

Teaching Methods and Learning Preferences in the Engineering Department of an Asian University

Jeamarie R. Abanador, Guillian Christine D. Buesa, Guada Marie L. Remo, Jovielyn Mañibo

Lyceum of the Philippines University, Batangas City, 4200 Philippines

Email: jakelaguador@yahoo.com

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Abstract

Teaching is a systematic plan to achieve a learning objective. As a profession it is taken as a mission to mold the young. There are three basic methods of teaching used by the instructors namely: teacher-centered, student-centered and focus-centered method. This research aimed to determine the different methods used by the faculty members and the learning preference of the engineering students that would help in attaining good coordination leading to students' academic learning. Descriptive type of research was utilized in the study with 100 engineering students as the respondents. Based on the data gathered, professors often used teacher-centered method while content-focused method is considered the most preferred by the students. From these results, an enhancement program was designed for the students to be able to cope with the teaching styles for their effective learning.

Keywords: *teaching style, instruction, engineering, learning, student-centered*

Introduction

Engineering is considered one of the hardest degree programs in college (Laguador, 2013a). In order to graduate from this five-year bachelor's degree, one must have full determination, excellent study habit, and of course, an exceptional analytical skill.

Every individual has his own perspective in learning, one factor of such is the methods of teaching used by their professors which are categorized generally into four types (Makokha & Ongwae, 2001), which are the Instructor/Teacher Centered Method, Content – Focused Method, Learner – Centered Method and Interactive/Participative Method. However, according to (Kafyuo, n.d) the learner-centered method and the interactive/participative method use almost the same strategies and/or medium in teaching, so it all boils down to three types.

Teacher/instructor-centered involves the teachers' action to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation. Likewise, it involves the establishment and maintenance of the classroom environment so that educational goals can be accomplished (Agno, 2009).

In content-focused teaching methods, both the teacher and the learners have to fit into the content that is taught. Generally, this means the information and skills to be taught are regarded as sacrosanct or very important. A lot of emphasis is laid on the clarity and careful analyses of content. Both the teacher and the learners cannot alter or become critical of anything to do with the content. An example of a method which subordinates the interests of the teacher and learners to the content is the programmed learning approach (Makokha & Ongwae, 2001)

Knowing these methods used in teaching clearly benefits the students because they will have a first-hand idea on the career they are pursuing. It is the role of the Higher Education Institutions (HEIs) to shape the values and character of the university students to prepare them in a life-changing professional career in the future (Laguador, 2013b). Therefore, each student must adapt the learning being taught to them differently from the university, depending on their interests as well as their capability, thus, their academic performances vary. The reason researchers conducted this study is to have a common knowledge of the teaching methods being used in engineering department and to be able to help the students cope to these methods for the benefit of their effective learning.

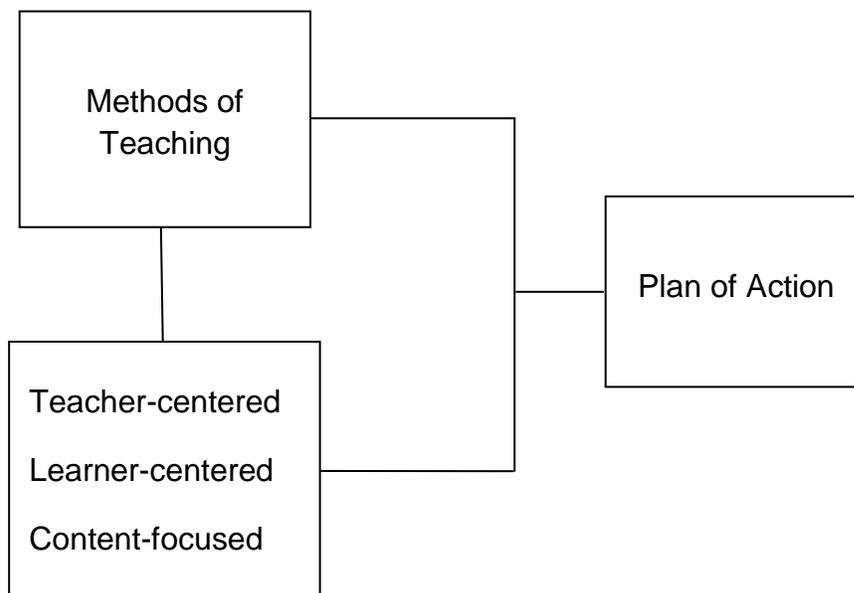
Objectives of the Study

This study determined the methods being used by the professors to assess the learning preferences of the students and to propose a plan of action that will help the engineering students adapt the methods of teaching of engineering faculty members at the Lyceum of the Philippines University, Batangas City, Philippines.

