

Student-Based Instruction: More than a Method

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Abstract

A 16-week case study of two middle school students revealed the limitations of particular instructional methods. The investigation aimed to discover why students can succeed in all courses except one. Using inquiry-based learning and combinations of the V-A-K-T model allow for multiple connections of course content and previous experience. The study's findings are relevant to administrators, classroom teachers, and curriculum coaches as they pertain to maximising learned content within adolescents.

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Critical Incident

In order to prepare her students for a test on fractions, sixth-grade Math teacher, Mrs Bernard set up a television game show called *Mind Jogger* for her students to play. She grouped them into fives and the students collaborated to answer the questions. The host of the game asked questions, allowed a specific amount of time for completion, and waited for the students to present their answer from the four possible choices. The game was divided into three rounds, with answers of increasing point value in every following section. I sat and observed the students' excitement about playing the game; however, I noticed that some students were not using Mathematics to solve the problems. Sometimes, groups did not know the answers to the questions so they waited for other groups to give their answers. Then, those groups stated that they also had the same answer. It was apparent that many groups were simply copying answers of other groups, even though those groups were often giving incorrect responses. Within each group, several members had disagreements as to what were the correct answers. One student, Steve Miller, kept giving his team mates wrong answers to the problems. As soon as the host of the game assigned a problem, he began stating random choices like, "Oh, it's C. I know it's C. Guys, come on." When the answer was actually B, the frustration within his group rose because Steve failed to solve most of the Mathematics problems during the review for the test, further complicating the situation. This event led his peers to say, "Don't listen to Steve anymore. He only gives wrong answers" (Author, 2004a).

Mrs Bernard infused a playful environment into her curriculum; a strategy that researchers would argue gives students opportunities for social interaction and intellectual discourse (Roth, 1995). Yet Mrs Bernard's application caused an opposite effect, as students were overly challenged by not only the questioning aspect of the game but also the collaboration amongst themselves. Watching Steve

struggle within the confines of a Mathematics game was especially odd because he was one of the highest achievers in the sixth grade. As his Science teacher, I witnessed his meaning construction. Why was Steve struggling within this exercise and in Mathematics in general? Why was Steve not achieving to the same extent in Math as he was in his other classes? Was it a personal issue or was it more widespread? After pondering these questions, I pursued the answers through inquiry.

Purpose of the Study

The purpose for this study was to determine why some students' achievement is high in all classes except one. Some students earn all As, but they still have a C in Mathematics. Why cannot children succeed in all of their classes? I conducted a four-month-long case study of two middle school students in order to gain a better understanding of how student thinking and learning is shaped in classroom environments. While keeping in mind that all students have unique cultures or standards for thinking, valuing, behaving and evaluating (Goodenough, 1981), I closely studied two students to gain insight as to why these students are unsuccessful in only one particular subject content area. My analysis of detailed observations and their transcriptions led me to several conclusions about this sample of students as it pertains to their thinking and learning, and how it relates to classroom instruction.

Methods

Setting

Bogden Middle School was the site of this investigation. The school's student population is composed according to the districting regulations of Ruston Parish in Louisiana. The students are predominately African-American (67%), while there is a minority of Caucasian (30%) and Asian (2%) students. All other ethnicities, such as Hispanics and American Indians, make up less than 1% of the population.

The site of Bogden Middle School influences the school atmosphere. It lies in the heart of a suburban neighbourhood that is predominantly Caucasian. Although some students live near the school, the majority of the students are bussed in from several low-socioeconomic neighbourhoods throughout the city.

Participants

Two participants were selected from one middle school in Louisiana. From analysing progress report cards, only 2 of 24 students in the class maintained As in all of their classes while earning below or equivalent to an average grade (C, D, or F) in one subject area. As a result of these findings, these students were chosen to be included in the study.

Steve, a 12-year old Caucasian male, was the first participant. Although he particularly excelled in science and English class, Steve struggled in math. He participated in class discussions and always completed homework assignments in every subject area.

Participant number two, Samantha, was a 13-year old African-American female. She earned high grades in every subject area except Social Studies. Samantha was also involved in extracurricular activities like playing flute in the school band.

