Centering K-8 CS Teachers' Experiences During a Day of Dialogue for Teachers and Researchers (RTP)

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Abstract
We recently hosted a workshop that brought together 12 K-8 teachers who teach computer science (CS) and/or computational thinking and 12 CS education researchers. Since there is a known gap between practices that researchers study and practices that teachers implement in a learning environment, the purpose of our full-day workshop was to create a meaningful space for teachers and researchers to meet and explore each others' perspectives. The dialogue was framed around teachers' classroom experiences with researchers reflecting on how they could improve their research practice. The workshop, held during the 2022 CS Teachers Association (CSTA) conference, included multiple hands-on, engaging activities where teachers and researchers shared their knowledge, a panel for teachers to share their classroom experiences, and a panel for researchers to share evidence-based practices that teachers could use in the classroom. Feedback from participants was overall positive, with teachers increasing their appreciation for research and researchers increasing their knowledge about the importance of framing their findings in actionable ways that teachers can understand and act upon. In this research-to-practice report, we share details about the workshop and its activities, impact on participants, lessons learned, and recommendations for presenting similar workshops in the future.

1 Introduction

There is a known gap between practices that researchers engage in and practices that teachers implement in a learning environment. Efforts to move applicable research findings to the hands of teachers can be long and complicated for a variety of reasons [1]. There is a variability in communication styles among the two groups, with researchers often clinging to academic vernacular and teachers using everyday teaching terminology [2, 3]. Similarly, academics are more apt to share their findings within academic conferences and journals, and teachers are more apt to share their findings within teacher conferences and their own professional learning communities [4], further stifling the ability to share findings from their practice.

Studies of educator-researcher collaborations, such as Research Practice Partnerships (RPPs), have highlighted issues related to these gaps, including distrust among the two groups [5–7] as well as power dynamics when the groups work together [8]. With over 53 million K-12 students in the US alone [9], there is an urgent need for researchers to find the most promising solutions to

address the challenges that teachers face in the classroom. However, there are many open questions with respect to the teacher and researcher gap that impede progress [10], including:

- How do we ensure that researchers are identifying problems of practice to study that are important to teachers (not just convenient)?
- How do we *translate* research into a *language* that is accessible to practitioners?
- How do we study efficacy? Effectiveness? Efficiency?
- How do we ensure that there are continuous, productive dialogues between teachers and researchers?
- How do we ensure teachers have a place to share their evidence and experiences from their own classrooms?
- How do we develop trust among teachers and researchers?
- How do we ensure teachers have dedicated time to engage in research?
- How do we ensure that researchers have dedicated time to work with teachers?

Within the medical research field, there is a focused effort to not only move research into practice, but also to ensure that research design, from its very inception, takes *practice* into consideration. *Translational research* "...seeks to produce more meaningful, applicable results that directly benefit human health. The goal of translational research is to translate (move) basic science discoveries more quickly and efficiently into practice" [11, online]. Translational research is far removed from applied research, and instead embraces practice during each step and clinical trial phases to ensure fidelity to the problem being solved. Although in education our research and practice operate more independently, considering how we can work more closely to minimize the teacher-researcher gap can enable meaningful problems of practice to be addressed in research and shared with teachers.

To create a meaningful space for teachers and researchers to meet and explore some of these questions in the context of each others' knowledge and experiences, we held a one-day pre-conference workshop at the 2022 Computer Science Teachers Association (CSTA) Conference. In this research-to-practice report, we provide a description of our workshop design, participant demographics, results of the workshop evaluation survey, lessons learned, and overall recommendations for improving the workshop in the future.

2 Workshop Design

The design of the workshop was intentionally focused on bringing together K-8 CS teachers and education researchers to share their perspectives and knowledge with each other to start the process of closing the teacher-researcher gap. Prior to designing our workshop, we conducted a literature review to determine if there were best practices in designing a workshop that brings together teachers and researchers. In our search for research and materials, we were unable to find publications that covered this type of workshop. Finding none, we designed our workshop based on research conducted on ways to engage two or more groups. Our initial planning discussions surfaced our main tenet in the workshop design. We wanted to center and focus on the teacher

perspectives and experiences. For researchers, we wanted them to better understand the needs of the teachers while they were designing their future research projects.