Conceptual Framework

The conceptual model, which guided the researchers in conducting the study was depicted on the paradigm. A large proportion of students entering college have not had much in the way of useful instruction or assistance with specific study methods (Laguador, 2013d). Teachers have been shown to have an important influence on students' academic performance and they also play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into actions and principles based on practice during interaction with the students. Both teaching and learning depends on teachers, no wonder an effective teacher has been conceptualized as one who produces desired results in the course of his duty as a teacher (Akiri & Ugborugbo, 2009).

The diagram shows the interconnection between the methods of teaching of the instructors and how they affect the student's academic performance. It is also given that there are three methods used by the professors namely: teacher-centered, learner-centered and content-focused.



Review of Literature

Teaching is defined as instructing, tutoring or educating. It stands for pedagogy, training and nurturing. As a profession it is taken as a mission to mold the young. Others are prepared to assume certain defined duties and responsibilities. It may be regarded as a teacher's role in educating children. Some refer to it as an occupation for a living.

Academic performance is an important result of all college curricular and co-curricular activities (Laguador, 2013f). Teachers have been shown to have an important influence on students' academic performance and they also play a crucial role in educational attainment because the teacher is ultimately responsible for translating policy into actions and principles based on practice during interaction with the students. Both teaching and learning depends on teachers, no wonder an effective teacher has been conceptualized as one who produces desired results in the course of his duty as a teacher (Akiri & Ugborugbo, 2009).

In order to realize the instructional goals formulated, a teacher must possess the ability to plan and organize all the needed task to be performed appropriately timed and adequately provided with suitable materials. Only then will actual teaching to be smoothly paved towards the desired ends. To underscore, it is hardly possible to make children learn without a precise method, or else the class activities will end up hit-and-miss or segmented operations.

In teaching, method is a systematic plan to achieve a learning objective. It is a procedure that must followed strictly to attain a goal. It refers to a series of related and progressive acts performed by the teacher and students to achieve the objectives of the lesson. It is well-planned procedure that guides the direction in undertaking a learning activity. Educators take

method as “a pattern or manner of treating people, objects and events that is directed purposely toward the achievement of an instructional goal.” (Salandanan, 2009)

As applied to the classroom teaching, method is a series of related and progressive acts performed by the teacher and the pupils to accomplish the general and specific aims of the lesson. Method has to do with the way a teacher communicates the subject to the student. It involves regular steps to guide the mental processes of the learner in mastering the subject-matter being presented to him. It also implies arrangement (Gregorio & Herman, 2005).

There are four main types of teaching methods which are widely used by the teachers in educating their students. These methods are namely as: Teacher/Instructor-Centered Method, Learner-Centered Method, Content-Focused Method and Interactive/Participative Method. (Makokha & Ongwae, 2001)

In this method, the teacher casts himself/herself in the role of being a master of the subject matter. The teacher is looked upon by the learners as an expert or an authority. Learners on the other hand are presumed to be passive and copious recipients of knowledge from the teacher. Examples of such methods are expository or lecture methods - which require little or no involvement of learners in the teaching process. It is also for this lack of involvement of the learners in what they are taught, that such methods are called “closed-ended” (Makokha & Ongwae, 2001).

The traditional teacher-centered method of instruction also known as direct or explicit instruction, consists of seven components. The seven components of direct instruction are: developing of anticipatory activities used to prepare the students to the lesson, identifying an objective, teaching of new material, modeling the objective to be learned questioning the students as a checked for understanding, providing a guided practice and an appropriate feedback to the student, and providing an independent practice of the new material for the student to do outside of the classroom (Pretson, 2007).

