]	-4.002[b]	-.153[c]	-2.056[b]	-0.25[c]	-1.284[b]
Asymp. Sig (2 tailed)	0.835	0.002	0.00	0.878	0.040	0.980	0.199

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks
c. Based on negative ranks

Table 1: Statistical comparison between the students' achievment in the mid-year examinations (PT) and final year examination (PAT) for all subjects

Statistical test results in Table 1 show that no significant differences between the achievement of students in the Mid-year (PT) exams and Final-year (PAT) exams for subjects in Bahasa Melayu Penulisan (BMP), Pendidikan Islam (PI), Kemahiran Hidup (KH), Pendidikan Jasmani Kesihatan (PJK). On the other hand, there is a significant difference for the subject Bahasa Melayu Kefahaman (BMK), Bahasa Inggeris (BI), Matematik (M3), Sains (SN), Kajian Tempatan (KT), SK, Bahasa Arab (BA), PW and Muzik (MZ). For the main subject of the Primary School Assessment Test (Ujian Penilaian Sekolah Rendah - UPSR), identified that there is a significant difference to the subject BMK, BI, M3 and SN; while BMP no difference.

2) **Comparison between students' area of residence and students' achievement in mid-year examinations (PT) for all subjects**

Test Statistics[a,b]

	ptBMP	ptBMK	ptBI	ptM3	ptSN	ptKT	ptPSK
Chi-Square	11.45	7.272	16.345	14.766	14.216	18.197	6.274
df	10	10	10	10	10	10	10
Asymp. Sig	0.324	0.7	0.09	0.141	0.163	0.052	0.792

Test Statistics[a,b]

	ptP1	ptBA	ptPW	ptKH	ptPMZ	ptPJK	ptGPS
Chi-Square	8.658	8.822	9.061	7.338	11.497	9.488	12.228
df	10	10	10	10	10	10	10
Asymp. Sig	0.565	0.549	0.526	0.693	0.32	0.486	0.27

a. Kruskal Wallis Test
b. Grouping variable: LOKMD (location,performancePT)

Table 2: Statistical comparison between students' area of residence and students' performance in mid-year examinations (PT) for all subjects

Statistical test results in Table 2 show that no significant differences between students' area of residence and students' achievement in the mid-year examinations (PT) for all subjects. This means the students' area of residence does not affect students' achievement in mid-year examinations.

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3) Comparison between students' area of residence and students' achievement in the final year examination (PAT) for all subjects

Test Statistics[a,b]

	patBMP	patBMK	patBI	patM3	patSN	patKT	patPSK
Chi-Square	8.639	9.196	12.462	20.765	14.528	7.348	6.828
df	10	10	10	10	10	10	10
Asymp. Sig	0.567	0.514	0.255	0.023	0.150	0.692	0.742

Test Statistics[a,b]

	patP1	patBA	patPW	patKH	patPMZ	patPJK	patGPS
Chi-Square	8.168	5.445	9.616	5.833	6.850	10.830	14.938
df	10	10	10	10	10	10	10
Asymp. Sig	0.612	0.860	0.475	0.829	0.740	0.371	0.134

a. Kruskal Wallis Test
b. Grouping variable: LOKMD (location,performancePAT)

Table 3: Statistical comparison between students' area of residence and students' performance in the final year examination (PAT) for all subject

Statistical test results in Table 3 show that there are significant differences between the students' area of residence and students' achievement in the final year examination of the M3 subject only. Other subjects showed no difference. This means that the students' area of residence only affect students' achievement in final year examinations for Mathematics subject only.

