“How Are My Talk Moves?” Supporting Inservice Teachers Through Vertical Collaborative Coaching and Learning of Science Communities

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Abstract

Talk moves are dialogic pedagogical tools used to enhance purposeful discussion and support student learning. However, employing talk moves has proven challenging for some inservice teachers because they struggle with things like student participation and time. In this article, we describe a professional development program’s adaptation of professional learning communities to support a cohort of K–12 science teachers from different school districts in improving their teaching practice and effectiveness. We discuss the structure of the program and the use of collaborative reflection, and we also provide teacher reflection notes Specifically, we focus on one vertically integrated community, including elementary, middle, and high school teachers, who chose to focus on enhancing their pedagogical practice of talk moves. Ultimately, the teacher reflection notes revealed that being a part of such a community motivated them to enhance their teaching practices, boosted confidence, and also provided them networking opportunities with other teachers.

Introduction

Dialogue, a term that is often misunderstood, is associated with semistructured talk that foster both thinking and understanding and engages participants in active listening and speaking (Edwards-Groves, 2014). Dialogic pedagogies have long been the interest of educators and researchers who claim, “that if it is structured and orchestrated skillfully, discussion can deepen students’ reasoning and understanding” (O’Connor et al., 2015, p. 111). It has the power to create synergetic environments in which teachers can readily assess students as they grapple with and make sense of what they are learning. This is important to a field like science education that is driven by a fundamental goal of scientific literacy development: to develop students’ abilities to apply and articulate science in various capacities (Dillon, 2009; National Research Council, 2012). Changing science standards have called for a shift from traditional teaching methods in which there is very little dialogue between teacher and student to active-learning methods in which students engage in dialogue and authentic activities (Inouye & Houseal, 2019). According to the *Next Generation Science Standards* (NGSS; NGSS Lead States, 2013), we want students to become citizens capable of participating in discussions related to contemporary STEM challenges and solutions (Banko et al., 2013).

Understanding the value of dialogue and its role in science lessons, our team of researchers and teacher educators embraced the opportunity to support a cohort of K–12 science teachers interested in enhancing their dialogic practices. We focus on a vertically structured CCLS group of teachers across grade levels from elementary to high school who set a goal to apply a practitioner's lens to a peer-reviewed research publication in an effort to employ talk moves during a physics lesson. We supported these teachers as they studied what the research community has to say about talk moves and applied that research in their classrooms. We found this to be impactful for the teachers, and in this article, we would like to share our experience and methods of support because others may find it beneficial.

Overview of the Professional Development Program

The professional development (PD) program described in this article is a branch of the 2-year Wipro Science Education Fellowship (Wipro SEF) that has been launched at various universities across the United States. This paper specifically reports on activities during the first phase of this fellowship. Building on the Boston Science Partnership's Science Education Fellowship, the Wipro SEF program is funded by Wipro and led by Dr. Arthur Eisenkraft at the University of Massachusetts Boston. The program is modeled after and guided by the professional learning community frameworks, as described by Dufour and Eaker (2009) and Loucks-Horsely et al. (2010), and the collaborative coaching and learning model implemented throughout Boston Public Schools (Neufeld & Roper, 2002). The concept behind professional learning communities is that such communities are designed to create communal environments for teachers to learn with a commitment to collaborative problem-solving and continuous assessment of teaching and learning, among other things (Dufour & Eaker 2009; Hamos et al., 2009; Siegel et al., 2019). Collaborative coaching and learning communities, which are inherently professional learning communities, are centered around classroom practice, drawing on theory, feedback, reflection, and inquiry (Neufeld & Roper, 2002). One of the unique features of Wipro SEF's PD model is the innovative adaptation of a professional learning community model to form Collaborative Coaching and Learning of Science (CCLS) communities. CCLS, a practice rooted in observation cycles, uses video recordings of classroom lessons to conduct honest reflections, ultimately leading to changes in practice (Karp et al., 2010). CCLS is designed to have teachers engage in the selection of "a course of study about science teaching and learning chosen by the participants, research, observations and debriefs, a review of student work, and reflective documentation" (Hamos et al., 2009, p. 17). These frameworks, therefore, focus on the act of reflective practice and, ultimately, leadership among teachers. Wipro SEF's PD model is thus built upon these notions of teacher support and development, and it incorporates activities strategically designed to improve teachers' practice and effectiveness in the instruction of science through the three pillars: reflective practice, peer leadership, and adult learning

