

Kindergarten Pupils' Birth Order and Achievement in Domains of Early Childhood Development in Camiling Central District of Philippines

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ABSTRACT

This study aimed to determine the relationship between kindergarten pupils' birth order and achievement in domains of early childhood development at Camiling Central District for the school year 2017-2018 and significant difference in their performance in terms of their birth order. The descriptive-comparative-correlational design was used in the study. A total of 221 kindergarten pupils' birth order was correlated to their achievement in the seven domains of early childhood development: gross motor, fine motor, self-help, receptive and expressive, cognitive, and socio-emotional. Also, a significant difference in the performance of pupils in the domains in terms of birth order was analyzed. Statistical results revealed that there is no significant relationship between kindergarten pupils' birth order and their achievement in domains of early childhood development. However, there is a significant difference in the performance of kindergarten pupils in terms of birth order. Based on the findings of the study, it implies that kindergarten teachers should consider kindergarten pupils' birth order in providing them with learning activities, experiences, and opportunities for the possible improvement of their domains of early childhood development.

Keywords: *Kindergarten pupils, Birth order, Domains of early childhood development*

INTRODUCTION

The National Association for the Education of Young Children considers the teacher's role in supporting children's development as one of their top fundamental principles. Children must function in all the early childhood developmental domains (i.e. physical, social, emotional and cognitive) if they are to successfully adapt to school and societal norms. These domains are empirically related and inextricably intertwined in early childhood. Kindergarten is a crucial year where learners' experiences nurture positive approaches to learning and this prepares children for the more rigid academic expectations of the elementary grades (Coppie and Bredecamp, 2009). The Department of Education believes kindergarten is a transition stage between informal literacy and formal literacy (Grade 1-12). This is the time of greatest growth and development, when the brain develops most rapidly, if not, at

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its fullest. It is a period when talking, walking, self-esteem, vision of the world and moral foundations are being established. These children at this stage should be immersed with play, activities, and games to naturally acquire the skills appropriate for their holistic development as emergent literates and be ready for formal school.

The Kindergarten Education Act or the RA 10157 supports NAEYC's mission to nurture positive approaches to learning and prepare children to naturally acquire the skills and competencies appropriate for their holistic development. Therefore, kindergarten teachers should guide and facilitate the learners using an engaging and creative curriculum that is developmentally appropriate. Moreover, teachers may also consider biological factors in attaining holistic development of kindergarten pupils like their birth order.

This study aimed to determine the relationship between kindergarten pupils' birth order and achievement in domains of early childhood development at Camiling Central District for the school year 2017-2018 and significant difference of their performance in terms of their birth order. Specifically, it aims at:

1. Describing kindergarten pupils in terms of their: birth order; sex; and domains of early childhood development;
2. Finding significant relationship of kindergarten pupils' birth order and their achievement in domains of early childhood development;
3. Finding significant difference in performance of kindergarten pupils in terms of their birth order; and
4. Drawing implications from the results of the study to kindergarten education.

METHOD

To determine if there is a significant relationship between kindergarten pupils' birth order and their achievement in domains of early childhood development, descriptive-comparative-correlational design was used. In descriptive research, variables are studied, as they exist in their setting. No experimental variables are manipulated and the main concern is to describe the status, profile, incidences or occurrences of the variables (Sicat, 2009). With this, the study looked for the learners' birth order and achievement in domains of early childhood development. Thus, this design was appropriate for the study. On the other hand, comparative research attempts to determine the differences between or among groups or individuals. With this, since the present study looked for the difference in achievement of kindergarten pupils in terms of birth order, this design is appropriate. Lastly, correlative research explores the relationship between or among variables. The variables are studied without any attempt to control or manipulate them. The study aimed at finding if there was



significant relationship between kindergarten pupils' birth order and their achievement in domains of early childhood development. Thus, this design is also appropriate.