4) Comparison between the students' family income and students' achievement in mid-year examinations (PT) for all subjects

Test Statistics[a,b]

	ptBMP	ptBMK	ptBI	ptM3	ptSN	ptKT	ptPSK
Chi-Square	12.054	7.804	13.508	12.753	13.438	6.651	11.359
df	5	5	5	5	5	5	5
Asymp. Sig	0.034	0.167	0.019	0.026	0.020	0.248	0.045

Test Statistics[a,b]

	ptP1	ptBA	ptPW	ptKH	ptPMZ	ptPJK	ptGPS
Chi-Square	5.900	7.768	11.059	9.707	4.719	13.186	10.029
df	5	5	5	5	5	5	5
Asymp. Sig	0.316	0.170	0.050	0.084	0.451	0.022	0.074

a. Kruskal Wallis Test
b. Grouping variable: GAJIMD (income,performancePT)

Table 4: Statistical comparison between the students' family income and students' performance in mid-year examinations (PT) for all subjects

Statistical test results in Table 4 show that there is a significant difference between the students' family income and students' achievement in the mid-year exams for BMP, BI, M3, SN, PSK and PJK subjects. Other subjects showed no difference. This means the students' family income affect students' achievement in mid-year exams for BMP, BI, M3, SN, PSK and PJK subjects only.

5) Comparison between the students' family income and students' achievement in the final year examination (PAT) for all subjects

Test Statistics[a,b]

	patBMP	patBMK	patBI	patM3	patSN	patKT	patPSK
Chi-Square	4.649	13.083	19.063	9.311	11.536	9.083	11.814
df	5	5	5	5	5	5	5
Asymp. Sig	0.460	0.023	0.002	0.097	0.042	0.106	0.037

Test Statistics[a,b]

	patP1	patBA	patPW	patKH	patPMZ	patPJK	patGPS
Chi-Square	15.454	4.229	8.425	10.128	3.513	8.617	10.296
df	5	5	5	5	5	5	5
Asymp. Sig	0.009	0.517	0.134	0.072	0.621	0.125	0.067

a. Kruskal Wallis Test

b. Grouping variable: GAJIMD (income,performancePAT)

Table 5: Statistical comparison between the students' family income and students' performance in the final year examination (PAT) for all subjects

Statistical test results in Table 5 show that there is a significant difference between students' family income and students' achievement in the final year examination of the subjects in BMK, BI, SN, SK and PI only. Other subjects showed no difference. This means that students' family income affects students' achievement in the final year examination for the subjects in BMK, BI, SN, SK and PI only.

6) Comparison between the number of students' family dependents and students' achievement in mid-year examinations (PT) for all subjects

Test Statistics[a,b]

	ptBMP	ptBMK	ptBI	ptM3	ptSN	ptKT	ptPSK
Chi-Square	0.652	0.352	0.056	0.415	0.915	0.928	0.791
df	2	2	2	2	2	2	2
Asymp. Sig	0.722	0.838	0.972	0.813	0.633	0.629	0.673

Test Statistics[a,b]

	ptP1	ptBA	ptPW	ptKH	ptPMZ	ptPJK	ptGPS
Chi-Square	1.230	0.266	0.682	1.260	0.192	2.595	1.915
df	2	2	2	2	2	2	2
Asymp. Sig	0.541	0.876	0.711	0.533	0.909	0.273	0.384

a. Kruskal Wallis Test
b. Grouping variable: TANGMD (dependents,performancePT)

Table 6: Statistical comparison between the number of students' family dependents and students' performance in mid-year examinations (PT) for all subjects

Statistical test results in Table 6 show that no significant difference between the number of students' family dependents and students' achievement in the mid-year exams for all subjects. This means that the number of students' family dependents did not affect students' achievement in mid-year exams.

7) Comparison between the number of students' family dependents and students' achievement in final year examination (PAT) for all subjects.

Test Statistics[a,b]

	patBMP	patBMK	patBI	patM3	patSN	patKT	patPSK
Chi-Square	3.854	2.755	0.598	0.396	0.765	1.445	0.666
df	2	2	2	2	2	2	2
Asymp. Sig	0.146	0.252	0.742	0.820	0.682	0.486	0.717

Test Statistics[a,b]

	patP1	patBA	patPW	patKH	patPMZ	patPJK	patGPS
Chi-Square	0.382	2.435	1.502	2.279	1.085	1.138	1.658
df	2	2	2	2	2	2	2
Asymp. Sig	0.826	0.296	0.472	0.320	0.581	0.566	0.437

a. Kruskal Wallis Test
b. Grouping variable: TANGMD (dependents, performancePAT)

Table 7: Statistical comparison between the number of students' family dependents and students' performance in final year examination (PAT) for all subjects

Statistical test results in Table 7 shows that no significant difference between the number of students' family dependents and student achievement in the final year examination for all subjects. This means that the number of students' family dependents did not affect students' achievement in the final year examinations.