Data Collection and Analysis

Throughout 16 weeks of observations, I kept detailed notes of the complete classroom environment, including the teacher's methods of instruction, the students' actions, reactions, and behaviours, and the overall classroom atmosphere. Completing my study within sixth-grade classrooms allowed me to minimise disruption, since students became accustomed to my presence in various classrooms.

As I assumed a participant-observer's role, I based my inquiry on symbolic interactionism, the perspective with an emphasis on interactions among people, use of symbols in communication and interaction, interpretation as part of action, self as constructed by others through communication and interaction, and flexible, adjustable social processes (Blumer, 1969). As a symbolic interactionist, I was concerned with the interplay and experiences of the students. I acquired extensive amounts of information while inquiring, further revealing that there were stark contrasts between the students within my study. Steve was a Caucasian student who lived in a suburban community with his grandmother. On the other hand, Samantha was an African-American and lived with both of her parents in a low socioeconomic community.

During the exploratory phase of my inquiry, I collected numerous types of data using procedures of qualitative researchers (i.e., Bogdan & Biklen, 1982, 1998; Seidman, 1991; Spradley, 1980). Along with systematic types of data collection, I also used naturalistic methods, including audiotaped and videotaped transcriptions of lessons, field notes, and several examples of student work from August to December. In my role as participant observer, I was keenly aware of learning that occurred during class through observations. I also spoke with students whenever possible outside the classroom. I held conversations with students before and after school as well as during lunch and recess to get a better understanding of their views and opinions on learning and teaching within their classes.

During my study, I primarily conversed with these two students Steve and Samantha. When the first interim report cards came out, I examined them, looking for trends and irregularities. What struck me was that these two students performed marvellously well in all subject areas but one; I became intrigued by these two students. This was the provocative spark behind conducting this study.

Through interviewing and interacting with Steve, a 12-year-old Caucasian student, I realised that he loves comic books, action films, writing, and playing tag at recess. Samantha is a 13-year-old African-American who likes to talk on the telephone and hang out with her friends. Steve had difficulty performing well in Mathematics, while Samantha was unsuccessful in Social Studies. Each of these students achieved a high A in the Science class I taught, so I began to ponder why they did not do the same in their other classes. To get a better perspective on how these two students learn, I extended my observations beyond the walls of my classroom. I visited several other classrooms, where many subject areas were taught, including Social Studies, Math, Literature, and Spanish. While observing in these classrooms, I began to notice distinctions in how teachers instructed.

These teachers implemented various methods including lecture, hands-on exercises, games, and question and answer exercises.

I gathered data using Spradley's (1980) ethnographic research cycle, beginning with broad ethnographic questions while collecting data through observation in my classroom, speaking with students throughout the course of the day, and observing their interactions in other classrooms. These primary data sources were triangulated with secondary data sources, including evaluated questionnaires as well as structured interviews of two students and numerous sixth-grade teachers. Using the constant comparative method (Glaser & Strauss, 1967), I collected and analysed data simultaneously, which included inductive behaviour-category coding with a comparison of all incidents observed.

Each day, I kept meticulous notes of student behaviour during my informal conversations, interviews, and observations. At least twice a week, I transcribed audiotapes and videotapes, while looking for recurring themes. In order to reduce premature assumptions derived from these transcriptions, I analysed the data from these sources (Erickson, 1986). After transcribing my raw notes from observations, I also looked for associations between multiple observers of two students (e.g., my observation and interpretation of an action or event in a classroom compared to the teacher's observation and interpretation of that same action or event). In summation, these data collection methods enabled me to describe and interpret the ways in which these two students learned in classrooms across the school. Throughout my study, I continued to collect data while alternating perspectives between insider and outsider, so I could better understand, assist, and guide my students in meaningful and challenging ways.

Interpretation

Through continuously collecting data for four months, I reached a major assertion: teaching methods alone, no matter how provocative, do not ensure student understanding. Meaning can be derived when active engagement, along with reflection, occurs within an environment that is conducive to learning – not too challenging or too simplistic. Providing students with an opportunity to use cognitive skills, such as observation, formulation of original ideas, and making new discoveries, enhances students' academic experiences and stimulates mental neural development (The National Institute for Play, 2000). Students gain lasting knowledge when they are provided opportunities to participate actively in their learning experiences. Academic experiences become memorable when physical activity is incorporated and instruction is geared to build upon their current levels of understanding. According to Dewey (1916), "Experience has shown that when children have a chance at physical activities which bring their natural impulses into play, going to school is a joy, management is less of a burden, and learning is easier" (p. 194). Activities which allow students to get up from their seats and participate physically stimulate effortless learning and productive play time.