2.1 Goals

We started our development of workshop activities by creating goals for the participants first and then designing activities that would achieve those goals. We wanted to ensure that the day was interactive, interesting, and hands-on. We also wanted to structure the activities in a manner that mitigated people talk ***at*** each other, while presenting a space for them to talk ***to*** each other, discuss with each other, and learn from each other.

We divided the goals for the participants into goals for teachers and goals for researchers. For teachers, we decided on the following goals:

- Develop or continue to develop their interest in K-12 CS education research
- Increase their knowledge about the research process
- Increase their knowledge about evidence that may help them improve their practice
- Increase their professional networks

For the researchers in our workshop, we set the following goals:

- Increase their knowledge about current, authentic K-12 CS classroom environments and problems of practice teachers face
- Increase their knowledge about the importance of framing their findings in actionable ways that teachers can understand and act upon
- Increase their professional networks

2.2 Recruitment and Incentives

We recruited CS teachers and CS education researchers to participate through social media and forums (ACM SIGCSE-members listserv, CSTA discussion forum, the NSF INCLUDES NETWORK, Twitter, and Facebook posts). Interested participants completed an online application that asked for demographic information, research background (teachers), and their research agenda (researchers) as well as their reasons for applying to the workshop.

Based on the responses, three of the researchers selected the participants to balance a number of factors:

- number of teachers vs number of researchers
- experience with educational research as a participant or part of research team (teachers)
- research topic focus (researchers)
- gender diversity of participants
- school diversity (public vs private, large vs small, urban vs rural, geography within the US)

Once the potential workshop participants accepted their invitation, we examined participants' areas of interest with respect to CS education and topics of CS education research and found two distinct areas: curriculum specific (e.g., CS integration, curriculum alignment, and developmentally appropriate practices in CS) and topics related to teacher professional development. We then centered the workshop and panels on those specific interest areas.

Table 1: Workshop Agenda as delivered on the day of the workshop

Time alloted	Activity
30 minutes	Light breakfast options; Form completions; Reflection question
30 minutes	Opening and introduction
45 minutes	Teacher panel
15 minutes	Break
25 minutes	Interactive Activity 1 (Reflection and Discussion)
30 minutes	Interactivity Activity 2 (Learning and Networking - Gallery Walk)
45 minutes	Lunch
30 minutes	Interactivity Activity 3 (Learning and Networking - Gallery Walk)
60 minutes	Researcher Panel
20 minutes	Break
25 minutes	Roundtable Discussions
35 minutes	Interactivity Activity 4 (Moving to actionable steps)
10 minutes	Evaluation form
20 minutes	Share out and closing remarks
Total time:	7 hours

We noticed at this stage that the K-12 respondents encompassed more than just traditional classroom teachers. There were media specialists, curriculum designers, technology coordinators, and professional development partners who were interested in our workshop and we invited them to participate.

2.3 Structure

In this section, we will discuss in detail the different activities we had the participants engage in during the workshop. Table 1 provides a general overview of the day including times for each of the activities discussed in this section.

As participants entered the workshop room, they were given forms to complete for reimbursements as well as a travel card that told them what groups they were going to be part of throughout the day. The purpose of the travel cards to ensure that the entire group of teachers and researchers interacted with each other throughout the day to increase networking and understanding of different experiences. We asked them to fill out the forms, grab any breakfast items or coffee they would like, and to then reflect on the following questions. We provided them sticky notes to write their answers upon and set up posters on the walls of the workshop room to place their answers. We asked teachers to reflect on the question *What questions or reflections do you have about K-8 CS education research*? We asked researchers to reflect on the question *What questions or reflections do you have about K-8 classroom practices*?

We officially started the day with a welcome presentation that included information about the rationale and goals for the workshop, community norms for the day, and a short presentation about what is known about the teacher-researcher gap and the challenges that exist.

Immediately after, we moderated a teacher panel (Figure 1). We asked four teacher participants prior to the workshop to take part in this panel. We chose panelists who came from a variety of

Figure 1: Teachers presenting to researchers during the teacher panel.

backgrounds (roles at school, grade bands, types and location of schools) based on their answers to the attendee interest form. We met with the participants of the panel a week prior to the workshop and asked them to prepare answers to the following prompts that would be discussed at the panel.

