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RESEARCH ARTICLE

Influence of Teachers' Teaching Styles on Students' Academic Performance through Structural Equation Modelling

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ABSTRACT

The study aimed to establish the influence of Teachers' Teaching Styles on Students' academic performance through the use of the Structural Equation Modelling (SEM) technique. The simple random sampling procedure was done in selecting 15 teachers from 22 teachers of different majors, and 248 student respondents from 568 students who underwent tutelage of the said teacher respondents. The study made use of a validated researchers-made instrument to identify the teachers' teaching styles; the indicators and domains of teaching styles included in the instrument were patterned from the study of Reid (1987) and Franzoni and Asser (2012); the computed Cronbach's alpha coefficient of the instrument was 0.817 which is in the acceptable level. The academic performances of the students were taken from the teachers' grading sheets stored at the University registrar. The CMIN/DF of the SEM-AMOS was used to determine if the model was correctly fitted to the actual condition. The study was able to establish the influence of teachers' teaching styles on students' academic performance bearing a very good fit model. As identified in the model, the intuitive, verbal and active teaching styles have a direct influence on students' academic performance. While, the sensitive, visual, reflective, sequential, and global teaching styles have no direct influence on students' academic performance, these teaching styles could complement the use of intuitive, verbal, and active teaching styles to improve the students' academic performance.

INTRODUCTION

The teacher factor has the biggest influence on students' academic performance. In order to optimize the influence of the teacher on students' academic performance, the teaching style used by the teacher should be matched with the student's preference. This statement was established by several researchers like Muharam et al (2019) who stated that the teaching styles of the teacher have a significant effect on students' motivation and academic performance; Okwuduba and Okigbo (2018) concluded that teacher's teaching methods have a significant effect to student's academic performance; and Wilson (2012) stated that students' academic performance was influenced by students' learning styles, their perceptions of their abilities, and learning preferences.

From the above arguments, teachers' teaching styles are vital in improving the academic performance of the students. Thus, education researchers continually search for how to improve teachers' teaching styles. To name a few researchers who have to ponder more on the effect of teachers' teaching styles and students' achievement is Ahmed et al (2021) who have identified that role modeling was the topmost teaching style that influenced student's motivation; Ibrahim and Ahmad (2016) who have found that teaching style - facilitator of learning was better than other teaching styles; and Ismaiel (2017) who have identified that the teaching style - formal authority could best give direction to student's activities. On the other hand, Sympas (2015) identified factors

that influenced teachers' teaching styles and teaching preferences such as course control, time management, active time, discipline, and responsibility.

Filipino first-year high school students were ranked 40th out of 42 participating countries in the 1995 Trends in International Mathematics and Science Study (TIMSS) (Kelly, 2002), and 36th out of 38 countries in the TIMSS 1999 examination (Mullis, Martin, Gonzales, and Chrostowski, 2004). In the TIMSS 2003 assessment, Filipino second-year high school students were ranked 41st out of 45 countries (Bietenbeck, 2011). The Filipino community, such as educators, researchers, and curriculum developers were alarmed by these TIMSS reports.

The Philippine's Department of Education (DepEd) has implemented a number of reforms to reverse the decline in the performance of Filipino students in international examinations. Like the granting of scholarships to students and faculty to pursue Math-related courses. In addition to changing the curriculum from the Secondary Education Development Program (SEDP) to the Basic Education Curriculum (BEC), curriculum improvements like the adoption of the Understanding By Design (UBD) framework, revisiting the Basic Education Sector Reform Agenda (BESRA), launching the ICT in Education program, and launching the Engineering Science Education Program (ESEP), among others were also implemented by the DepEd.

In addition, the DepEd capacitated all the teachers through the conduct of teachers' training in the form of In-service Enhancement for Teachers (INSET) which is focused on Content, Instructional Material Development, and Teaching Strategies. Teachers were retooled to use different teaching styles and strategies to suit the varied types of learners. All these initiatives by DepEd were done with the hope that the achievements of Filipino students in Mathematics could be improved.