The kindergarten pupils in 10 schools of Camiling Central District during the school year 2017 – 2018 will be the subjects of the study. The population of 492 was reduced to 221 as sample size using simple random sampling technique through Slovin's formula at 0.05 alpha level. The data were elicited through the results of final assessment of the Early Childhood Development Checklist, the instrument used by kindergarten teachers in the public schools. The Checklist is divided into 7 domains: Gross Motor, Fine motor, Self-Help, Receptive Language, Expressive Language, Cognitive and Social-Emotional. For ethical concerns, consent was secured from the parents of the kindergarten pupils.

Simple frequency counts and percentage were used to analyse data for the study. In identifying the correlation of the birth order and domains of early childhood development of kindergarten pupils, the Chi-square test was used. Meanwhile, Analysis of Variance was used to determine the significant difference in performance of kindergarten pupils in terms of their birth order. Tables and figures were utilized to give the reader a comprehensive picture of the gathered data and information.

RESULTS AND DISCUSSION

Description of Kindergarten Pupils

The kindergarten pupils were described in terms of their birth order and achievement in domains of early childhood development. Birth order refers to the chronological order of sibling births in a family. The birth order of the kindergarten pupils in the district was collected. Sex refers to gender. It is either of the two main categories (male and female) into which humans are divided on the basis of their reproductive functions.

Table 1: Birth Order of the Kindergarten Pupils in the Camiling Central District

Birth Order	No. of Pupils	Percentage (%)
Last-born	74	33.48
First-born	61	27.60
Middle-born	582	6.24
Only child	28	12.68
	N=221	100

Table 1 shows that majority (33.48%) of the pupils were last-born, 27.60% were first-born children, and 26.24% were middle-born children. Only few (12.68%) were only child of their parents.



Table 2. Sex aggregation of the Kindergarten Pupils in the Camiling Central District

Birth Order	Male	Female
Last-born	35	39
First-born	22	39
Middle-born	28	30
Only child	17	11
Total	102	119

Table 2 shows that there are more last-born and first-born females than male pupils. However, inside the kindergarten classrooms, there are more middle-born and only child male pupils than female ones. As a whole, there are more female kindergarten pupils than males.

Domains of Early Childhood Development

The achievement of the kindergarten pupils were described in terms of their performance in the seven domains – gross motor, fine motor, self-help, receptive language, expressive language, cognitive and socio-emotional. The performances were assessed through the Early Childhood Development Checklist, an instrument used by kindergarten teachers in public schools. The instrument is being administered at two assessment periods within a year to measure the development of the pupils. The data presented below is the result of their second and final assessment.

Table 3. Achievement of the Kindergarten Pupils in Domains of Early Childhood Development

Domains	Suggest Significant delay in overall development		Suggest slight delay in overall development		Average development		Total		Mean	Verbal Description
	F	%	F	%	F	%	F	%		
Gross Motor	0	0	12	5.43	209	94.57	221	100.00	2.95	Average development
Fine Motor	1	0.45	1	0.45	219	99.10	221	100.00	2.99	Average development
Self-help	0	0	12	5.43	209	94.57	221	100.00	2.95	Average development
Receptive Language	1	0.45	1	0.45	219	99.10	221	100.00	2.99	Average development
Expressive Language	0	0	40	18.10	181	81.90	221	100.00	2.82	Average development
Cognitive	0	0	9	4.07	212	95.93	221	100.00	2.96	Average development
Socio-emotional	0	0	9	4.07	212	95.93	221	100.00	2.96	Average development

Table 3 shows that the achievement of kindergarten pupils in all domains of early childhood development is average. With this, we can interpret that most of them are



in normal development since most of the indicators in each domain of early childhood development, if not all, were correctly performed by the kindergarten pupils.

Gross motor refers to the child's ability to control and coordinate body movements involving large muscle groups (Jacobson, 2011). Crawling, walking, running, skipping, jumping, and climbing are all examples of gross motor skills. During the assessment, most among the skills/activities prescribed by the checklist, gross motor domain was successfully accomplished. Some of these skills/activities were: climbing on chair or other elevated piece of furniture like a bed without help, walking backward, running without tripping or falling, walking upstairs with alternate feet without holding handrail, and moving body part as directed. With this, it is interesting to note that there is minimal problem in the gross motor development of the kindergarten pupils because in the study of Piotrkowski, Botsko, and Matthews (2000), they found in a survey of kindergarten teachers that good health was one of the factors perceived to be essential to school readiness. In addition, issues of physical fitness are rarely addressed in state standards items, despite their clear importance to long-term health outcomes. Half of the physical well-being and motor development items cataloged by Scott-Little, Kagan and Frelow (2005) addressed motor skills, but only 11.5 percent addressed fitness.