- Briefly introduce yourself and your classrooms (what kind of students do you have/your type of school)
- What are your top two problems of practice that you experience when teaching your students about CS? Can you give examples?
- What challenges do you face when ensuring that all of your students are engaged in learning CS?
- Have you noticed any CS learning gaps due to the pandemic that impacts student learning now? If so, explain.
- What do you wish researchers knew about your in-the-classroom practices?

After our first break, we divided participants into three groups of researchers and four groups of teachers. We gave prompts to both sets of attendees, asking them to reflect on position-specific questions and work with their groups to create posters for a gallery walk activity.

We asked the teachers to reflect on the following questions and use them as inspiration for their poster. The audience for their poster was the researchers.

- What are your unique major problems of practice teaching CS (that researchers may be able to solve)? Or, what has already been discussed in the panel that you want to explore more in your group?
- Are there other connections between the problems that potentially lead into bigger problems?
- Of these problems and connections that your group brainstormed, which are the most compelling that you would want researchers to study?

Researchers reflected on the following questions to use them as inspiration for their poster. The audience for their poster was the teachers.

Figure 2: Teachers presenting to researchers during the gallery walk.

- What surprised you from the teacher panel discussion? In what ways has the panel changed your ”researcher” thought process about teaching K-8 CS?
- Based on the information shared during the teacher panel, what would you want to know more about to help you inform your research?
- Of the items that you just surfaced, which are the most compelling that you would want to study to support K-8 CS teachers?

Once the groups completed this activity and created their posters, the gallery walk began. The groups of teachers presented their posters to the groups of researchers through a 1-minute elevator speech followed by 5 minutes of discussion and questions (Figure 2). The groups of researchers rotated until they heard each of the teacher groups' presentations. After lunch, another gallery walk was held, with the groups of researchers providing a 1-minute elevator speech and engaging in conversations with the groups of teachers who were rotating around the room.

After the gallery walks, three researchers participated in a research panel to discuss their research areas with clear application to the K-8 classroom. As with the teachers, we met with the researchers a week prior to the workshop and asked them to prepare an 8 minute teacher-practice-friendly presentation about some of their research that would directly apply to classrooms. The structure of this session was as follows:

- 8 minutes for researcher presentation
- 5 minutes of table talk within small groups in the audience
- 5 minutes Q& A between the audience and researcher (influenced by the table talk)

The researchers' topics included negative impacts of gender stereotypes in K-8 CS education, scaffolding CS curriculum for K-8 students, and strategies to include students with disabilities in K-8 CS education.

After the afternoon break and snacks, we created four groups of teachers and researchers mixed together and asked them to reflect on their learning and interactions throughout the day and create a list of ideas or questions that they were not yet able to get answered throughout the day in a shared online document. After the reflection exercise, we asked those same groups to work on creating actionable next steps for their professional work. We asked the groups to share out some

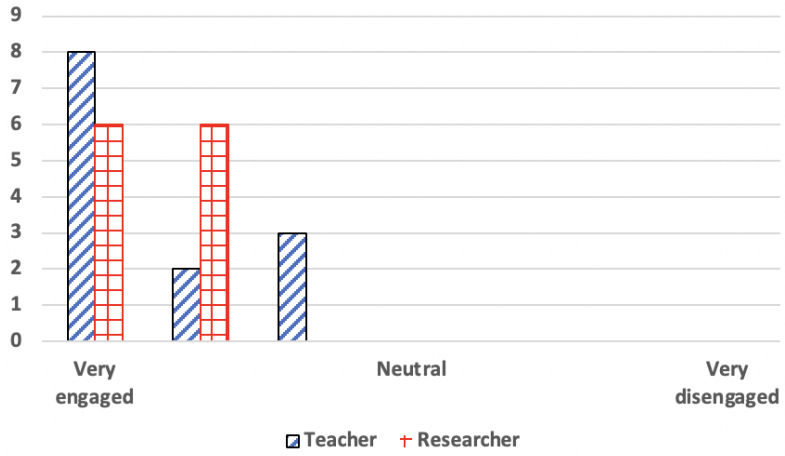

Figure 3: Engagement levels reported by teachers and researchers.

of their ideas for actionable steps before ending with an evaluation survey and brief closing remarks.