However, according to the PISA 2018 and TIMSS 2019 results, Filipino students are among the countries with low performance in mathematics (Mullis, Martin, Foy, Kelly, and Fishbein, 2020; Salandanan, 2010). Thus, Filipino students' mathematics performance continues to be a problem in the country.

With these, the researchers come across these questions: why Filipino learners were still at the bottom of countries' ranking despite the intensive training for teachers to teach effectively? Are the teaching styles of the teachers properly matched with the student's learning styles? Finding answers to these questions drive the researchers to make an exploration of the influence of teaching style on students' academic performance. In addition, the exploration could be more meaningful if it will be done using Structural Equation Modeling (SEM), as SEM included a visual representation of the relationship.

Framework of the Study

This study focused on the teaching styles of teachers to students' academic performance. As such, the relationship between teaching styles had a great effect on the students in their academic performance to perform better. The level of teaching styles directly influenced the students' academic performance. The study also developed causal models which could explain the interrelationships between the variables.

The effects of teaching methods on the academic performance of students proved to be significant. Teachers who are effective at improving test scores often are equally effective at improving students' academic performance. These findings lend empirical evidence to well-established theory on the multidimensional nature of teaching and the need to identify strategies for improving the full range of teachers' skills (Blazar et al, 2017). Bendahmane (2021) emphasized the necessity of improving classroom instruction in methods that provide equal chances for all students and adapt to their needs, as well as statistically highlighting the favorable impact of teaching-learning styles. Ghanizadeh and Jahedizadeh (2016) demonstrated the role of teachers' creativity in their preferred teaching style. The teachers' teaching styles are very useful in enhancing teaching quality and have an effect on how teachers can provide knowledge for students in the future.

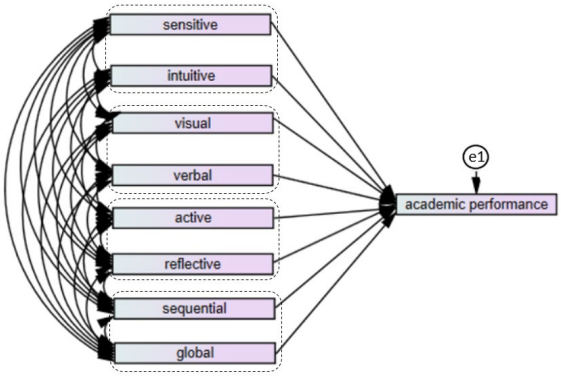

Figure1 Hypothesized Model that reflects the relationship of the Teachers' Teaching styles on Students' Academic Performance

METHODOLOGY

The study is descriptive-correlational research. The descriptive was used to describe the teachers' teaching style and students' academic performance. The SEM-path analysis using AMOS was used to explore the relationship of the teachers' teaching styles to students' academic performance. A simple random sampling procedure was done in selecting teacher and student respondents; 15 teachers of different majors were randomly selected from 22 teachers from the College of Teacher Education, and 248 students who were under the tutelage of the selected teachers were randomly selected from 568 students. The instrument to identify the teacher's teaching style was used in the study; its indicators and domains of teaching styles were patterned from the study of Reid (1987), and Franzoni and Asser (2012) and were later modified to suit the locale setting for the study. The instrument underwent validation and pilot testing for its reliability. The computed Cronbach's alpha coefficient of the instrument was 0.817 which is the acceptable level. The researchers personally conducted the instrument on the 15 teachers. The data on the academic performance of the selected students were sourced from the university registrar's office. The Path Analysis of the Analysis of Moment Structure (AMOS) was used to describe the influence of the teaching style on students' academic performance. The CMIN/DF was used to determine if the model was correctly fitted to the actual condition. The regression weights and estimates together with the corresponding p-value were used to determine the significant path to be removed or maintained in the hypothesized model.