Teacher/instructor-centered involves the teachers’ action to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation. Likewise, it involves the establishment and maintenance of the classroom environment so that educational goals can be accomplished. (Agno, 2009)

Teacher-centered instruction includes teaching strategies "in which the teacher's role is to present the knowledge to be learned and to direct, in a rather explicit manner, the learning process of the students. (Backiel, 2009)

In content-focused teaching methods, both the teacher and the learners have to fit into the content that is taught. Generally, this means the information and skills to be taught are regarded as sacrosanct or very important. A lot of emphasis is laid on the clarity and careful analyses of content. Both the teacher and the learners cannot alter or become critical of anything to do with the content. An example of a method which subordinates the interests of

the teacher and learners to the content is the programmed learning approach. (Makokha&Ongwae, 2001)

Content-Focused Coaching is a professional development model designed to promote student learning and achievement by having a coach and a teacher work jointly in specific settings, guided by conceptual tools (Staub, 2005).

This last method of teaching centers on students' learning in the lessons but is also about teachers' learning from the process. In the short term, teachers refine how they teach particular lessons to specific groups of students. In the long term, they develop professional habits of mind and general teaching expertise. Expert teachers know both their subject and the best pedagogical practices by which to bring the subject to their students. (Staub, West & Bickel, 2006)

To fulfill the student learning objectives of the course, the class facilitator integrated technology-driven teaching strategies in the learning experience of the students including multimedia presentations, World Wide Web resources, open line of communication thru email, networking sites page, video/photo portfolios, digital cameras and photo editing software (Bay, 2013).

Learner-centered teaching is a teaching which is focused on learning – what the students are doing is the central concern of the teacher. Learning by doing is one of the most important aspects of psychomotor domain (Laguador & Dizon, 2013). Being “focused on learning” is easily understood at a superficial level, but its delineation reveals more details and intricacies: It is the teaching that engages the students in the hard, messy work of learning. It motivates and empowers students by giving them some control over learning process. It is the teaching that encourages collaboration, acknowledging the classroom (be it virtual or real) as a community where everyone shares the learning agenda. It promotes students' reflection about what they are learning and how they are learning it. It includes explicit learning skills instruction (Weimer, 2013).

Student engagement through learner-centered approaches leads to desirable student outcomes. The benefits of learner-centered education include increased motivation for learning and greater satisfaction with school; these outcomes lead to a greater academic achievement. Students in learner-centered programs differ from students in more instructor-centered programs in some concrete and specific ways (Wiley, 2009). Teachers must provide enough encouragement and motivation to students to strive harder to achieve higher grades in the subjects. They may establish a reward system that will recognize the students with exemplary performance during quizzes or major examinations to increase their motivation to exert more effort in dealing with their studies (Laguador, 2013e).

The last type of the teaching method which is the participatory/interactive method is driven by the situational analysis of what is the most appropriate thing for us to learn/do now given the situation of learners and the teacher. They require a participatory understanding of varied

domains and factors (Makokha&Ongwae, 2001). This method is also termed as learner-centered method. This means that the activities done with this method focuses on how the students analyze and learn the topic the instructor wants to imply (Kafyuo, n.d).

The used of teaching methods produces a variety of results. It may be strong and effective in one case, may be weak and harmful in another case and may still be in another case. The point is the teacher should develop some definite procedure as he requires more teaching experience through the years, which could bring better results. Experience shows that this kind of result is possible if the teacher's exigency and convenience.

Dela Rosa concluded that the methods and strategies of teaching are the best means of improving the educational system of the country. By the methods and strategies used by the teachers in the classroom, students teach a lot of it in gain more knowledge and understand mean on the different situations in problems in daily life (Gutierrez, 2010).

Materials and Method

This part of the study presents the details of the research outline used. This includes the research design, participants, measure, data gathering procedure, and data analysis.

Research Design

The descriptive method was utilized in this study since it involved collecting and interpreting data in order to gather information needed in the study to serve this purpose.

The data description is factual, accurate and systematic, the research cannot describe what caused a situation. Descriptive research cannot be used to create a causal relationship, where one variable affects another. Descriptive research can be said to have a low requirement for internal validity. (Sevilla, 2007)

The description is used for frequencies, averages and other statistical calculations. Often the best approaches, prior to writing descriptive research, is to conduct a survey investigation. Qualitative research often has the aim of description and researchers may follow-up with examinations of why the observations exist and what the implications of the findings are.