DISCUSSIONS AND CONTRIBUTION

Based on the data captured from SIS which are name, Id, total_sibling, address and family_income and, students' performance from SEAS which are subjects, PT and PAT marks, the school administrator can identify the factors which contribute to the students' academic performance.

For example, this study do the comparison on the students' performance in PT and PAT and, students' family dependents, area of residence and, family income. The result in Table 2, Table 3, Table 6 and Table 7 show that no significant differences between students' performance in both PT and PAT with the students' area of residence and family dependents. This means that the students' area of residence, and students' family dependents does not affect the students' performance in their PT and PAT exams. On the other hand, the result on Table 4 and Table 5 show that there is a significant difference between students' performance in both PT and PAT with the students' family income on BI and SN. This means that the students' family income does affect the students' performance in their PT exams on BI and SN.

The findings above help the school administrators to take initiatives meet and discuss with the students' family and the authority agencies. For example, if the students' family dependents or family income affected the students' academic performance, further discussions can be made with the students' parents and the Parents and Teachers Association (PIBG). Other than that, if the area of resident affected the students' academic performance, further discussion can be made with the District Authority Agencies to improve the social living and others in the area of resident.

In addition of that, based on the data captured from SIS which are name, Id and, students' performance from SEAS which are subjects, PT and PAT marks, the school administrator can make comparisons between the various exams and subjects. They also can measure the effectiveness of the program and activities which have been organized in order to enhance the students' academic performance.

For example, this study do the comparison on the students' performance in mid-year examinations (PT) and final year examination (PAT). The result on Table 1 shows that there is a significant differences between the students' performance in PT and PAT on Bahasa Melayu Kefahaman (BMK), Bahasa Inggeris (BI), Matematik (M3), Sains (SN), Kajian Tempatan (KT), SK, Bahasa Arab (BA), PW and Muzik (MZ), while others no difference For the main subject of the Primary School Assessment Test (Ujian Penilaian Sekolah Rendah - UPSR), identified that there is a significant difference to the subject BMK, BI, M3 and SN; while BMP has no difference.

The findings above can help the school administrators by showing the pattern of students' academic performance and measure the effectiveness of the program and activities which have been organized by them before the tests to enhance the students' academic performance.

For example, if the school administrators have organized several programmes and activities after PT and before PAT and, there is a significant difference between the students' performance in PT and PAT, it shows that the programmes and activities help the students to improve their academic performance. Its inspire the school administrators and the educators to organize more programmes and attempts for their students academic excellence. The school administrators can put more budget and continue the program and activities. If there is no significant difference, means that the programmes and activities does not effective and does not help the students to improve their academic performance.   Therefore, the school administrators should revise the program and activities. The findings may help the school administrators to perform their short or long term strategic planning in improving student performance. The State or Federal School Administrator can also use the same data utilization and analysis, which involves bigger volume of data, to get a better picture of the students and school performance and, the effectiveness of programmes that being organized.

CONCLUSION AND RECOMMENDATION

Educational data from Information Systems Database (example: SIS and SEAS) can be fully utilized either by the individual school to identify the factors which contribute to the academic performance, or by the State or Federal School Administrator which involves bigger volumes of data. Meanwhile, the school administrator may identify their internal factors which may affect their own students' performance.

The other important data are the students' performance data in the exams on particular subjects. The school administrator can make comparisons between the various exams and subjects and, can identify the performance. The school may also organize many programmes and activities to help their students on academic performance. The result can help the school administrator to identify the factors contribute to this students' performance. It may come from the programs or activities that being organized by the school, or because of the teachers or because of the students itself. The State or Federal School Administrator also can use the same analysis, which involves bigger volume of data, to get a better picture of the students' and schools' performance and, the effectiveness of programmes that being organized. Further studies can be made using various analysis tools or software of educational data on strategic planning by the school administrators.

The educational data which being used in this study are based on a sample of available data given by the School Adminitrator and are very limited. It probably will not give the same results for the larger sample data, and the results of this study cannot be a general decision for all situations.

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