RESULTS AND DISCUSSION

The Teachers' Teaching Styles

The dominant teachers' teaching styles could be determined based on the instructional strategies employed by the teachers inside the classroom which could be associated with areas of content, presentation, student participation, and perspective. Teachers could be classified based on content as either sensitive teachers or intuitive teachers; based on presentation, the teachers could be classified as visual teachers or verbal teachers; based on participation, teachers could be classified either as active teachers or reflective teachers; and based on perspective, teachers could be classified as sequential teachers or global teachers.

Content: Sensitive Teachers vs Intuitive Teachers

As reflected in Table 1, the overall level of practice for a sensitive teaching style among teachers was frequently practiced. A sensitive teaching style includes teachers' practices of encouraging their students to perform tasks in the lessons in order to have mastery of the topics. Teachers practicing this style observed that students prefer concrete materials during class discussions; data must be factual. While the overall level of practice for intuitive teaching style among the teachers was occasionally practiced. Teachers who are intuitive enjoin their students in their class to participate by presenting ideas and lessons in a lively manner. They also observed that students enjoy reading, writing, and saying things in creative and interesting ways.

Thus, the dominant teaching style of the teacher-respondents as to content was sensitive style. This statement was based on the computed mean score of 5.07 for sensitive teaching style which is higher than the computed mean score of 4.48 for intuitive teaching style. It could be further

described that most of the teachers were sensitive to the need of the students in order to increase the students' engagement in the class. They prepare to introduce instructional materials that are concrete, contain factual data, and provision for performance tasks to ensure mastery of the topic. This finding is in parallel to the statement of Blair and Scriven (2019) that most teachers displayed the self-control qualities and were sensitive to the need of the students and it appears to be the most desirable qualities of teachers for students.

Presentation: Visual Teachers vs Verbal Teachers

The overall level of practice for visual teaching style among the teachers was frequently practiced. A visual teaching style includes teachers' practices providing concrete and visual materials. The teachers who have this visual teaching style observed that their students learn best by reading what is written on the board or provided in the slide presentations. Students easily follow written instructions and learn more by reading textbooks than by listening to audio lectures. While the overall level of practice for verbal teaching style among teachers was frequently practiced. For teachers practicing verbal teaching style, they observed that students can easily perform activities with oral instruction, easily grasps ideas by listening during the lecture-discussion and from their interactions with the classmates, and understands topics easily from the handout and verbally explained by the teacher.

Although numerically, the visual teaching style obtained a mean score of 4.78 which is higher than the 4.74 mean score of the verbal teaching style, as to the level of practice, both were in the same level of practice as "frequently". Thus, the teachers adopted both, the visual and verbal teaching styles in the presentation of the topics; the visual teaching style could be more effective if coupled with the verbal teaching style. This statement strengthens the conclusion made by Sinelnikov (2016) to use more correct task representations and more mature tasks by using more diverse forms of visual and verbal representations in teaching particularly in teaching the content knowledge.

Table 1. Mean and Qualitative Description of Teachers' Teaching Style

Teaching Style	Mean	Level of Practice
Content		
- Sensitive	5.07	Frequently Practiced
- Intuitive	4.48	Occasionally Practiced
Presentation		
- Visual	4.78	Frequently Practiced
- Verbal	4.74	Frequently Practiced
Student Participation		
- Active	5.14	Frequently Practiced
- Reflective	4.76	Frequently Practiced
Perspective		
- Sequential	5.56	Always Practiced
- Global	4.44	Occasionally Practiced

Legend: 5.50 – 6.00: Always Practiced 3.50 – 4.49: Occasionally Practiced

1.50 – 2.49: Very Rarely Practiced	4.50 – 5.49: Frequently Practiced
2.50 – 3.49: Rarely Practiced	1.00 – 1.49: Never Practiced

Students' Participation: Active Teachers vs Reflective Teachers

The overall level of practice for the active teaching style among the teachers was frequently practiced. Teachers who employed this active teaching style encourages students to work with each other and to analyze to resolve given problem. The teachers also observed that students subjected to this teaching style learned better when they do things in class, or for the class project, or working with other students, or performing lively activities, or working assignments in pairs or groups of three, or when they study with others in groups. While the overall level of practice for reflective teaching style among teachers was frequently practiced. Teachers who adopted this teaching style

usually gave lots of guidance, guidelines, and reference materials in giving an assignment. They also provided opportunities for the students to perform the task and give ample time for the students to respond to questions. And if possible, teachers presented models of successful works from other people when giving an assignment. Students exposed to this teaching style are expected to perform better when working alone or performing an individual task and have the initiative to resolve problems by themselves first instead of relying on teachers' explanations. Teachers employing this teaching style observed that students learned better if the students were exposed to evaluating the works of others.