Participants of the Study

The participants of this study were the Engineering students of levels Two and Three of Lyceum of the Philippines University-Batangas. They were selected to evaluate and assess their academic performance in relation to the methods of teaching used by their professors. The questionnaires were answered by one-hundred (100) students. Twenty-one were (21) Computer Engineering Second Year students, thirty (30) respondents were from General

Engineering 2A, twenty (20) respondents were enrolled in Industrial Engineering 3A, twelve (12) more respondents were Mechanical engineering third year students, six (6) respondents were from Electronics engineering 3A, and the remaining were Computer engineering third year students.

Instrument

The self-constructed instrument was prepared by the researcher after having the knowledge about the study. The questionnaire is composed of 2 sets, each having 12 items. The first part contains techniques and strategies used by the professors in their teaching. These 12 items were divided equally to suit the 3 methods of teaching namely Teacher-Focused Method, Learner-Centered Method, and Content-Focused Method. In this, the researchers intended to know which method is mostly used by the respondent's instructors. In order to obtain unbiased results, the items pertaining to a particular method are not arranged in a successive manner, thus in an alternating one. The items 1,4,7, and 10 were for teacher-centered method, while the items 2,5,8, and 11 were applicable for learner-centered method, and items 3,6,9, and 12 belong to content-focused method. The respondent scored an item based on how often his instructor uses that kind of technique in teaching. The scales used are: 3.50-4.00 - Always; 2.50-3.49 - Often; 1.50-2.49 - Sometimes; 1.00-1.49 - Never. The results for each method were then tallied and judged again for the same scale.

The second part of the questionnaire contains factors related to each method of teaching that helped the researchers know how the respondents act or behave when their professor uses such technique. The sequence of the items was the same. The scales used were: 3.50-4.00 - Strongly Agree; 2.50-3.49 - Agree; 1.50-2.49 - Strongly Disagree; 1.00-1.49 - Disagree. The results for each method were then tallied and judged again using the same scale. In this set, the researchers ought to know how a particular method of teaching affects the interests in studying of the respondents. Indeed, they knew how such method affect the respondent's academic performance.

Procedures

The researchers made a set of questionnaire for the Engineering students of Lyceum of the Philippines University - Batangas which focused on their academic performances in relation to the methods of teaching used by their professors. During the preparation of the questionnaires, the researchers made an intensive reading and did some research from books and thesis related to the said topic. The researchers asked the permission from the College Department Dean of Engineering of LPU-Batangas for the questionnaires to be distributed to the respondents.

The questionnaires were personally distributed and administered to the respondents. Close follow-up was made to ensure that all the respondents were able to answer the entire

questionnaire. When the researchers were already finished administering and collecting the questionnaires, they started tallying and tabulating the data.

Data Analysis

The set of respondents were distinguished per program and year level. The number of responses for each choice was added. The composite mean for each method was computed by adding their respective total individual response divided by the total number of respondents. The area with the highest number of responses was the method of teaching most often used by their professors. The average rating of each question under the categorized method was computed by adding all the individual rating divided by the total number of respondents. The categorized method with the highest computed composite mean is the one that greatly affects the learning of the respondents.

Results and Discussion

Teacher-Centered Method

Teachers often used illustrations and examples as denoted by the weighted mean score of 3.43. They also often explained principles and theories clearly and used some visual aids in teaching and provided enrichment materials as indicated by the weighted mean scores of 3.30 and 3.29 on rank number 2 and 3, respectively. Orienting the students to a topic prior to classroom and laboratory works obtained the least weighted mean score of 3.19 with often verbal interpretation. The composite mean score of 3.30 implies that the teachers were often used the teacher-centered method.

Students put all of their focus on the teacher. The teacher talks, while the students exclusively listen. During activities, students work alone, and collaboration is discouraged. It involves the teachers' action to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation. (Agno, 2009) Teacher-centered instruction includes teaching strategies "in which the teacher's role is to present the knowledge to be learned and to direct, in a rather explicit manner, the learning process of the students (Backiel, 2009).