In terms of fine motor skills, almost all of the pupils attained average development. It can be viewed that the ability to control and coordinate hand and finger movements such as (a) copies a simple pattern of different basic shapes (b) draws a human figure without prompts (c) draws a house without prompts using geometric forms, and (d) colors with strokes staying within the lines is average in development among almost all of the pupils. It can be viewed further that the pupils accomplished successfully most of the indicators in the ECD Checklist. Such skills/activities were picking up objects with thumb and index finger, displaying a definite hand preference, putting small objects in/out of containers, holding crayon with all the fingers of his hand making a fist (i.e., palmar grasp), scribbling spontaneously and the like.

On the other hand, Self-help refers to the ability of the child to become independent in performing tasks such as learning to dress oneself, feed oneself, using the toilet, brushing teeth, bathing, tying shoes, and alike (Jacobson, 2011). In terms of the class performance, the kindergarten pupils are average in overall self-help development. This can be interpreted that during the assessment period, most of the indicators such as feeding self with finger food (e.g. biscuits, bread) using fingers, eating without need for spoon feeding during any meal, bathing, drinking from cup without spillage, dressing without assistance except for buttons and tying, going to the designated place to urinate (pee) or move bowels (pooh) and never



does this in his underpants anymore and the like were accomplished successfully.

Receptive language is the understanding of language “input.” This includes the understanding of both words and gestures (North Shore Pediatric Therapy, Nd). Receptive language goes beyond just vocabulary skills, but also the ability to interpret a question as a question, the understanding of concepts like “on” (North Shore Pediatric Therapy). With this, it is shown in table 3 that achievement of the pupils is also average. This can be viewed that the kindergarten pupils performed most of the skills successfully. These were pointing to family member, pointing to 5 body parts, pointing to 5 named pictured objects, following one-step instructions that include simple prepositions (for example, in, on, under, etc.), and following 2-step instructions that include simple prepositions.

Expressive refers to the ability to use words and gestures to express his thoughts and feelings, e.g. draw and tells a story about his drawing (North Shore Pediatric Therapy, Nd). Like the other domains, kindergarten pupils have average performance in expressive language. However, this domain has the greatest number of kindergarten pupils who are under Slight Delay in Overall Development. This can be interpreted that during the last assessment of the checklist, almost 20% of the pupils were not able to perform some of the indicators. Some of these tasks of the pupils were using 5-20 recognizable words, using pronouns (e.g. I, me, ako, akin), naming objects in pictures, asking “who” and “why” questions, giving account of recent experiences (with prompting) in order of occurrence using past tense and the like.

A child’s ability to understand concepts and their logical relations and to manipulate them to arrive at new ideas or conclusions is called Cognitive (Early Childhood Care and Development (ECCD) Council, 2010). In the study, results revealed that kindergarten pupils’ ability to look at direction of fallen object, match objects, sort based on shapes, arrange objects according to size from smallest to biggest, name 3 animals or vegetables, assemble simple puzzles and the like is average.

As shown in the Table 3, kindergarten pupils’ achievement in socio-emotional domain is also average. This means that majority among the pupils have the ability to know one’s self, express and understand feelings, and relate to others. The results further revealed that most of the skills were successfully performed by the kindergarten pupils during the assessment. Some of these skills/activities were playing alone but likes to be near familiar adults or brothers and sisters, demonstrating respect for elders using terms like “po” and “opo, sharing toys with others, identifying feelings in others, helping with family chores (e.g., wiping tables, watering plants, etc.) and other activities prescribed by the checklist. In this regard, teachers, parents



and other stakeholders must work hand in hand to sustain and even improve the performance of the pupils in this domain. According to Thompson and Lagattuta (2006), socio-emotional development is of importance during the early childhood period because it relates to children's capacities to form relationships, both trusting relationships with adults and friendships with peers and these relationships in turn seem to be related to the speed of learning in early care and educational settings. These markers of positive relations with peers and teachers have implications for children's engagement and participation in the classroom. Children learn to regulate the expression of emotion in a variety of ways, including turning to others with whom they have secure relationships for comfort and support, using external cues, and, increasingly with age, managing their own states of arousal.

