Outcomes of Increased Practitioner Engagement in Edtech Development:

How strong, sustainable Research-Practice-Industry Partnerships will build a better edtech future

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Executive Summary

The last two years have seen record increases in funding to schools to support technology implementation and within the edtech market to develop new technologies. This influx of funding on both the school and industry sides creates an incredible opportunity for the field to shape the way that edtech is developed.

A new participatory research model, Research-Practice-Industry Partnerships (RPIP), presents a unique value proposition. Design processes have typically placed professional designers, not the end users, at the center of the work. In traditional design processes, developers scale products by investing heavily in marketing (to spur purchases) and training (to spur use). In some cases they invest in research to show efficacy, typically long after a product has entered the marketplace. On the other hand, RPIP aims to create better designs for scalable technologies that both meet the needs of educators and incorporate research from the learning sciences.

RPIPs create an intentional feedback loop that transforms the knowledge, action, or goals of all involved parties (Baker et al., 2022). As a result, developers can more effectively build inherent utility and user experiences, requiring less training to implement. Because RPIPs bring the learning sciences into the development process, evidence of efficacy and impact can immediately inform the development process itself. This yields a product more likely to be used, used appropriately, and have the desired impact for learners.

Digital Promise partnered with edtech startup Merlyn Mind and the University of California, Irvine (UCI) in an RPIP. The partnership between Digital Promise, Merlyn Mind, and UCI began in 2020, and in 2021, leaders at Merlyn Mind wanted to expand their engagement with educator practitioners to learn more about their perspectives on artificial intelligence in the classroom. In January 2022, Digital Promise formed the first Merlyn Mind Practitioner Advisory Board.

Based on data collected through a combination of surveys and interviews with staff at Merlyn Mind and members of the Practitioner Advisory Board, we suggest that increased educator engagement in edtech development yields positive impacts and new learning for all partic- ipants. Results showed that engagement between the Board and Merlyn Mind was mutually valued. Practitioners learned more about AI and edtech in general, and Merlyn Mind staff learned more about working with schools and educators, from professional development design to contract processes. Participants also benefited from the networking and collabora- tion that participation in the RPIP brought and felt it helped them grow professionally.

While we have seen many examples of commercial edtech products integrating research (Noakes et al., 2020) or leveraging user-centered and participatory design techniques with practitioners (Angevine et al., 2019), this partnership is unique in engaging both simultaneously and iteratively, and we believe this is a replicable model with benefits for all stakeholders. If edtech developers are willing to be bold and increase educator and researcher involvement in their design processes, we believe they can bring products to market that truly meet the needs of today's teachers, students, and classrooms.

Introduction

In the past two years, billions of dollars in funding has gone to school districts to support technology implementation. According to EdWeek Market Brief, global spending reached $19.4 billion last year, an increase of 21% from 2019 (Bradley, 2021). The influx of funding has caused an influx of edtech tools into classrooms. In a recent survey, school districts reported using an average of 1,403 edtech solutions monthly between August and December of 2021, with educators accessing an average of 86 technologies monthly (Fittes, 2022). This is the equivalent of adopting three to five years' worth of technology in just 12 months (Gillespie, 2021).

This increase isn't just reflective of existing technologies being implemented on a broader scale. The market has seen a record increase in funding for new technologies. In 2021, there was an almost 30 percent increase in private and venture capital funding to edtech startups, a sum of $2.2 billion, the highest investment ever in one year in the U.S. for edtech (Wan, 2021).

The industry has an incredible opportunity to shape the future of education through the way that edtech is developed. If developers are willing to be bold and bring third parties into their development process, they can bring products to market that center the voices of educators and demonstrate research-based outcomes.

Digital Promise partnered with edtech startup Merlyn Mind and the University of California, Irvine (UCI) in a new model for increased educator engagement in edtech development. This white paper provides an overview of that partnership and suggests that increased educator and researcher engagement in edtech development yields positive impacts and new learning for all participants.

Historically exclusive design processes

Traditional design processes, whether that process is for curriculum design, edtech product design, or products outside the education industry, have typically placed professional designers at the center of the work.

Over time, designers have made moves to take into account the needs and wants of users within the design process. For example, to examine impact on users and consider user preferences, some designers develop personas, fictitious representations of target users that aggregate features of that user, to utilize during the design process, a technique that has benefits for final designs (Miaskiewicz & Kozar, 2011). Yet, these techniques are not always inclusive or successful from a broader standpoint. Personas have been critiqued for oversimplifying, making assumptions about, and othering users, particularly because the designer is the one who develops the persona (Cabrero et al., 2016).

Without including actual users within the design process, it is inevitable that assumptions will be made and products will fall short of user needs because they are created by engineers who are experts in their field, rather than the true end users (Norman, 2013).