Learner-Centered Method

Professors often provide feedback/correction when questions arise as denoted by the weighted mean score of 3.34 on rank number one (1). They often let the students solve the problems and/or answer a question by themselves and the teachers as well as the students equally interact during the class room discussion as indicated by the weighted mean scores of 3.24 and 3.17 on rank numbers 2 and 3, respectively. However, instructors during discussion spend some time listening while students spent some time talking obtained the least weighted mean score of 2.75 on rank number 4.

The composite mean score of 3.13 implies that the teachers were often used the student-centered method. It promotes students' reflection about what they are learning and how they are learning it (Weimer, 2013). This approach emphasizes a variety of different types of methods that shifts the role of the instructors from givers of information to facilitating student learning. When a classroom operates with learner-centered instruction, students and instructor share the focus and interest. Instead of listening to the teacher exclusively, students and teacher interact equally. Group work is encouraged, and students learn to collaborate and communicate with one another. The youth of today must take part on many challenging roles of designing plans and implementing the programs that would give them the sense of leadership and ownership of their achievements (Laguador & Camello, 2013).

Content-Focused Method

Teachers often apply what they had learned to familiar situations or solving problems as denoted by the computed weighted mean score of 3.28 on rank number one (1). Teachers also often design and implement lessons from which they will learn and they students responded incorrectly, they give students a chance to try again after providing a cue with computed weighted mean scores of 3.22 and 3.16 on rank number 2 and 3, respectively. Relating some relevant personal experiences or events which have occurred in the work setting regarding on the lesson obtained the least obtained weighted mean score of 3.15 on rank number 4 with often verbal interpretation. The composite mean score of 3.20 implies that the teachers often used the content-focused method which is a professional development model designed to promote student learning and achievement by having a coach and a teacher work jointly in specific settings, guided by conceptual tools (Staub, 2005).

Students Learning Preferences

Table 1 shows the students learning preferences in terms of the three identified teaching methods.

Table 1: Students Learning Preferences

Teacher-Centered Method	Mean	Verbal Interpretation
1. I understand better when my instructor first explains the principles and theories clearly.	3.58	Strongly Agree
2. I prefer that the lecture has illustrations and examples.	3.45	Agree
3. I lose interest when the instructor does all the talking.	3.04	Agree
4. I study more if my instructor uses some visual aids in teaching and provides you some enrichment materials.	3.34	Agree
Composite Mean	3.35	Agree
Learner-Centered Method		
1. I want my teacher to approach or listen to me in case I have questions regarding on my topic	3.38	Agree

2. I learn better when me and my teacher interact equally.	3.37	Agree
3. I participate actively when there are some group activities.	3.30	Agree
4. The lesson retain longer in my mind if I have practice to solve a problem by myself.	3.44	Agree
Composite Mean	3.37	Agree
Content-Focused Method		
1. I prefer instructors who put a lot of emphasis and analysis of content.	3.25	Agree
2. I understand better if my instructor gives lots of examples.	3.49	Agree
3. I wanted to know how/what does our lesson come out in reality or in the field of your chosen program.	3.38	Agree
4. I listen to my teacher's stories that occurred in the work setting regarding on our lesson and understand the content of your lesson better.	3.34	Agree
Composite Mean	3.37	Agree

Legend: 3.50-4.00 = Strongly Agree; 2.50-3.49 = Agree; 1.50-2.49 = Strongly Disagree; 1.00-1.49 = Disagree

From the results obtained, it is concluded that the students prefer whichever of the three methods of teaching is used by their professors for each have the same verbal interpretation.

With a composite mean of 3.35 implies that the students preferred the teacher-centered method where students put all of their focus on the teacher. With a composite mean of 3.37, in learning-centered method, the students easily understand the topic being taught by their professors. This means that the activities done with this method focuses on how the students analyze and learn the topic the instructor wants to imply. It is the teaching that engages the students in the hard, messy work of learning (Weimer, 2013). Sometimes teachers do not have enough time to give their students a chance to review what they learned the last time they met before they start the examination, most especially before the quiz starts. Faculty members also sometimes fail to determine the defects of their students and what areas in the lesson needed for a remedial class (Laguador & Agena, 2013).