Relationship between Kindergarten Pupils' Birth Order and their Achievement in Domains of Early Childhood Development

Birth order is the chronological order of sibling births in a family (Bartleby Research, Nd). First-born, last-born, middle-born and only child were used to describe the birth order of the kindergarten pupils. On the other hand, gross motor, fine motor, self-help, receptive language, expressive language, cognitive and socio-emotional composes the domains early childhood development.

Table 4: Relationship of Kindergarten Pupils' Birth Order and Achievement in Domains of Early Childhood Development

Domain of Early Childhood Development	p-value	Level of Sig.	Interpretation
Gross Motor	0.65	0.05	Not Significant
Fine Motor	0.14	0.05	Not Significant
Self-help	0.26	0.05	Not Significant
Receptive	0.14	0.05	Not Significant
Expressive	0.21	0.05	Not Significant
Cognitive	0.57	0.05	Not Significant
Socio-emotional	0.30	0.05	Not Significant

Using the Chi-square test, statistical results revealed that there is no significant relationship between kindergarten pupils' birth order and achievement in all domains of early childhood development since the computed p-values were more than the level of significance. With this, the performances of the kindergarten pupils in each indicator of each domains of early childhood development are not in relation with their birth orders. This study is a replication of a study conducted by Nanit (2020) in the nearby district of the study's locale – Santa Ignacia North District with 189 kindergarten pupils enrolled in the SY 2015-2016 as respondents. In the previous



study, the author found that there is a significant relationship of gross motor and expressive domains with the birth order of the kindergarten pupils. With this, we can infer that the findings in two different studies will only be applicable in the location of each study. Thus, a wider scope of study may be done for more conclusive findings.

Difference in Performance of Kindergarten Pupils in terms of their Birth Order

It is part of the objectives of the study to find if there is a significant difference between kindergarten pupils' performance in terms of their birth order using Analysis of Variance as statistical treatment.

Table 5: Difference in Performance of Kindergarten Pupils in terms of their Birth Order

Birth Order	n	Mean	Interpretation
Last-born	61	71.75	A
First-born	74	71.72	A
Middle-born	58	70.16	B
Only child	28	69.86	B

Table 5 shows the result of the conducted test using Analysis of Variance. Based on the statistical results of the study, the computed Least Significant Mean Difference is 1.33. As a rule, if mean difference of two groups is greater than LSMD, the null hypothesis is rejected and vice-versa. Moreover, as an interpretation of the results between each group, if the assigned letter in one group is the same with the other group, the null hypothesis is accepted. Since the computed mean difference of Last-born's and First-born's performance in domains of early childhood development is 0.03, the null hypothesis is accepted. Thus, there is no significant difference between the performance of the last-born and first-born children.

On one hand, since the computed mean difference between last-born and middle is 1.59, the null hypothesis is rejected. There is a significant difference in the performance of the groups; last-born performed better than the middle-born kindergarten pupils. In terms of the performance between last-born and only child pupils, since the computed mean difference is 1.90, the null hypothesis is also rejected. There is a significant difference in the performance of last-born and only child kindergarten pupils. The former performed better than the latter group. Between the first-born and middle-born, their performance is significantly different. This is due to the computed mean difference of 1.56, which is higher than the computed LSMD. First-born children performed better than the middle-born. As a result of statistical analysis, there is a significant difference between the performance of the first-born and only child pupils. The null hypothesis was also rejected due to the



fact that the mean difference of 1.86 is higher than the computed LSMD of 1.33. Lastly, like the first- and last-born, there is no significant difference between the performance of the middle-born and only child kindergarten pupils. With the mean difference of 0.30, which is lower than the computed LSMD of 1.33, the null hypothesis is accepted. In summary, there is a significant difference in the performance of kindergarten pupils in terms of birth order. However, this is only true between last- and middle-born, last-born, and only child, first- and middle-born, and first-born and only child kindergarten pupils.