Leveraging participatory design

Bringing users into the design process allows the designs to be based on their lived experiences, provides opportunities to align the designs to their needs, and democratizes the design process. Taking a design justice stance, this means not only bringing in users but rather specifically including the people and communities who are most marginalized by the design and centering their voices. It entails decentralizing the designer and placing them in a facilitation role while honoring the expertise and knowledge of community members (Costanza-Chock, 2020).

One method for doing so is participatory design, a design technique focused on involving users within the design process and equalizing power structures between designers and users (Bjerknes & Bratteteig, 1995; Bødker et al., 2000; Muller & Kuhn, 1993). Participatory design techniques that centralize equitable representation and are purposefully inclusive of user voices have been successfully utilized partnering with teachers (Penuel et al., 2007; Lui & Slotta, 2014) and students (Coenraad, et al., 2021; Pinkard et al., 2017; Proctor & Blikstein, 2019). Involving educators during the design process allows the process to rely on their ability "to pay attention to broad goals for learning and for improving large-scale systems" (Penuel et al., 2007, p. 52) as well as their knowledge of what is happening in the classroom (Roschelle & Penuel, 2006). Past projects have included teachers in the design process through collaborative conversations (e.g., Carroll et al., 2000; Lui & Slotta, 2014), survey and interview input and feedback (e.g., Cooper & Brna, 2000; Leary et al., 2016), and implementation feedback on designs (e.g., Barab et al., 2001; Duell et al., 2014).

Research-Practice-Industry Partnerships

Research emerging from the Creativity Labs at UCI is building upon the idea of participatory design in edtech, coupled with evolving approaches to research-practitioner partnerships (RPPs). RPPs are defined as collaborations that bring together a diversity of expertise to work toward educational improvement or equitable transformation; they intentionally shift power dynamics in research so that both researcher and practitioner have a voice (Farrell et al., 2021). When industry is brought into the partnership, the resulting model is a Research-Practice-Industry Partnership (RPIP), where representatives from all three sectors collaborate to develop new learnings that benefit all parties (Peppler & Schindler, 2021).

Figure 1.

Research-Practice-Industry Partnership Model
Peppler, K. & Schindler, E. (2021)
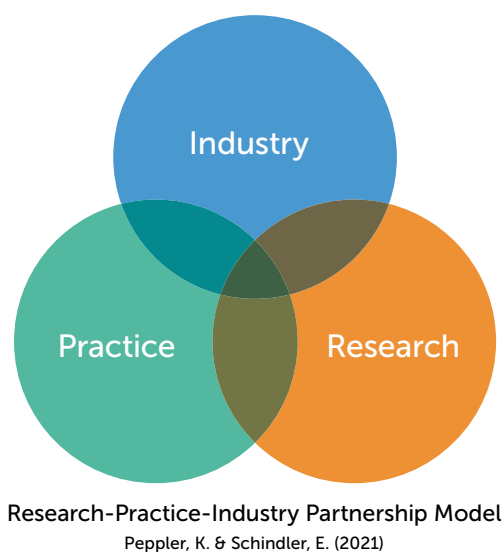
Dr. Emily Schindler, lab manager/associate director at Creativity Labs at the time of this project, explained, "One of the failures [of learning sciences research], so far, is that we haven't been able to adequately engage industry partners in the co-development space. Industry has a problem where they're making things that don't scale as well as they might hope, and so do the learning sciences" (Global Silicon Valley, 2021).

RPIPs acknowledge the strengths and challenges that face each stakeholder group and capitalize on those for mutual learning. Dr. Schindler explained the following in an American Educational Research Association (AERA) presentation (Schindler & Peppler, 2022):

- Industry-based tech developers have been able to scale product use and implementation in a way that has eluded many products or interventions developed in practitioner or research environments, but they often lack access to practitioner feedback and the strategic bandwidth to gather and respond to user feedback and needs.

- Researchers, particularly those who take a design-based approach, are well-versed in the methods for gathering and synthesizing user feedback to inform designs, but very few research designs scale and spread beyond niche environments and audiences.

- Practitioners are well-positioned to know how digital technologies could improve teaching and learning, but they are often so busy that they don't have time to gather and share that knowledge with anyone else, especially developers. Instead, practitioners become amateur technologists in their own learning environments, where tech tools either become part of their practice or find a space to collect dust.

Therefore, the RPIP model presents a unique value proposition. In traditional design processes, developers scale products by investing heavily in marketing (to spur purchases) and training (to spur use). In some cases they invest in research to show efficacy, typically long after a product has entered the marketplace. On the other hand, RPIP-developed products create an intentional feedback loop that transforms the knowledge, action, or goals of all involved parties (Baker, Weisgrau, & Brister Philyaw, 2022). As a result, developers can do a better job of building inherent utility and user experiences, requiring less training to implement. Because RPIPs bring the learning sciences into the development process, evidence of efficacy and impact can immediately inform the development process itself. This yields a product more likely to be used, used appropriately, and to have the desired impact for learners.