Having a composite mean of 3.37, content-focused method is a method where both the teacher and the learners have to fit into the content that is taught. Generally, this means the information and skills to be taught are regarded as sacrosanct or very important. A lot of emphasis is laid on the clarity and careful analyses of content (Makokha & Ongwae, 2001). Content-focused teaching cultivates the skills educators need to empower students' to engage in intellectual habits of reasoning, discourse and mastery of important, relevant content in the academic domain being taught. Content-Focused Teaching is a professional development

model designed to promote student learning and achievement by having a coach and a teacher work jointly in specific settings, guided by conceptual tools (Staub, 2005).

Proposed Program/Activity Design that would help the Engineering Students Adapt their Instructor's Methods of Teaching

Program/Activity	Specific Objectives	Responsible Persons	Time Duration	Expected Outcome
I. Orientation <ul style="list-style-type: none"> • Inform students of the course requirements. • Clarify learning objectives and expectations. • Collect baseline data on students' knowledge and motivation. • Give students an overview of how the institution molds students to become professionals (et.al. achievements, education system, accreditations, etc.) 	<ul style="list-style-type: none"> • To clarify all reasonable questions students might have relative to the course objectives. • To explain a detailed discussion pertaining to the aims and objectives of the course in general. 	CATC, Dean and Faculty of Engineering	1 day	Before the end of the day, students must fully understand everything regarding their career choice and for that knowledge, they are expected to fully commit themselves to their goal and put their faith and trust to the institution's way of giving birth to professionals.

II. Advisory

<ul style="list-style-type: none"> Forming peer/study groups. Forming Academic Advisement which will monitor a student's week-to-week academic progress. 	<ul style="list-style-type: none"> To support and help each other in reaching his/her academic goals and future aspirations. To evaluate on how well the students are improving. To have sharing of ideas. 	Students	All throughout the semester	Students who studied in groups are expected to have better analysis on each topic.
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Program/Activity	Specific Objectives	Responsible Persons	Time Duration	Expected Outcome
III. Time Management				
<ul style="list-style-type: none"> Decide what to study, how long to study or how much to study before you get started. Study for at least an hour every day before the next class. Review the lesson plan prior to class. Plan your breaks in the short and long term. Get things done in 	<ul style="list-style-type: none"> To help the students in balancing their time in studying the lessons taught by their professors. For the students to easily adapt/learn the topics that will be discussed on the class by the professor. To avoid cramming on deadlines. 	Students Guardians	All throughout the semester but at least 1 month being monitored by the guardians.	<p>After a month, students are expected to get used in managing their time efficiently thus, with the good results they are expected to continue this as a part in their study habit.</p> <p>This course of action will lead to students' increase in their academic performance because of their readiness prior to</p>

proper time; make a time schedule on everything.	<ul style="list-style-type: none">• Being prepared is the key.	their lessons.
<ul style="list-style-type: none">• Make an advance study.		When the time is properly managed, cramming is avoided meaning, time is used efficiently.

Conclusions

Teachers in the College of Engineering were versatile when it comes to their teaching where they often used the teacher-centered, learner-centered and content-focused method. In general, the professors are not sticking on one method of teaching instead, they apply all these methods. Regarding the assessment of the engineering students, they prefer all the methods of teaching for them to fully understand and learn effectively concerning on their career choice. A proposed program was designed to help the Engineering students to adapt the instructors' method of teaching.

Recommendations

Students should improve the way of learning in many ways to be able to adapt quickly, more so, they should exert more effort, given that engineering is really a difficult one. Engineering students must be encourage to participate in the community extension projects as part of teaching strategies through providing extrinsic motivation like giving incentives or award of recognition and appreciation for joining the activities (Laguador & Chavez, 2013). Faculty members should find an alternative ways in teaching by integrating technology in the classroom like using e-learning to enhance the interest of the students (Alday & Panaligan, 2013).

Students should approach their professors whenever they have difficulties to the subject. Students should do further research about the subject, and do not rely on the professors' teaching only. The College of Engineering faculty members must encouraged the students to read textbooks or reference books being used in the subject regularly before coming to class,

use the library facilities and services for further reading about the lessons and they must also establish group study during vacant periods to utilize their spare time to a most productive one (Laguador, 2013c). Advance technology could be a useful tool to help the students understand better in their academics. For the future researchers, it is advised to use other variables and incorporate qualitative data.

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