Implications of the Study to Preschool Education

In recent decades, numerous studies have shown that early childhood education is key to success in later school and in life. According to Reynolds (2000), long-term effects include a reduction in remediation and assignment to special education, an increase in high school graduation rates, higher rates of employment and lower instances of crime. Furthermore, children who participate in quality early childhood education perform better in school and become productive members of the community and society (UNICEF, Philippines, nd). Thus, all factors including biological factor shall be considered which influence the acquisition of child's holistic development. This study determines the relationship between kindergarten pupils' birth order and achievement in domains of early childhood development at Camiling Central District for the school year 2017-2018 and significant difference of their performance in terms of their birth order.

It can be viewed from the findings that there are still kindergarten pupils who are with slightly significant and significantly delayed. The fact that the pupils were already assessed upon entry to kindergarten and the gathered data is the result of the last assessment of the teacher, there should be a development in the performance of the pupils. It should be noted that all of these domains are crucial in every child's holistic development. Running, jumping, and climbing are just important for a child as learning the ABC's. Each of these domains is also interrelated. When a child starts to give account of recent experiences, he will also be enhancing his cognitive abilities. Learning new words will encourage him to participate more in social situations. Observing children in a few minutes will shed a light on how each domain affects the others.

On the other hand, statistical analysis revealed that domains of early childhood development have no significant relationship with birth order. However, it is interesting to note that there is a significant difference of performance of kindergarten pupils in terms of birth order, particularly, groups between last- and middle-born,



last-born and only child, first- and middle-born, and first-born and only child kindergarten pupils. With this, since the Kindergarten Education Act supports NAEYCs mission to nurture positive approaches to learning and prepare children to naturally acquire the skills and competencies appropriate for their holistic development, it is the main responsibility of kindergarten teachers to provide learning activities, experiences and/or opportunities to improve their domains in early childhood development considering the birth orders of the kindergarten pupils.

CONCLUSION AND RECOMMENDATIONS

The purpose of this study was to determine the relationship between kindergarten pupils' birth order and achievement in domains of early childhood development at Camiling Central District for the school year 2017-2018 and significant difference of their performance in terms of their birth order. Based on the findings, it is concluded that most of the kindergarten pupils are last-born and first-born, followed by middle-born children, while only few are only-child pupils. On the other hand, there are more female pupils than males. Their performances in domains of early childhood development are all average. In can be concluded that the kindergarten pupils are in normal development in terms of domains of early childhood development.

In addition, there is no significant relationship of kindergarten pupils' birth order and their achievement in domains of early childhood development. Furthermore, there is a significant difference of performance of kindergarten pupils in terms of birth order, particularly, groups between last- and middle-born, last-born and only child, first- and middle-born, and first-born and only child kindergarten pupils. Last-born pupils as the best performers, followed by first- then middle-born; and only-child pupils as least performers based on the computed means. Consequently, the following are hereby recommended:

- i. The kindergarten pupils with significantly delayed and/or slightly delayed performance should be improved by providing varied learning experiences catering different developmental domains.
 - ii. Kindergarten teachers may consider the significant differences in the performance of each birth order in providing activities and/or learning opportunities to kindergarten pupils.
 - iii. School administrators should provide kindergarten teachers with continual exposure and training to deal with the improvement of kindergarten pupils' achievement in the domains of early childhood development.
 - iv. Further research has to be conducted considering other localities and variables, as well as wider scope.
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Scalable Query Profiling Employing Purging and Elimination Technique

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ABSTRACT

Reusing Queries contributes in speeding up the performance of database in responding to future queries as it can reduce the number of database queries to be processed and sent back to the user. Profiling a query in a machine who requested a query in database server improved the response time when the query is reused. It also avoids the utilization of database and network resources. This is because the data will be served locally as compared to obtaining the data from the original source that is still travelling in the network which entails cost not only on the database server but also in the network infrastructure. A condition in the query that limits the result set of the query will be removed before it will be sent to the database for evaluation. This is to enhance the ability and usefulness of the result set of the query in answering future subduced queries to be requested. To prevent query capability duplication as well as to efficiently manage the space utilizes in the profiling of queries, profiled queries that are subduced by an incoming query will be purged while queries that are subduced to profiled query will not be accepted in the query logs and its result set will not be exported.