Although numerically, the active teaching style obtained a mean score of 4.87 which is higher than the 4.746 mean scores of the reflective teaching style, as to the level of practice, both were at the same level of frequently practiced. Thus, teachers who adopted an active teaching style could be more effective if coupled with a reflective teaching style. As concluded by Brito (2019), learners were empowered through the use of suitable teaching methods, they felt a feeling of confidence, competence, and self-esteem, allowing them to better manage life's problems. Thus, students become more participative in the class discussion and activities.

Perspective: Sequential Teachers vs Global Teachers

The overall level of practice for the sequential teaching style among teachers was frequent practice. Teachers who adopted this sequential teaching style allow students to lay out the materials in clear sequential steps and encourage students to devise something that will help them remember things better. Teachers also observed that students learned better if the activity - the task was shown or demonstrated in class on how to accomplish. While the overall level of practice for the global teaching style among teachers was occasionally practiced. Teachers who adopted this teaching style encourage students to find out more about the topic in which they are interested in their own, instead of relying on their teachers. If the students still do not understand something, teachers further encourage their students to figure out the problem themselves. Finally, if the students still do not understand the topic or concept, the teacher will assist the students to facilitate their learning.

The dominant teaching style used by the teachers as to perspective was sequential. This statement was based on the overall mean score of 5.56 for sequential teaching style which is higher than the overall mean score of 4.44 for global teaching style. This statement further suggests that most teachers prefer and encourage their students to organize their own learning materials and prepare them in a clear step-by-step manner to understand the concept better. In some instances, teachers demonstrated the step-by-step procedures of accomplishing things for the students to pattern their solutions. According to Alnujaidi (2019) teachers who opted to use a sequential teaching style. They preferred to introduce the information in small linear steps and small details; they like to provide students with new information in large jumps and random order so that students could grasp the big picture.

The Students' Academic Performance

Table 2 reflects the academic performance of the 248 teachers exposed to 22 teachers of different fields or majors. Out of these 248 student-respondents, a total of 37 or 14.11% obtained grades of 1.00 or 1.25 with descriptive ratings of outstanding; a total of 151 or 60.84% of the students obtained a grade of 1.50, 175 or 2.00 with descriptive ratings of very satisfactory; and 44 or 8.71% of the students obtained grades of 2.25, 2.50 or 2.75 with descriptive ratings of satisfactory. There were 21 or 8.47% of the students obtained grades of 3.00 with a descriptive equivalent of fair, while 5 or 2.05% obtained a conditional grade of 4.00. No students were given a remark as failed.

The overall average grade of the 248 students was 1.90 and described as very satisfactory. Further, the majority of the students have a very satisfactory performance during the first semester of 2019 - 2020, under the teacher – respondents who taught English, Mathematics, Social Studies, Physical Education, Health and Music.

Table 2. Frequency and Percentage Distribution of Grade of Student-Respondents during the First Semester 2019-2020

Academic Performance (Grade)	Frequency N = 248	Percentage	Qualitative Description
1.00	5	2.02	Outstanding
1.25	32	12.9	Outstanding
1.50	52	20.97	Very Satisfactory
1.75	60	24.19	Very Satisfactory
2.00	39	15.73	Very Satisfactory
2.25	13	5.24	Satisfactory
2.50	13	5.24	Satisfactory
2.75	8	3.23	Satisfactory
3.00	21	8.47	Fair
4.00	5	2.02	Conditional
Average	**1.90**		**Very Satisfactory**

Teachers' Teaching Styles and students' Academic Performance Path Model

Figure 2 was the established model reflecting the influence of teachers' Teaching Styles on students' academic performance. The CMIN/DF value of 1.335 together with the P-value of 0.055 confirmed that the figure is the model which correctly fits the actual scenario.