In this article, we focus only on the first pillar or the program, reflective practice. To facilitate reflective practice, we adopted the process of observation cycles during which teachers observe each other's teaching practices through video recordings. This pillar supports

teachers coming together for 3-hour monthly workshop sessions that provide them an opportunity to think about their teaching and address various aspects of science teaching, such as student engagement in science and engineering practices. In the Wipro SEF program, CCLS communities are created for teachers to reflect on individual and collective challenges, provide peer feedback, and engage in collaborative inquiry using education research. Although learning communities of this nature are not new to the field, we believe that this PD models a unique way of challenging teachers by strategically placing them in both vertical (across grade levels) and horizontal (within grade levels) teams called V-CCLS and H-CCLS communities, respectively. During their first year, teachers are assigned to each community for one semester (V-CCLS communities in the fall and H-CCLS communities in the spring). Furthermore, we seek to foster stronger connections between practitioners and researchers by engaging teachers in focused studies of research literature while participating in CCLS communities. We understand that supporting teachers' engagement in studying education research literature is a valuable initiative because education studies have revealed that effective teaching requires an understanding of the research on how people learn, thereby bridging the research–practice gap (e.g., Clough et al., 2009).

Thus, the overall goals of the program are to (1) create and support a corps of K–12 science teacher leaders, (2) institute a culture of active and reflective instruction through the use of video and CCLS communities, and (3) improve teacher quality and effectiveness and improved relationships with partner districts in order to increase student achievement in science. Teachers are supported through the collaborative efforts of district science coordinators and mentors at host universities to provide insight on how the fellowship activities can be tailored to district goals and needs (Eisenkraft, 2021).

Description of PD Participants

The first phase of this PD functioned as a 2-year fellowship throughout the school year from August through May. Due to the rigors of this program, a substantial time commitment was required of participants, an average of 125 hours each year. The program targeted biology, chemistry, physics, and earth/environmental science teachers from Grades K–12 across several school districts. To apply, teachers were required to have a valid license to teach a science subject and must have taught science for a minimum of 3 years by the end of the current school year. In the case of elementary teachers, this can be a generalist certification. We specifically looked for teachers who intend to stay in their current position for at least the next 2 years in an effort to establish a commitment to change within their current districts. Based on these criteria, we selected up to 20 teachers annually as a cohort. Because the intent is to continue to grow program participation in each school district, previous participants could not be selected again.

Focusing on V-CCLS Communities

The vertical structure of discussing instruction across grade levels has been effective; hence, we have made the V-CCLS community the focal point of this article. Wipro SEF programs structure the V-CCLS communities to comprise four to six teachers from different school districts with at least one elementary, middle, and high school teacher. These vertical communities are also grouped by subject area (biology, chemistry, physics, or environmental/earth science); thus, each teacher is assigned to a group according to their area of expertise. The innovative feature here is the aspect of each V-CCLS community engaging in a self-selected course of study. First, each community agrees on a content topic that can be taught effectively across grade levels, and second, they explore research on a pedagogical practice that can be implemented during a lesson on the chosen topic. This two-part process is carried out during the first monthly workshop of the semester in August. During the workshop, each community of teachers meets to determine the common content topic and discuss the kinds of challenges they want to address in their classrooms. The main goals are for teachers to reflect on areas in the teaching–learning process that they believe they can improve on pedagogically and find commonality across grade levels. Once they have agreed on a pedagogical practice, teachers begin their peer-reviewed research publication selection process guided by their pedagogical practice of interest. We support this process by conducting a presentation explaining how to go about finding peer-reviewed research publications, which includes providing resources and examples of what constitutes a peer-reviewed research publication. This selection process can be likened to a small-scale literature review in which each teacher is responsible for reading and presenting two to three research publications to their V-CCLS community with a summary of why they think each publication might be a good fit. This process takes place over the course of a month, from August to September.