CCS Concepts

Profiling Query → Query logs • **Purging query** → avoids query capability duplication • **Elimination** → enhanced the ability of the result set of query in answering future subduced query to be executed. The dependency of the client to the database server in terms of responding to queries will be decreased as the number of query in the query logs increases. The shifting of some of the workloads of the database server to the client prevents the constant utilization of infrastructure such as the database server and network resources by properly utilizing the previously requested information. It can also decrease the response time for requested queries that are subduced to previously executed query.

Keywords

Queries, Database, Subduced Queries, Reusing Result Set, Purging, Query Identification Number, Index;

1. INTRODUCTION

Reusing Queries contributes in speeding up the performance of database in responding to future queries as it can reduce the number of database queries to be processed and sent back to the user. Moreover it can also decrease the utilization of database resources as well as the infrastructure cost according to West [1]. Information in databases is typically accessed using SQL query. The select statement is the responsible statements in order obtain results from a database. A typical request of information in the database

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performs some steps before a user may able to view the requested information. 1. The user formulates query using the application software. 2. The application software connects to the database and submits the query. 3. The database retrieves data and returns these to the user. 4. The application software receives the incoming data and presents them to the user. These four steps will be repeated from time to time for every query that will be made. This entails cost because the resources of the database will be frequently utilized. If it will be applies in a server-client setup, the bulk of the workloads will lies on the database server as well as the regular utilization of infrastructure is needed for the processing of every requested query. The text of the query and its result set will be profiled in the client side and it will be used to respond to future subduced query to be executed.

2. OBJECTIVES

The objective of the study is to develop a model that will enhance the capability of SQL Queries by employing purging and elimination technique. Specifically it aims to;

1. Eliminate condition in the query before sending to the database for evaluation.
2. Profile a query.
3. Purge queries that are subduced by incoming query.
4. Reuse past query in responding to requested query.

3. METHODOLOGY

3.1 Elimination

The purpose on the presence of a condition in the query is designed to extract only those information from the database that meets the criteria. This scenario will limits the number of rows to be produced, thereby it also limits is ability to respond to future subduced queries to be executed because its result set when reused is only capable to answer subduced queries that are joined with similar condition. In order to avoid this, the requested query will undergo checking process to identify the existence of a condition. If a condition is detected, next step is removing it from the query before it will be sent to the database for evaluation. Conditions in the query will be distinguished by the existence of a "where" keyword in the query.

3.2 Query Profiling

Query Profiling will be applied after the query undergone elimination process. A folder that serves as the repository of unique requested query will be created to store the text of the query and its result set. A file will be created and it will contain the text of requested queries which referred to as the query logs [2]. The result set of the query will be exported as text file [3] and it will be stored in a row and column format. The uniqueness of the query is determined by its source where the information will come from and the included field. Before the text of the query will be registered in the query logs, it will be attached with QUERY IDENTIFICATION NUMBER, which is an auto number generated by the algorithm [4]. The generation of QIN number will start to one (1) and progresses

the result set of the query; 3. Established relationship between the text of the query and its result set and 4. Key to pinpoint who among the profiled queries are capable to respond to the requested query. The query logs will be used purposely to respond to queries that are subduced from the past queries. Requested Queries that are unable to be responded by profiled queries will be directed to source-out its data to the database and it will be deposited in the repository.