3 Workshop Participants

We accepted 15 teachers, 11 researchers, and seven individuals who a unique combination of both research and teacher roles. However, due to complications with travel (e.g., COVID-19 related, travel delays), only 13 K-8 teachers, 5 researchers, and seven individuals who held dual roles were able to attend the workshop. To balance the experiences during the day, all of the seven individuals who held dual roles were placed in the researchers group, giving a total of 13 K-8 practitioners and 12 education researchers.

The demographics of the participants included 74% percent identifying as cisgender female, 21.7% as cisgender male, and 4.3% as non-binary. Sixty percent of participants indicated that they were White/European descent, 12% were Black/African descent, 8% were Asian American or Pacific Islander, 8% identified as either Jewish, Indigenous to America, or Black and White, and 4% identified as East Asian, Southeast Asian, or Latino/a/e.

For the teachers, the distribution of grades taught were as follows: pre-K to 2nd grade (26%), 3rd through 5th grade (39.1%), and 6th through 8th (34.8%). Most teachers (46.2%) have been teaching 16 to 25 years, and most (46.2%) have spent 5 to 10 years teaching CS in K-12. There were 46.2% of teachers who taught at Title I schools.

4 Results of Workshop Evaluation Survey

We collected both qualitative (via open-ended questions) and quantitative data in a post-workshop feedback form. All participants reported that they were engaged to very engaged, with 62% of teachers and 50% of researchers reporting that they were very engaged (Figure 3). Likewise, all participants also found that the workshop was valuable, with 50% of teachers and 66.7% of researchers reporting that they found the workshop very valuable (Figure 4). Further, all participants reported that they would recommend or highly recommend a similar workshop to their colleagues.

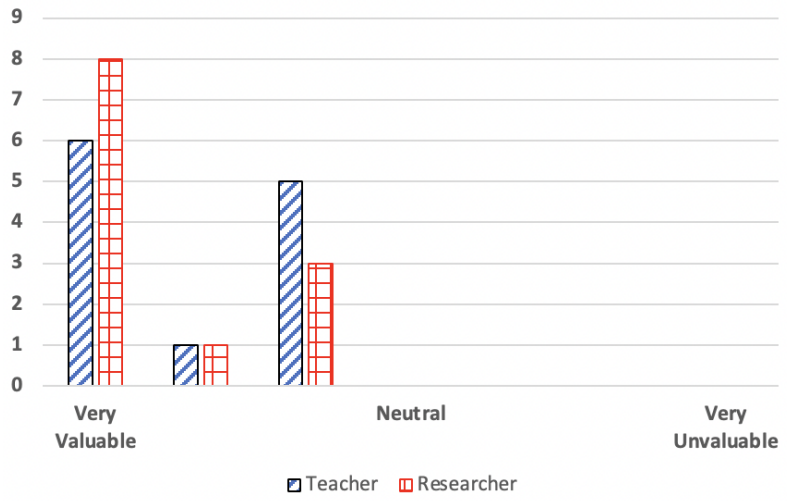

Figure 4: Workshop value reported by teachers and researchers.

4.1 Teacher Impacts

We grouped teacher feedback on the open-ended prompts into two categories: new knowledge learned and positive experiences.

4.1.1 Teacher New Knowledge Learned

All teachers reported that their knowledge about applying research evidence in practice increased, with nearly 1 of 4 (23%) reporting a very significant increase in knowledge. One teacher participant stated that they learned that there is ”not a standard definition of CS, but it would be valuable” and ”found out more information on how to access CS research and what drives the research.”

4.1.2 Positive Experiences

As noted in the quantitative responses, most of the teacher participants found the workshop beneficial and had positive experiences. As shown in Figure 5, 92% of teachers agreed or strongly agreed that they made meaningful connections with other teachers and with researchers.

One participant noted that ”[a]ll voices were heard. There is a shared understanding between researchers and teachers that there is a gap concerning CS education”. The concept of feeling valued and heard was echoed in other participant responses as well. Furthermore, the work created a space for ”teachers and researchers to get insights from both groups and make connections that are necessary to continue great conversations”. Finally, one participant summarized the positive experience of the workshop as ”[a]mazing discussion, quality reflections on important topics of CS in K8. This has generated lots of ideas and will provide lots of support in my role as a lead teacher.”