At Bogden Middle School, some observed teachers used methods including games, group work, and other creative approaches to teaching. To maximise learning for all students, teachers should use a number of instructional methods to present material (Felder, 1993). The variety of student learning styles represented in each classroom presents the need for teachers to infuse a variety of instructional methods into curriculum delivery. However, students' knowledge will not be increased if the methods chosen are ineffectively implemented. The teachers of Bogden Middle School were convinced that their methods were appropriate for

students, and although their ideas had value, they were not always structured in such a way that was both meaningful and instructive. Therefore, they were not beneficial to all and failed to lead numerous students to knowledge formation. Lovelace (2005) suggests teachers should instruct towards students' strengths to increase academic performance and improve educational attitudes.

Mrs Bernard, a sixth-grade Mathematics teacher, implemented various methods of instruction that seemed exciting for students, but did not always meet their academic needs. In a typical day, she gave the students Math problems to solve while she checked student homework from the previous night. After the completion of this portion of class, she reviewed the correct answers with students, having them modify their answers if necessary. Quickly transitioning to the lecture, she provided students with some examples of how to solve additional problems. Then she reviewed the information and assigned homework due the following day.

Prior to examination time, she gave students a review via a television game show that gave problems and four possible answers to each group of students. They collaborated and stated their proposed answer. The group which answered the most questions correctly received bonus points on the test. The following class period, students took a test that involved solving problems without the aid of possible choices.

The following excerpt is from my transcriptions, and it demonstrates Mrs Bernard's regular method of instruction.

- Bernard *I want you to do the four problems of the day, while I check your work.*
- Steve *(While working on a problem) Hey Jimmy, what did you get for number 3?*
- Jimmy *Man, do your own work.*
- Bernard *Where's your work?*
- Steve *It's right here.*
- Bernard *OK, you get a check.*
- Bernard *OK class, let's go over the answers to today's problems.*
- Bernard *The answer to number 1 is five-thirds. The answer to number 2 is two-fifths. Number 3 is one-third, and 4 is one-half. Does anyone have any questions about those problems?*
- Steve *I don't get number 3.*
- Bernard *Can someone show Sam how to do number 3? I don't have time for that right now.*
- Bernard *All right, class, let's move on to today's lesson on compound fractions.*

(Author, 2004a)

Mrs Bernard conversed with students, while paying particular attention to getting her lesson completed. When students had difficulties, they were encouraged to ask questions. The most common teacher retort was to restate the correct answer. This left the learner empty many times. The student never learned how to solve the problem; rather, he learned the correct answer. Could he ever solve a similar problem like that one? It is unlikely because he still does not understand the process. The instructor stopped teaching after giving the answer, but in

Mathematics especially, the answer is not the most important aspect. The meaning comes through manipulating numbers, formulas, and mathematical concepts to solve problems, therefore its application has realistic uses throughout life, unlike memorising an answer to one problem.

Without meeting the student's need, the teacher often left the student behind. Through repetitive instances of not learning how to solve problems, he never learned the information necessary to perform well on his test. This is nearly a certainty because students are not permitted to take their Mathematics books home, nor are they allowed to repeat assignments. Steve and other students may be left with an incomplete understanding of many mathematical concepts.

While Mrs Bernard made a valiant effort to provide her students with fun activities for test reviews, her students did not always grasp the material. Other teachers like Mr Smith have strong feelings that students gain knowledge from their teachers through oral lecture. The teacher, in this case, Mr Smith, relayed information, allowing them to learn through the comprehension of the presented material. In his classroom, he filled three chalk boards in the front of his classroom with information that was relevant to the lecture. When students entered his classroom, they were required to copy the information. Shortly after, Mr Smith began his class-long lecture.

The following transcripts were recorded from a videotaped lesson on Egypt within Mr Smith's sixth grade class.