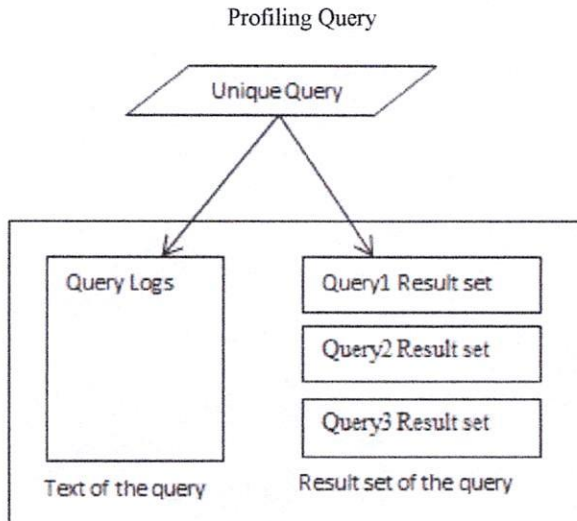


Figure 1. The text of the select statement will be stored in the query logs while its result set will be exported in the same repository.

3.3 Purging

As a way of maintaining the repository as well as to efficiently manage the space it utilizes, purging technique will be employed. The text of the profiled queries in the query logs will be compared to the text of the incoming query. If the text of the profiled queries stored in query logs matched or subduced by the text of the incoming query then the text of the profiled query in the query logs will be purged from the list along its result set [5]. Text of profiled queries are considered to be subduced if it meets the criteria; 1. It's source of data is similar to the source of the incoming query and 2. Its field/s are all existed in the incoming query. This technique was implemented in order to avoid query capability duplication because the incoming query contains or has the capability to respond to future queries that can also be served by queries that are already profiled. This method will not only reduce the number of queries stored in the repository but also to free some used space [6].

3.4 Method of Reusing Query

The text of the requested query will be compared to the text of profiled queries in the query logs in order to determine who among the profiled queries are responsive to the requirement of the requested query. A profiled query in the query logs will become responsive to the requirements of the requested query if they have similar source and the field/s in the text of the requested query are all existing in the text of the profiled query. After determination, the QIN attached to the text of the profiled query will be used to pinpoint its result set followed by extraction and population for the purpose of reuse [7]. An index/es will be generated for the text of requested query by way of matching it to the fields of the text of subduced profiled query which eventually served as referenced field in the populated result set in the format of rows and column followed by iteration until the last data will be obtained.

Assume that this query requested;

and let assume that the query below is stored in the query logs,

Select
 user_id,username,first_name,last_name,gender,password,status
from user_details

The index/es would be;

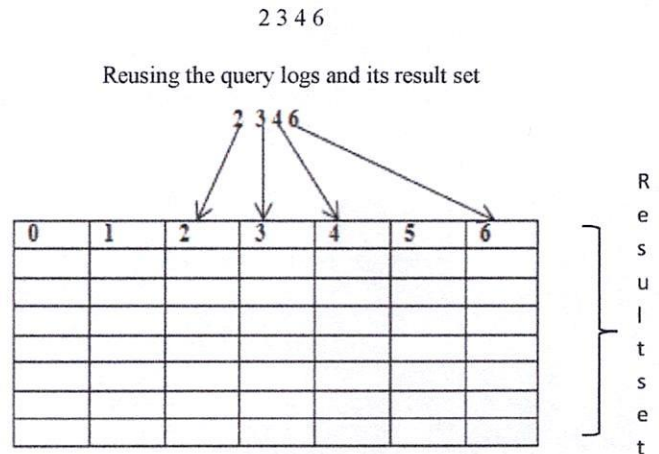


Figure 2. Utilization of the generated indexes of the query as bases in referencing to the populated result set of the query logs.

4 PERFORMANCE TEST

4.1 Testing

The model was tested on a server-client setup. In the server side, MySQL were used to create the database and the table and uploaded a dataset containing ten thousand (10,000) rows with seven (7) fields [8] [9]. The sample dataset was downloaded at <https://www.sample-videos.com/download-sample-sql.php>. The uploading process was done by utilizing the interface of phymyadmin. Seven (7) different queries were formulated and executed using the designed model installed in the client side. The queries are shown below.