4.2 Researcher Impacts

Researchers comments to the open-ended questions primarily focused on how they can share their research with teachers to learn about CS implementation in classrooms. One researcher stated that ”we need to listen to our teachers to understand what they need and what their questions regarding

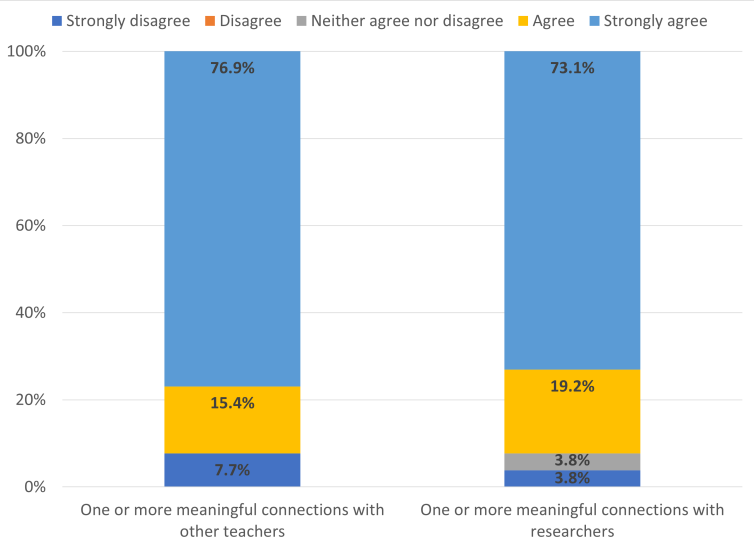

Figure 5: Results for whether or not participants felt that meaningful connections were formed during the worskhop.

CS education are. [I also learned] we need to work together to create safe spaces, open dialogues, and design studies, too." Another researcher noted that "[t]here are a lot of factors that influences CS instruction that is not within teachers' control. There needs to be flexibility for different situations in research interventions, curriculum design, and standard design, etc." Finally, another researcher participant stated, "[w]hat I took away is that there is a great need for research in the K-12 space to influence how teachers select curriculum as well as making other decisions about how to teach and what to teach in a stand alone CS course or in CS integrated classes."

4.3 Participant Suggested Improvements

We asked participants for suggestions on how to improve the workshop for future offerings. Feedback from teachers primarily focused on the concept of needing more time for discussions ("Teachers need more time to talk"). Another topic that was evident in the data was the need for more connections and knowledge of each other. For example, one participant suggested that we "provide bios and interests before the workshop and maybe sent out a list a week beforehand so people can reach out to each other and meet up during the workshop" and "create a shared space for conversations in the future outside of the workshop". Supporting this idea was the suggestion of providing name tags that indicated "teacher" or "researcher" for other participants to know who was in the room. Finally, one participant suggested more clarity around some of the instructions ("it would be good to give instructions beforehand and expectations, as I was distracted and confused at times").

5 Lessons Learned and Recommendations

5.1 Lessons Learned

Based on the feedback from the participants and our own observations during and after the event, we identified a number of lessons learned about workshops of this nature. We are broadly categorizing these into lessons on organization and structure, participants, and environment.

5.1.1 Organization and Structure

Based on the morning activities, we could have allotted more time and less time for the brainstorming of actionable steps at the end. We believed that the actionable steps would take more time to generate, but as it turned out, the discussions from the morning made it easy to identify those steps. The participants noted that more discussion time in the morning activities would be of more value.

Because we had allotted so much time for round-table discussion and brainstorming about actionable steps, the afternoon was not as structured. It was clear fatigue set in during those sessions. The times of those sessions were shortened from our original plan when we noticed this on the ground, but we feel that having more structure in the afternoon and activities with shorter duration may help combat some of that fatigue.

There was a fair bit of confusion around the travel cards that indicated groups for the participants. Feedback was that the participants appreciated being split up into various groups throughout the day because it forced them to talk to many (if not all) of the other participants. However, something in the presentation of the travel card caused confusion during the switching of groups. Further, we abandoned one of the planned group switches towards the end of the day the workshop because of all the moving around participants had already done.

Participants noted that they would have liked more time during the day without explicit structure for spontaneous conversation. Since participants were given a goal or topic to focus upon for the activities, conversations that went slightly away from the goals of the activity needed to be put on hold and sometimes not returned to.