- Mr. Smith *Now, see the mortuary priests were called the servant of Ka. They were very important at this time. They...*
- Mr. Smith *Cedrick, sit down; Son, that is your last warning.*
- Mr. Smith *Now, where was I? Oh yes, the servants of Ka brought daily offerings to the king. In ancient Egypt, there were many kings. None of whom lived longer than Khufu.*
- Chris *Who's that? (the class laughs)*
- Mr. Smith *Well, he did a lot, but who we really need to talk about is Isis.*
- Mr. Smith *Isis was the goddess of magic. She was the daughter of Seb, the child of Nut, and also the daughter of Neb-er-tcher.*
- Mr. Smith *I know this is hard to understand but you have to because you have a test on all of the information that's on the board on Friday.*

(Author, 2004b)

Through lecture format, learning is possible. Yet, Mr Smith's lectures did not provide students with many real-world connections that may help them tap into their current knowledge base, make connections with knowledge they already have, and expand on what they already know. Roth and Roychoudhury (1993) suggest that students are far more likely to understand concepts when they evaluate, integrate, and elaborate on existing schemas. Students in Mr Smith's class heard

his lectures about ancient gods and goddesses, but their purpose in culture today was never a focal point. Mr Smith rarely gave analogies, stories, or any other type of discussion about their relevance. He simply stated the facts, and iterated that they had to learn the information for the test. He focused on ancient mythology throughout the Egypt unit, while briefly mentioning other aspects like pyramids, mummies, and the Great Sphinx. Based on student discussion and my extended observations, students did not connect with Smith's material due in part to his instructional methods.

During this same lesson, I observed Samantha and recorded her actions and mannerisms. I noted 15 instances of Samantha putting her head down, three instances of her shaking her head, and five instances of her saying, "Aw, man." From analysing my field notes, I quickly realised that she paid almost no attention to the teacher. Samantha never appeared interested in the information on which he lectured. Because most of her classmates were also not attentive, the class did not appear to grasp the content. Smith's style of lecturing for 90 minutes was ineffective in many ways, and as a result, behavioral problems ensued.

While some teachers used one instructional method of delivery, others excelled using an array of methods. There were two instances in which I had the privilege of observing Ms Tate's Spanish class. The classroom was filled with Spanish décor including antiques, posters, and banners. When I entered the classroom, Ms Tate greeted me, speaking in Spanish. Although I did not understand everything she said, I tried to communicate with her. She was excited to have me observe, and even more thrilled to be teaching the children. Throughout the class, she spoke to the students in both Spanish and English to enrich their learning experience. Ms Tate called on the class to chorally participate by repeating common Spanish phrases dealing with fashion – the topic of the day. The students were allowed to have conversations with each other, using Spanish fashion words to guide them. They even listened to tapes, sang songs, and danced to Spanish music. The class stayed on-task for nearly the entire 90 minutes; and when the teacher gave a question and answer review session at the end of class, almost every student, including Steve and Samantha, raised their hands to answer.

The teacher worked with all students in oral conversation, using new vocabulary. The lesson was about clothing (nouns) and colours (adjectives). The teacher asked the students what colours are the parts of clothes.

La maestra trabaja con todos los estudiantes en conversación oral, usando vocabulario nuevo. La lección fue sobre de las ropas (cosas) y los colores (adjetivos). La maestra pregunta a los estudiantes que colores son los partes de la ropa.

La maestra *¿Qué color es la camisa?*

El estudiante *La camisa es roja.*

La maestra *¡Perfecto! Sí, la camisa es roja. ¿Qué color es el vestido?*

La estudiante *El vestido es blanco.*

La maestra *Ahora, vamos a escuchar una cinta de ropas y colores. Es un ejercicio de escuchando.*

(Author, 2004c)

English translation:

Teacher	<i>What colour is the shirt?</i>
Student	<i>The shirt is red.</i>
Teacher	<i>Perfect! Yes, the shirt is red. What colour is the dress?</i>
Student	<i>The dress is white.</i>
Teacher	<i>Now, we are going to listen to a tape about clothing and colours. It is a listening exercise.</i>

(Author, 2004c)

Her students were intrigued by the method in which she delivered course content, so they wanted to learn. In these scenarios, Ms. Tate involved the students in the process of teaching and learning. For example, students gained knowledge through play and reflection. In Ms Tate's class, students held conversations, sang songs, and then wrote about what they learned in their notebooks at the end of class. "Reflection is often overlooked, but it is always immensely beneficial," according to Ms Tate. In this Spanish classroom, students looked forward to reflecting.