1. Select user_id from user_details
2. Select user_id,username from user_details
3. Select user_id,username,first_name from user_details
4. Select user_id,username,first_name,last_name from user_details
5. Select user_id,username,first_name,last_name,gender from user_details
6. Select user_id,username,first_name,last_name,gender,password from user_details
7. Select user_id,username,first_name,last_name,gender,password,status from user_details

Every query was executed twice because in the first execution, the model obtains its data from the database server and profiled it in the client side. In the second execution, the query is responded by utilizing the repository because it is now subduced to the previous query which means the query will be served locally [10]. Instead of obtaining the data to the database server, the request will be serve locally. This method avoided the utilization of the database server and network resources because the data will not be obtained from the original source. Two scenarios were used in executing the formulated queries which is the ascending and descending order. In ascending order of execution, there was a chance that the query will be

query will be purged because it is subdued by the incoming query. After executing the seven queries, the last query which is the "Select user_id,username,first_name,last_name,gender,password,status from user_details" retained in the repository. In descending order of execution of the queries, the last query which is the "Select user_id,username,first_name,last_name,gender,password,status from user_details" was executed first. The next six (6) queries were not admitted to the repository because they are all subdued to the first query.

Table 1. Latency incurred in the execution of the query.

Queries	Latency for the First Execution (in seconds)	Latency in Second Execution (in seconds)
Select user_id from user_details	0.267642974854	0.0776579380035
Select user_id,username from user_details	0.312852144241	0.123073101044
Select user_id,username,first_name from user_details	0.364005804062	0.156177997589
Select user_id,username,first_name,last_name from user_details	0.35187792778	0.175606012344
Select user_id,username,first_name,last_name,gender from user_details	0.317807912827	0.204800844193
Select user_id,username,first_name,last_name,gender,password from user_details	0.639189004898	0.251147985458
Select user_id,username,first_name,last_name,gender,password,status from user_details	0.435513019562	0.264527797699

The result shows that the latency in the second execution was decreased by fifty (50) percent as compared to the first execution across to all the executed query. One of the contributory factors for this reason is that in the second execution, the data were not travelled in the network instead the query was served locally.

4.2 Simulator

The performance of the query was simulated using the JMeter. [11] [12] It will be the source of response time graph. The response time is the elapsed time from the moment the query is sent to the server until the moment when the last bit of information has returned to the client [13]. Ten (10) users with ten (10) loops counts at one (1) transaction per seconds were set as the parameters for the testing of the query that accessed data from the database server with 10000 rows. It is decided that only the last query will undergo simulation because it is the query that retained in the query logs.

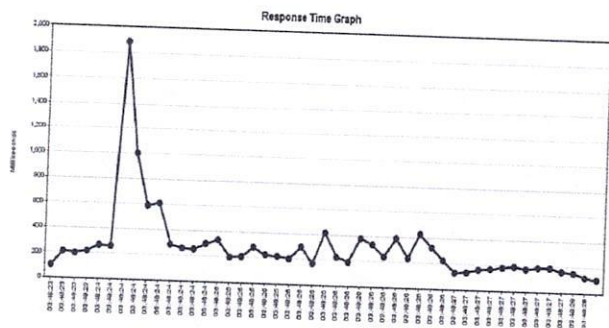


Figure 3. Response time graph when the query Select user_id,username,first_name,last_name,gender,password

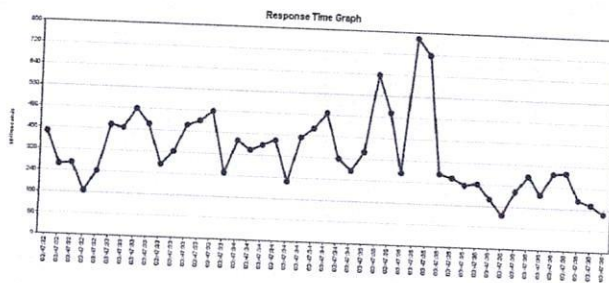


Figure 4. Response time graph when the query Select user_id,username,first_name,last_name,gender,password,status from user_details was executed for the second time.

The response time graph indicates that the figure 1 incurred higher latency as compared to figure 2. The highest response time per request in figure 1 is registered at almost 2000 milliseconds while in the figure 2 is almost 800 milliseconds.

5. CONCLUSION

In a scenario where the same information are to be accessed by a substantial number of users, a single access can be possibly cater the needs of the entire users which substantially reduced the amount of request being sent to the database which lead to decreased utilization of infrastructure.

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