In the established model, all the teaching styles were significantly related to each other as represented by the double-headed arrows between and among the eight (8) teaching styles. The relationships that existed were not causal effects but considered covariates to each other. Thus, these relationships between and among the teaching styles suggest that the teachers employed all the identified styles throughout the semester and that these teaching styles complimented each other.

These findings further imply that teachers were using not only one teaching style throughout the semester. Teachers were shifting from one teaching style to another teaching style depending on the needs of the students, or that will suit the topics for the day, or maximize the students' potential to learn. These practices of teachers adopting or using more than one teaching style are in line with the principle of education that teachers must be flexible often times and be ready to integrate more than one teaching style. The teachers should readily shift from one teaching style to different teaching styles in every class discussion to optimize students' engagement in the class. The result also supports the conclusion of Ridwan (2019) that teachers must prepare a variety of teaching styles in order that the students to develop and utilize their learning styles that will allow effective accommodation of learning.

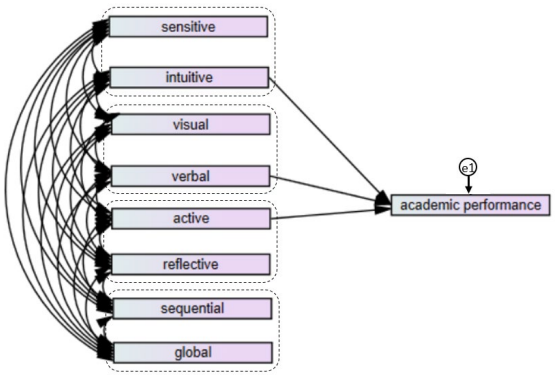

Figure 2 General Model for Teaching Styles to Academic Performanc

In addition, not all teaching styles have a direct influence on students' academic performance. In the model, only the intuitive, verbal, and active teaching styles have a direct influence on students' academic performance. These statements were based on the established relationships represented

in Figure 2 by the single-headed arrows emanating from the intuitive, verbal, and active teaching styles toward academic performance.

Intuitive Teaching Style to Academic Performance. It can be inferred from the model that teachers who designed the content of the lecture using the intuitive teaching style such as planning the class lecture ahead of time and thinking or imagining how to present the ideas and lesson in a lively manner to engage their students to participate in the class have direct influence to the students' academic performance. An intuitive teacher imagines students' reactions ahead of time; how will his/her class react to what he or is planning to do inside the class. His intuition helps him to plan students' activities. It can be deduced from Caldera, et al (2020) that teachers who considered intuitive teaching style, particularly in the classroom management could create and enhance a culture of achievement among the students, thus it impacts the students' academic performance.

Further, the intuitive style could be more effective in improving the academic performance of the students if it will be combined with other teaching styles or interfaced with other teaching styles. This conclusion was based on the double-headed arrows connecting other teaching styles with the intuitive teaching style which further connected to academic performance represented by a single-headed arrow. This statement is similar to the conclusion of Huang et al (2012) that students who preferred an intuitive learning style could impact students' academic performance, and it could be more impactful if this learning style could be coupled with other teaching styles.

Verbal Teaching Style to Academic Performance. Teachers who use a verbal teaching style could effectively influence students to achieve high academic performance. This conclusion was based on the single-headed arrow connecting verbal teaching style to academic performance. Specifically, teachers who were fond of using verbal teaching in presenting or discussing topics to the learners, encouraging learners to read aloud but not in a monotonic way, warrant role-playing, and providing learners with a combination of information in a variety of verbal ways could positively influence the academic performance of the students. This is in parallel to the conclusion of Omar et al (2015) that the use of verbal learning style is associated with improved students' academic achievement. Likewise, the use of this teaching style could serve to improve the quality of instruction in higher education.