After analysing a variety of teaching methods used at Bogden Middle School, I decided to embed some aspects of these teachers I observed into my own teaching style. Within my Science classroom, I was not always using hands-on manipulatives; however, from observing in Mr Smith's class, I realised that students needed to regularly play or manipulate materials, ideas, and concepts related to subject content. Inquiry creates opportunities for students to manipulate ideas and curriculum content. Research suggests that when Science classes are taught using inquiry-based instruction, individuals are actively engaged in attempting to understand and interpret concepts for themselves (Gerber et al., 1997). I first utilised these instructional concepts when teaching a unit on Matter.

In groups of three, students rotated between three stations in the room. The students went to their placements, where they received guided instructions on how to proceed through the experiment. Students were given mixtures of water and cornstarch, also known as Oobleck. The students had lab sheets, which stated they had to design four tests to determine physical properties of the substance. Some students tried to poke it, cut it, push it, pour it, pick it up, and even smash it. They were attempting to differentiate whether the substance was a liquid or a solid. Afterwards, the students had to record their observations of each test. Finally, students had to analyse their data and come to a conclusion about the Oobleck. Was the Oobleck a solid? Was it a liquid? Was it neither or even somewhat of both? Through inquiry, students learned via their own investigations. Thus, the information became instilled within their knowledge base.

To reflect on everything that occurred during the Oobleck activity, I videotaped the activity. I would have missed many of the events during the experiment without the recordings. Some students, like Steve, were sharing information while others were showing their testing procedures. In many of these instances, I did not notice what the students were saying or doing. Because I had a group of eight students, I could not see everything that was going on; however, I reflected on the lesson after watching the videotape.

After analysing the videotape, I noticed some key points about the Oobleck activity. Some students had initial misconceptions about the Oobleck. Because the substance looked like a solid, they made assumptions before they tested the material. Samantha directly stated, “Yeah, the Oobleck keeps its shape.” I asked her to show me, and when she tried, Samantha changed her mind because of her observations. Many students chimed in saying, “Yeah, it don’t [sic] keep its shape.” Near the end of the lesson, students were jumping at the opportunity to give me their conclusions to their tests. I was truly amazed at how excited the students were to learn about Oobleck. Through discussion, testing, and collaboration, the students learned from experiencing the lesson holistically.

After analysing the data collected from the Oobleck lab activity, I have come to several conclusions. I studied lab sheets, the video, field notes, and conversations with students to reach these conclusions. From examining the lab sheets that were collected from the students, it was apparent that the students used the scientific method during the experiment. First, they observed the Oobleck. How did it look? What did it look like? Did it smell? Then, the students hypothesised what kind of material they thought it was (solid, liquid, etc.). Next, the students devised four tests which they could use to determine properties of the Oobleck. After, they examined the Oobleck, conducting tests to prove or disprove their hypotheses. The students were sharing their ideas with each other and discussing the properties aloud in an orderly, investigatory fashion. In fact, they were anxious to give me their reflections and conclusions. Samantha, Steve, and others learned a considerable amount from this scaffolded experience because they were able to see, feel, touch, and discover the Oobleck for themselves rather than having someone tell them about it. Through inquiry-based activities and investigation, as in Ms Tate’s Spanish class, the students learned the information rather than memorising it for a test later in the week.

Synthesis

Through the observation and teaching of several students in particular, I had the opportunity to analyse just how these two students think and learn within school settings. From looking at these individuals, I witnessed a large amount of what Bogden Middle’s classroom teachers failed to recognise. Through this narrow lens of investigation, I learned that students’ classroom actions are often a reflection of their trained modes of thought.

Steve, one of the students who participated in my inquiry project, continuously asked other students for their answers because he thought that the ultimate goal in Math class was to write the correct answer on his page. After all, this would satisfy the teacher when she checked his work. Mrs Bernard saw that he had the correct answer and assumed that he understood what he was doing, congratulated him, and checked his page. Since the teacher never asked Steve about how he solved the problem; it was not a top priority for him. Mrs Bernard, his Math teacher, failed to stress that solving was the most important aspect within Mathematics. Steve honestly thought that if he had the right answer on his page, he accomplished what the teacher was asking him. Even when Steve wrote an incorrect answer on his page and the teacher called out the correct answer, he just erased and corrected the answer. No learning was involved! He wrote the answer, not having a clue how to solve the problem. During the next class when he took an examination, he performed poorly, failing to solve the pre-algebraic problems.