These types of partnerships require an upfront commitment from the industry partner to do things differently. As Dr. Kylie Peppler, associate professor at UCI, explained, "Bringing educators into the fold sounds so easy, but that's not easy. You have your programmers, you've got your designers, and they have a really clear vision. So how do they really, truly listen, especially to some of the mistakes? You have to build the company differently to do so, and you have to know the questions you want to be able to ask and the claims you want to be able to make" (Global Silicon Valley, 2022).

A Plan for Co-Design

Dr. Gus Schmedlen, president and chief revenue officer at Merlyn Mind at the time of this project, knew from the outset that Merlyn Mind wanted to center the voices of educators in the design of their product and provide educators with evidence of their product's effectiveness. Dr. Schmedlen explained, "A report from the Brookings Institution Center for Universal Education cited that less than 1 percent of the edtech solutions they cataloged were rigorously tested and evaluated both internally and externally by a third party (Vegas, E., Ziegler, L., Zerbino, N., 2019). "We didn't want to be that organization [who doesn't rigorously test using both internal and external evaluations]. We wanted to do something different; we wanted to do it the right way and make sure that we serve teachers with evidence and not with what we thought might help them in the classroom" (Global Silicon Valley, 2021).

The partners in this project also recognized the significance of this effort for an artificial intelligence product. AI, even more so than other data-driven technologies, raises questions in the minds of teachers, students, and parents. AI systems have incredible promise to support teaching and learning, but there are also transparency, privacy, ethics, equity, and bias concerns (Rainie, Anderson & Vogels, 2021). Through increased practitioner engagement, the partners hoped to increase educator knowledge of AI, while also increasing researcher and industry understanding of their concerns.

> *About the Product: Coordinating and managing the technology created to make classroom instruction clearer and more efficient can sometimes be overwhelming and distracting. Merlyn Mind created Merlyn, the digital assistant designed specifically for classrooms. Merlyn is designed to bring AI-enabled voice and remote control to classrooms to save educators time, alleviate techno-stressors, and enable teachers to focus on what matters most: their students.*

Activities

The partnership between Digital Promise, Merlyn Mind, and UCI began in 2020. Recognizing the importance of educator feedback in the development of its product, Merlyn Mind sought out Digital Promise because of its experience, networks, and reach. Digital Promise served as project lead, coordinating activities with Dr. Peppler and Dr. Schindler at UCI, who steered the research process and evaluation of the Symphony Classroom implementation. In addition to findings regarding the efficacy of Merlyn Mind in reducing teacher stress and saving time, Drs. Peppler and Schinder reported that the RPIP model was perceived positively by the educators participating in the study, the product development team, and the researchers themselves (Peppler & Schinder, 2021; Merlyn Mind, 2022). As this research yielded compelling findings, leaders at Merlyn Mind wanted to expand their engagement with educator practitioners to learn more about their perspectives on AI in the classroom.

In January 2022, Digital Promise formed the first Merlyn Mind Practitioner Advisory Board. Potential board members were recruited through Digital Promise's networks, and interested educators completed an application explaining their experience and interest in AI and emerging technology in the classroom. Final candidates engaged in an interview with Digital Promise staff to elaborate on their interest and experiences.

All six selected board members have extensive classroom experience, four of whom are in technology coach or administrative roles.

While prior AI experience was not a requirement, we sought candidates who were curious about the technology and open to its use in education. Beyond testing and determining the practical use of the digital assistant device, the board also considered issues endemic to the adoption of AI. Student privacy, feasibility of implementation, and equitable use are top of mind for educators as they consider AI as a classroom management solution.

The advisory board set to work in February 2022, attending monthly Practitioner Advisory Board meetings. These meetings consisted of group discussions with Merlyn Mind staff around topics including professional development, learning communities, and technical resource implementation. The practitioners shared suggestions about lessons they have learned through practice within their own schools, districts, and other learning communities of practices. The practitioners also completed surveys to inform these discussions beyond anecdotes. The survey results offered insights to other professional learning communities and advisory boards these practitioners belonged to.

Additionally, the Advisory Board members collaborated with Digital Promise researchers Drs. Judi Fusco and Pati Ruiz to inform a series of short articles on AI in the classroom[1].

Concurrently, we met biweekly with the Merlyn Mind team and UCI researchers who were continuing their original efficacy research program in two schools. During these meetings, we discussed the progress of the ongoing UCI research and connections to what we were learning from the new Practitioner Advisors. These conversations served as the engine of our RPIP feedback loop, providing transparency and clarity around the perspectives from each stakeholder group and leading to iterations in the plans and activities of each participant.

Data Collection

The data that inform this white paper are a combination of surveys and interviews.