The use of a verbal teaching style could be more effective if this teaching style will be complemented by other teaching styles. If verbal teaching styles will be properly interfaced with the other teaching styles, students' learning could be improved. This conclusion was based on the double-headed arrows connecting other teaching styles with the verbal teaching style which further connected to academic performance represented by a single-headed arrow. Renandya and Widodo (2016) have this same conclusion; the use of verbal teaching methods in tandem other teaching and learning styles such as mastery and memorization can give students with the greatest advantage for verbal performance.

Active Teaching Style to Academic Performance. Teachers who design learning activities more hands-on, experiential, or adopt the learning-by-doing approach could significantly influence the students' academic performance. This statement was based on the relationship established between the teacher's active teaching style to students' academic performance as represented by a single-headed arrow in the model. This finding conforms with the findings of Mercer and Dörnyei (2020) that the use of an active teaching style particularly involves all or combinations of the senses of the learners such as hearing, seeing, smelling, speaking, tasting, and touching positively impacted the students' academic performance.

The use of an active teaching style could be more effective if this teaching style will be complemented by other teaching styles. If active teaching styles will be properly interfaced with the other teaching style, students' learning could be improved. This conclusion was based on the double-headed arrows connecting other teaching styles with the active teaching style which further connected to academic performance represented by a single-headed arrow. The effect of this complementation of teaching styles on students' academic performance is manifested in the conclusion of İlçin et al (2018) and it showed positive improvement.

Intuitive, Verbal, and Active Teaching Styles to Academic Performance. As reflected in Figure 2, the intuitive, verbal and active teaching styles have a direct influence on students' academic

performance. The figure further suggests that these three teaching styles could significantly influence best the students' academic performance. It could be inferred further that if the teachers adopted these teaching styles all together in their classes or discussion could improve the academic performance of their students. In the study of Jahanbakhsh (2012) and Demirkan (2010), students who were taught matching their preferred learning styles, active and intuitive learning styles, show positive correlations with their academic achievement of students. While Abidin et al. (2011) concluded that students who preferred verbal learning approaches had a positive impact on their achievement.

The use of other teaching styles could still be used in addition to Intuitive, Verbal, and Active Teaching Styles, and the complementation of all these teaching styles could positively influence the students' academic performance. This finding was supported by the findings of Lu and Yang (2018), and Hernández et al, (2017) that students' achievement was positively impacted by the complementation of verbal and intuitive teaching-learning styles and students' concentration.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

All of the following Teaching Styles were adopted by teachers in their classes; in terms of content, teachers have used the sensitive teaching style than the intuitive teaching style; for presentation, the visual teaching style was used slightly more often than the verbal teaching style; teachers more often used the active teaching style to encourage students' participation than the reflective teaching styles; teachers often practice sequential teaching style than global teaching style.

The influence of teachers' Teaching Styles on students' academic performance was established using the SEM model and the following statement could be concluded:

- Teachers are using varied teaching styles, and the use of a specific teaching style is complemented using other teaching styles.
- The teaching styles: Intuitive, Verbal, and Active Teaching styles have a direct influence on students' academic performance.
- Teaching styles-intuitive, verbal, and active could complement the efficiency of transfer of learning when adopted by the teachers.

Recommendations

- Teachers are encouraged to expose their students to different teaching styles to accommodate the individual differences of the students.
- Teachers are encouraged to adopt intuitive, verbal, and active teaching styles or any two combinations to maximize the transfer of learning from the teachers to students.
- Teachers are encouraged to adopt other teaching styles in addition to the intuitive, verbal and active teaching styles that suited the kinds of the students and topics involved to get the optimum assimilation of learning by the students.
- The Dean of the College together with department chairs spearhead group meetings of teachers in every discipline or major or specialization in order to strategize what and how teaching strategies be adapted to each group in order to optimally enhance the transfer of learning.
- Almost true to all groups, students preferred the verbal and active learning styles and these had a positive influence on their academic performance. Thus, the teachers may design their class instruction or delivery to match the verbal and active learning styles of the student

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