Although Steve had difficulty understanding how to solve Math problems, he flourished in his other classes, especially in Science. When the teacher asked inquiry-based questions, Steve practically jumped out of his seat to answer them because he realised that there were no wrong answers. In fact, in classrooms in which participation was strongly encouraged, students were more than likely to think creatively and desire to show their knowledge and thoughts on those particular topics. When process was taught to be more important than product, students actively engaged in the activity or experiment. They understood that they were going to receive credit for completing the whole activity, and not just writing down the correct answer.

From comparing these two classes, it was obvious that students like Steve must be engaged in the entire learning process in order to fully understand the material. He was not unique in this regard. All teachers need to foster more complete thinking and learning processes within their students so that they can thrive to meet their learning potential. Surprisingly, some students did learn within Sam's Mathematics class. Students, who view completing the entire process of solving the problem as important, realised that getting the right answer is only a portion of the task. These students succeeded in classrooms in which process was not overly stressed; however, in order to reach all students, a teacher must utilise multiple methods of instruction to reach students with varying learning styles. Paschler et al. (2010) of UC-San Diego found that rather than matching one's instruction to particular learning styles, one should provide an array of instructional methods and utilise particular models based on the content.

Samantha had one such mindset, as I have just described. She understood that it is very important to read, respond, and ask questions to understand the subject matter. She had superior study habits and participated in class; yet, she still struggled within Social Studies. Her teacher, Mr Smith, instructed his students via oral lecture. Students were told to copy down the notes from the front board and listen to the lecture. Samantha's learning style did not mesh with copying notes down from a board to gain knowledge; she wanted to be active and engaged in the lesson. She asked questions, which were quickly dismissed, because her teacher preferred to stay on course with his planned lecture and minimise interruptions. The lack of involvement from the students led towards lack of interest in content. Samantha wanted to participate in class; however, her teacher did not encourage it. As a result, she earned a D in Social Studies for the first nine weeks, since she had failed to learn a slew of facts about the history of Egypt.

Due to past experiences within school settings, students have particular trained modes of thought. As a teacher, one must fully explain what is most important within one's class and utilise multiple instructional approaches to reach all learners. For example, when I teach Science, I explicate to my students that I want learning to be exciting. When my students conduct experiments, I have them formulate hypotheses about what they thought would happen and record their observations while conducting the experiment. Then, they either affirm or negate any initial hypotheses, and write down a brief conclusion about what was learned from the experiment. Through these processes, students more fully understand why they were given the assignments. I continue to re-emphasise that one's effort and participation are more important than merely writing the correct answer. After all, there are always multiple ways of solving problems within Science and many other subjects. Therefore, it is up to the student to show the teacher how he or she arrived at the final answer. The teacher can then assess whether that student has completed the assignment correctly.

For a student to reach his or her learning potential, a link must be made between the thinking and learning style of the student and the teacher's methods of instruction. When teachers vary their methods to reach the learning styles of their students, the classroom environment will inevitably be more conducive for learning. Teachers cannot force students to succeed or guarantee that students will earn high grades, but they can bestow an opportunity to learn in school by differentiating their instructional techniques, targeting students' current levels of understanding on curricular topics, and infusing interactive assignments for physical and mental engagement.

The core finding of this inquiry project revolved around the ideology that it is imperative for a student's thinking and learning to be fostered through positive experiences; otherwise, the student will likely become hesitant to participate in the classroom. Students at Bogden Middle School enjoyed being in environments in which their thoughts were deemed important, as opposed to those that only promoted correct answers. By encouraging participation, discussion, and collaboration, students feel more comfortable at school. With an open mind they are free to share their thoughts, ideas, and feelings with their classmates. Through this process, they can learn to think about subject matter via multiple perspectives. In these types of classroom environments, school is exciting for students. When students develop a love to learn, school becomes an opportunity to exercise one's brain, not a dreaded requirement. Through inquiry-based learning, the ultimate goal of education can be attained – building lifelong learners.

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