After the teachers have selected a peer-reviewed research publication, they collectively study and reflect on the contents of the publication and share a summary justifying their choice with university mentors. Each teacher is then responsible for creating and teaching a lesson focused on the agreed-upon content topic using the pedagogical strategy they have researched. They videorecord themselves teaching this lesson to share it with their V-CCLS community. Each community is encouraged to establish their own meeting schedule for sharing video-recorded lessons by creating a calendar for meeting and presenting. They are also advised to follow specific protocols when viewing and providing feedback on each other's classroom videos. The community selects a facilitator to help the community adhere to their norms, keeps time, and facilitate conversation. The teacher being observed completes a pre-observation form that includes the lesson objectives, the grade level, a brief description of the students in the classroom, and any questions the teacher has about their lesson. The teachers who are not presenting provide written feedback for that teacher by completing an observation and reflection form. Observation forms prompt teachers to include the following: (1) warm feedback (i.e., what went well), (2) cool feedback (i.e., potential areas to explore), (3) questions for the demonstration teacher to ponder, and (4) suggestions on how research could strengthen this lesson. Similarly, the reflection forms are guided by the

following prompts: (1) “As a result of this meeting, I . . . ,” (2) “What was most helpful was . . . ,” (3) “I could see how the lesson related to the research by . . . ,” and (4) “A suggestion for our next meeting is . . . .”

Once a schedule is set, the community of teachers comes together for meetings, otherwise known as CCLS debriefings. Each meeting is held for approximately 1.5 to 2 hours, and one teacher video is observed. Because our PD team is not present at these meetings, the sessions are videorecorded for later review. About 1 week prior to the meeting date, the teacher being observed is responsible for sending out the recorded lesson and their preobservation form. These debriefings are essential to the reflective practice because each teacher gets an opportunity to actively reflect on their individual practice with colleagues. The process for implementing V-CCLS communities is described in Table 1.

Table 1

A Guide for Implementing V-CCLS Communities (Center of Science and Mathematics in Context, University of Massachusetts Boston, 2014)

I. Establish V-CCLS team	II. Engage in observation cycle	III. Synthesize learning
Create a culture: • Set community norms. Determine a course of study: • Decide on a common learning concept for the lesson. • Decide on a peer-reviewed research publication that will guide pedagogical practice for the lesson. **Note:** The peer-reviewed research publication will also be the lens for observations. Discuss the peer-reviewed research publication to develop a common understanding. Establish an observation schedule among teachers: • Teachers decide on the dates to meet and have a debrief on their recorded lessons.	Based on the scheduled times, the teacher being observed should: • Record the lesson. • Complete and share a preobservation form explaining the lesson objectives, grade level, and a brief description of the students in the classroom prior to the meeting. • Share the video with the community prior to the meeting. • The community watches the video prior to the meeting. • During the meeting, the community debriefs about the video as a group (rewatching video clips as needed). • Each teacher completes a detailed reflection of the debrief meeting, including a self-reflective response on a reflection form and helpful critiques for the colleague observed on an observation form. **Note:** Be sure to use the peer-reviewed research publication to inform the debrief. The teacher might also share student work to connect to student learning.	Teachers should be encouraged to reflect on V-CCLS work and accomplishments by: • Revisiting the course of study and considering what insights were gained overall. • Encouraging teachers to revisit their personal reflections. • Encouraging teachers to share their written reflection notes on the colleague observed. Share successes through presentation and celebrate.

Studying the Experiences of a V-CCLS Community

The V-CCLS community of teachers presented here is described as the physics group. Within this community were five teachers (two elementary, one middle, and two high school teachers) with teaching experience ranging from 3 to 25 years. For their course of study, this community initially decided to broadly research dialogic pedagogical practices. This was

particularly interesting because although educators have noticed that classroom talk supports student learning, researchers struggle to find solid empirical evidence to confirm this link. Researchers struggle to accept findings as generalizable because of the significant variation of factors across studies, such as teacher characteristics, open discussion time, and the types of questions asked during discussions (O'Connor et al., 2015; Sedova et al., 2019; Tabach et al., 2020). However, when talks are well structured, Edwards-Groves (2014) proposes that "it makes 'thinking and learning visible'" (p. 4). With careful attention, teachers can detect or find traces of their teaching when engaging in dialogue with students, which can provide some insight into students' understanding during the learning process (Tabach et al., 2020). To achieve this, teachers are encouraged to embrace dialogic practices by deliberately and consciously using talk moves. We saw this notion being embraced among this community of teachers, who describe that after skimming through a variety of publications related to classroom talk and argumentation, they all agreed that talk moves are most practical and "grounded in usable strategies" worth studying (V-CCLS teachers, Written Summary on Research Selection). Thus, for their course of study, the teachers chose the content topic of thermal energy and explored research related to scientific argumentation through talk moves. One of the fundamental questions they sought to address was: "How are my talk moves?"