In our gallery walks, we made sure all the researchers heard presentations of the teachers posters and vice versa, but did not schedule a time for the teacher groups to hear from all the other teacher groups and the researcher groups to hear from the other researcher groups. We solved this on the ground by asking the participants to do that during the lunch break, but that caused a spontaneous lunch conversation to be interrupted. In the future, we will make sure that all the groups get to hear from all the other groups.

5.1.2 Participants

There are a number of challenges with participants in these types of events. We are very happy that we curated our participant list with the application questions. This helped us to try to balance the voices in the room. Further, it was a first step in the process of the participants thinking about why the workshop could be valuable to them. We were also able to identify areas of interest of the participants before the workshop and work to customize activities to those in the room.

We were pleasantly surprised to have attendees from K-12 schools whose primary job was outside of the classroom. All school districts (particularly when looking across states) operate slightly differently and the people who have direct impact on classroom activities may not only just be classroom teachers. Being able to attract other members of the K-12 school community to hear their perspectives and experiences was very valuable and in future, we will work to better advertise the workshop for inclusion of those media specialist, curriculum designers, and technology coordinators to bring those experiences to the discussions.

The coaching we provided to the participants who presented in our panels throughout the day was

important. We designed the panels with explicit goals in mind and wanted to make sure the panelists understood those goals and were able to tailor their participation to meet those goals. However, we feel that we may have not done enough to help the researchers understand what type of information they should present to the teachers in the room. At points, the presentations from the researchers slipped very much into typical academic conference presentations, which wasn't a good fit for the teachers in the room. It is likely the case that more coaching may be needed for some academic researchers to understand how to present their work to a non-researcher audience.

5.1.3 Environmental Factors

When conducting an event of this type, there are certain things you can control about the environment and certain things you can't. However, we found ourselves thinking about several issues with regard to environment for these types of events that could impact their success.

If you have the ability to control the furniture and setup of the room where the workshop is happening, keep in mind what types of setups may be most conducive to your activities. With our activity, round tables may have been the ideal setup, but we weren't able to secure that for the event. We were able to get participants to gather "in the round" somewhat effectively, but round tables would have made our activities and the changing of groups easier.

In the post-Covid landscape, the realities of having some participants not able to attend in person is an ever-present possibility. Our event was held at a conference that was not hybrid, so they did not have infrastructure set up for hybrid sessions (appropriate A/V, wifi, etc.). Thus, we were not able to put together an effective virtual attendance option with the resources we had. In future, we need to think about virtual attendees and how they could be integrated much earlier in the planning process. However, their integration is also mitigated by the costs associated with the equipment needed to conduct a hybrid event.

5.2 Recommendations

Thinking about our lessons learned, reflecting upon the literature about the researcher-practitioner gap, and critically reading our participant feedback, we have come up with a list of recommendations for events like this in the future.

- Collect information about your participants before the workshop and use it to customize the workshop for the audience's needs.
- Consider making that information available to participants before the workshop starts.
- Consider that in K-12 schools, there are change-makers that are not classroom teachers and bringing them into the conversation adds additional perspectives.
- Coach participants on the audience for any presentation they are giving during the workshop.
- Forcing the mixing of participants can be positive and allow for interactions. Think carefully about how many times during the day it should be done and how you are going to explain it to the participants.
- Afternoon fatigue may be able to be averted with shorter duration activities with explicit goals.
- Consider the physical set-up of the room and how that can help or hinder your activities.

- Consider how to effectively incorporate virtual attendees.
- Schedule time for free discussion without explicit goals.
- Think about scheduling an optional meet-up of participants at some point in the near future to allow them to reconnect and discuss further after some time has passed from the workshop day. This could be later during the conference or online after the event.
- Set norms for the day that encourage active listening, questioning, and openness to learning.

6 Conclusion

We set out to create a respectful space for K-8 teachers and researchers to come together to openly discuss their roles in the education ecosystem and how can they learn from each other. Although we could not find any previously published literature on similar types of self-contained workshops, we chose to center the workshop on the teacher voice in an effort to emphasize that researchers play a supporting role to deliver high-quality, equitable CS education to students. We were pleased to see how productive the workshop was for both researchers and teachers and how well the participants engaged throughout the workshop to learn from each other. We will use this knowledge to improve the next iteration of the workshop.

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