Michaels and O'Connor (2015) describe *talk moves* as specific phrases that aid in the "moment-to-moment" interactions between teacher and student (p. 112). According to Edwards-Groves (2014), these talk moves are tools in the dialogic practice that allow teachers to be intentional about pressing for reasoning, revoicing and repeating ideas, customizing the point, allowing wait time, and pushing students to think deeper—allowing participants in the discussion to reflect on the ideas of others as well as their own. Further, talk moves have proven to be particularly useful in science education by fostering argumentation; teachers can facilitate dialogue by challenging and prompting students to make claims and justify them (Tabach et al., 2020). As shown in Table 2, talk moves can be used to enhance purposeful discussion and support students in multiple ways.

Table 2

Types of Talk Moves as Described by Tabach et al. (2020) and Heyd-Metzuyanim et al. (2016)

Talk move	Description	Example
Share, expand, and clarify thinking	Asking students to expand on their own ideas, or the teacher revoices students' reasoning	• "Can you elaborate on what you just said?" • "What I'm hearing you say is . . . ."
Careful listening	Helping students to listen carefully such that they can restate or explain others' ideas	• "Who wants to explain Devon's idea in their own words?"
Deepen their reasoning	Challenging students	• "But how is this different from . . . ?" • "Isn't this . . . ?"
	Press for reasoning	• "Why?" • "What makes you say that?"
Collaborative thinking	Helping students think with others by agreeing or disagreeing with points shared in addition to soliciting additional viewpoints	• "Who agrees with Shonell's argument?" • "Who wants to add to what Jonette has said?"

The physics teachers group decided to base their reflective practice of talk moves on the publication "'Scaling Down' to Explore the Role of Talk in Learning: From District Intervention to Controlled Classroom Study" (O'Connor et al., 2015), which was published as a book chapter. In their summary justifying their decision, the teachers shared:

> This research could be helpful if we wanted to look at how to enhance speaking and listening skills in our science classrooms and seeing how explicit teaching of these communication skills can help our students be more self-aware. We were especially interested in the possible question stems, which we may be able to incorporate into our own lessons. This could have potential implications to enrich our science classroom discussion by highlighting claims/evidence reasoning as well as being able to dialogue about differences in understandings.

Our PD team noticed distinct processes happening in the teachers' thinking as they began studying the research. Initially, the community expressed that they approached reading with a practitioner lens and wanted a publication that would provide practical applications for their classrooms. When reading practitioner publications, one often walks away with tools or

practical uses for a model to add to their instructional practice. However, we noticed that the teachers shifted from gathering instructional tools to focusing more on how the tools they possess influences student learning. This helped to promote one of the PD's main goals of reflective practice because it required the teachers to examine lessons they had taught in the past.

For instance, in the group's summary of the publication selection, one of the high school teachers, whom we will call Ms. A, shared that:

> Page 10 in the article lists question stems used to promote academically productive talk, and I found this interesting to reflect upon the frequency with which I use these phrases in my own teaching, as well as to compare how effectively such classroom talk would increase student learning in my experience.

In conversations held prior to reading the peer-reviewed research publications, the teachers sought to share and trade their diverse strategies and did not really focus on impact. The teachers shifted to reflecting on and investigating their current practices of classroom talk instead of focusing on new question stems that could be adopted. Such a shift in thinking might be attributed to the fact that peer-reviewed research publications place more emphasis on studying models and processes to glean evidence of effectiveness and impacts. As this community unpacked the content of their publication, their discussion was more about reflecting on how the talk moves they employed in the past had positively influenced their classroom discussions. Additionally, given that this was a vertically aligned group, we noticed that the conversation became cross-disciplinary when teachers considered the benefits and uses of the research across various subject areas. The teachers also shared that they connected the research to the speaking and listening standards in *Common Core State Standards for English Language Arts* (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) as well as the NGSS progression of the Science and Engineering Practice of "Engaging in Argument from Evidence" (NGSS Lead States, 2013).

As the teachers transitioned from unpacking the peer-reviewed research publication to carrying out their lessons, it was evident that they were very intentional in structuring their classroom discussions based on insights from the two studies highlighted in the publication. For example, findings suggest that focusing on motivating students to expand and dig deep into their thoughts can be impactful (O'Connor et al., 2015). Hence, we saw that one of the elementary teachers, Ms. B, focused on "giving students the chance to elaborate on and support their answers" in an effort to promote scientific argumentation. The other elementary school teacher, Ms. C, shared her lesson and expressed that she wanted to place focus on "how students verbalize and discuss what they were observing." During her lesson, Ms. C asked students, "What do those sources of thermal energy have in common? How are those sources of thermal energy alike?" A student responded, "They used light, they used like … because you can burn the fish with it and other things like that." She then revoiced for

clarification; “Are you saying that sources of thermal energy use light and can burn?” The student agreed. After revoicing this student’s response, she then pushed other students to join in the conversation through agree–disagree and collaborative thinking talk moves (see Table 1). By doing this, we noted her efforts to use talk moves to encourage students to articulate themselves and elaborate on each other’s statements and to address the challenge of sustained participation in classroom discussions. High school teacher Ms. A commented on Ms. C’s lesson, saying, “I could see how the lesson related to the research by the revoicing she did, and [the] conversations her students were having directly aligns with effective talk moves.” This was a theme throughout each teacher’s lesson. Ms. C also shared, “I could see how [middle school teacher Ms. D’s] lesson related to the research by how the students supported their predictions and contributions with reasoning. The teacher revoiced student responses and encouraged further discussion about their claims and evidence.”

The most significant observation we noted was that the teachers made an effort to support student learning through talk moves by initially teaching how classroom discussion works because the literature they studied revealed that this can positively influence participation (O’Connor et al., 2015). It was apparent that they were working as a team to base their practice on what they studied. For example, Ms. A commended middle school teacher Ms. D, saying, “There was explicit teaching of how to talk and how to listen. This was brought up in the article, and when students are explicitly taught these skills, conversations can be richer and deeper.”

Teachers’ Self-Reflection on the V-CCLS Community Experience

Similar to Inouye and Houseal’s (2019) experience with collaborative and reflective practice, we saw that our teachers were constantly evaluating themselves for ways in which they could facilitate more impactful classroom discussion through talk moves. As the community delved more into collaborative reflective practice, we also saw that teachers were motivated by their colleagues to improve on their practice. On one of her reflection forms, high school teacher Ms. A shared:

> As a result of this meeting, I really am looking at the way I incorporate talk in my classroom. I am not sure if this is a result of the meeting or just the entire PD experience. I look for ways for students to engage in academic discourse and use the scientific vocabulary. I am also looking for ways to encourage all students to talk, not just a few.

Elementary school teacher Ms. C wrote:

> As a result of this meeting, I am even more interested in our COS [course of study]. I am realizing that this COS is more than just vocabulary and academic talk; the “talk moves” and argumentation techniques are life skills that are going to be beneficial in all areas for my students. Spending more time explicitly teaching and practicing discussion and argumentation will be well worth the deeper understanding, critical thinking, and communication skills they can gain and experience.

By analyzing her colleagues’ lessons, Ms. C also realized how responding to students with a press for reasoning talk move—such as “What makes you say that?”—can help students to argue and justify their claims. Middle school teacher Ms. D demonstrated this for her colleague by using the method of revoicing students’ responses in a very neutral tone, not indicating correct or incorrect answers, and pressing for their reasoning.

In terms of the vertical nature of the community, during a debriefing, a teacher from the elementary level, Ms. E, was very transparent in sharing with her colleagues that she was not feeling confident in her ability to engage in dialogue practices during a science lesson in comparison to those who teach science in higher grade levels. However, her community quickly reassured her that it was a learning process for all of them as well. After the meeting, she wrote in her reflection notes:

> As a result of this meeting, I gained insight into science in the upper grade classrooms. I also learned a lot of strategies related to the research that I will try to scale down and use in my first-grade classroom.

The teachers expressed appreciation for the opportunity to collaborate across grade levels and converse with other professionals in their field outside of the school setting. One thing they really seemed to enjoy was getting together to share new ideas and tools. Ms. A mentioned:

> During our meeting, it was good to hear the reasoning she [the teacher being observed] used for all the teaching decisions she made. I learned some new tools as well, which I hope to try out in my own classroom. There were a few other ideas which I am interested in exploring [like] talk anchor charts for the wall and perhaps scoring a conversation.

Challenges Observed

While teaching and during video analysis, teachers were encouraged to attend to the influence that their talk moves have on students and the classroom discussion instead of focusing solely on the execution of the pedagogical strategy. However, in reviewing videos of debriefings, we noticed that the focus of conversations shifted between solely analyzing the execution of their strategy and connecting the teachers’ use of talk moves to students’ responses. Initially, some teachers seemed more concerned about using specific talk moves instead of allowing students’ responses to influence their talk move decisions. For instance,

at least two teachers mentioned wanting to place focus on whether they were using enough higher order questioning in their discussion. Nevertheless, after talking with their community and drawing on the research, we saw a shift in their approaches. For instance, high school teacher Ms. A mentioned in her reflection, “I would like to look at how to incorporate more student-led questioning strategies . . . .” When teachers were focusing more on themselves or the wording of their talk moves, colleagues helped them to realize that although they may not have articulated questions as they anticipated, the talk moves employed still pushed the discussions in the right direction. We saw this with elementary teacher Ms. E, who said, “I initially felt that the lesson did not go well but took away some positives from the group’s feedback.”

As the PD team, we did not view these challenges as problematic but informative. We understand that teachers were being challenged to go to another level in their practice by not only thinking like a practitioner but also employing an investigative lens to evaluate their lesson in its entirety while connecting with the research literature. We noticed that the group’s efforts to draw on research were visible. For example, middle school teacher Ms. D expressed to her elementary school colleague, Ms. C, “I am wondering if [your] students understand the gas phase or are only good with the definition.” It was evident that she was assessing students’ reasoning through their responses to the talk moves, as O’Connor et al. (2015) suggest, rather than spewing out rehearsed responses. Finally, during workshop meetings, the teachers also highlighted challenges and frustrations, such as failed video recordings. However, we saw them rise up as leaders and take the initiative to support and push each other in spite of setbacks.

Conclusion

In this article, we present a way in which teachers wanting to enhance pedagogical practices, such as dialogic practices, can be supported through V-CCLS communities. We further present a guide for how such communities can be established by PD teams in Table 1. In particular, we illustrated how collaborative video reflection can serve as a key component in helping a community of teachers navigate the challenge of dialogic practices. Our team recognized ways in which we can improve the program to better support teachers. One of the main areas in which teachers needed more support was in selecting peer-reviewed research publications. Some teachers gravitated toward practitioner articles that seemed to be more familiar and accessible for them instead of data-heavy research publications. Therefore, we expanded our discussion of peer-reviewed research publications and their purpose in our workshop. We also provide examples of peer-reviewed research publications that others might find helpful for studying talk moves in the Appendix. Finally, we recognize that not all aspects of our PD are new to the science education community, but we hope to offer our unique implementation of active reflective practice within vertically aligned teacher communities while also anchoring this practice in education research. The pillar of reflective practice served as an approach to push the V-CCLS communities’ growth because it provided an opportunity for teachers to dig into the theory of their pedagogy using the

research literature while actively practicing the studied strategies in their science lessons. In particular, it would be beneficial for teachers who want to bridge the research–practice gap while "deepen[ing] their understanding and interpretation of what their . . . practice looks like in the classroom" (Eisenkraft, 2021). Further, given teachers' feedback, such as their self-reflections on the V-CCLS community experience, we argue that frequent collaborative reflection can provide both motivation and insight for those seeking to master complex aspects of teaching such as dialogic practices. Developers of PD programs can draw on the methods presented as a guide to focus on reflective practice of talk moves, or any other pedagogical strategy, using multiple cycles of video; to focus more deeply on the application of research in the classroom using multiple publication; and to focus on facilitating professional learning communities within contexts like the one presented in this article.

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Supplemental Files

Appendix-Taylor-Siegel.docx

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