The Practitioner Advisory Board members completed both a pre-participation and post-participation survey. The pre-participation survey gathered participant goals for their engagement on the Board. A post-participation survey was given toward the end of the six-month engagement. That survey consisted of a series of Likert scale questions on the personal and professional impacts of serving on the Practitioner Advisory Board and their perceptions related to the activities they engaged in as Board members. That survey was followed by a series of individual and small group interviews where we asked additional questions on the benefits of participation, the process of giving feedback on early drafts of blogs on AI, and the process of giving feedback on product resources directly to the Merlyn Mind team.

We also conducted interviews with key stakeholders at Merlyn Mind. From Merlyn Mind, we spoke with Evan Lock, vice president of business development, and Zach Rutta, director of teacher advocacy and community. In addition, we reviewed past panel discussions with UCI and Merlyn Mind partners at conferences where they spoke about the partnership. For the purposes of this report, all Board members' responses are anonymous.

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[1] "I'm a Teacher, Will Artificial Intelligence Help Me?" posted March 16, 2022. "How Can AI Systems Support Teachers: 5 Big Ideas from the Learning Sciences" posted May 4, 2022. The third and final article is a reflective piece on the future of AI in education and will be published at the end of June.

Impact

We have found that through an RPIP, an intentional feedback loop transforms the knowledge action or goals of all involved parties (Baker, Weisgrau, & Brister Philyaw, 2022), which can result in scalable technologies that meet the needs of educators, researchers, and industry alike. All participants who engaged in this project reported positive outcomes related to increased practitioner engagement. In the following sections, we describe several specific benefits participants discussed in the surveys and interviews, as well as areas for improvement.

"The Practitioner Advisory Board has provided valuable insight into how we plan, present, and organize our professional development and training."
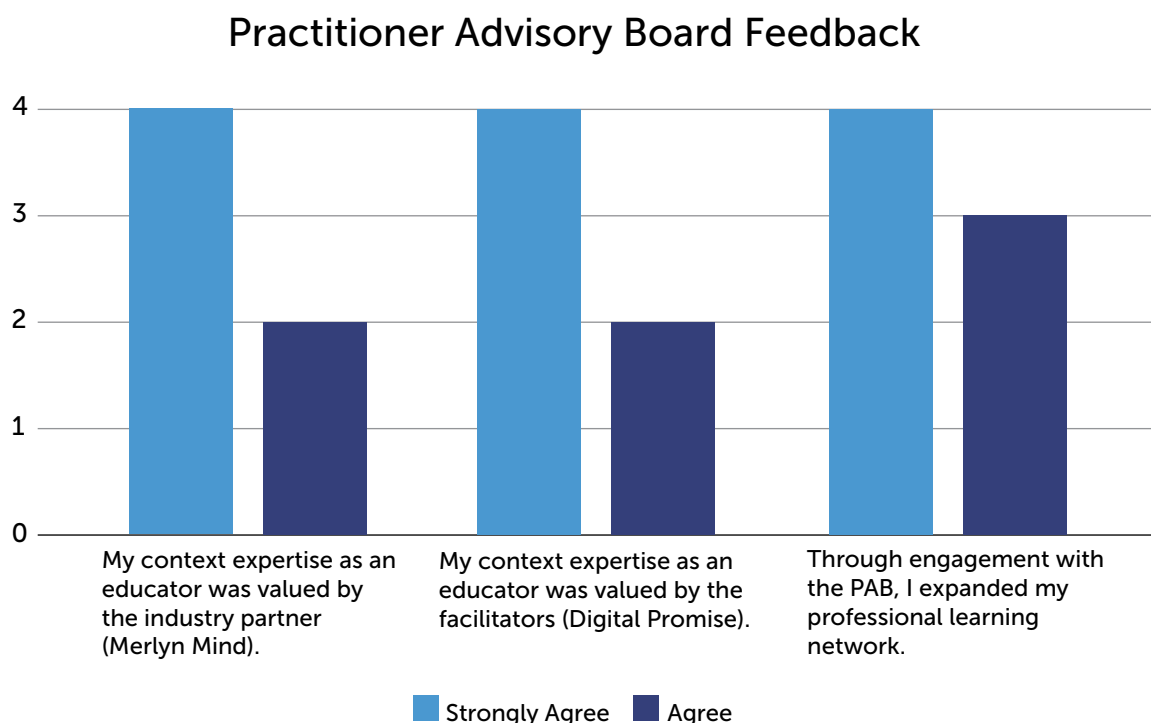
–Zach Rutta, director of teacher advocacy and community, Merlyn Mind

Engagement between the Board and Merlyn Mind was mutually valued.

When asked if engaging in the Practitioner Advisory Board was a valuable use of their time, all six Board members replied either agree or strongly agree. All agreed or strongly agreed that the topics they were asked for input on were relevant to them and that their feedback was taken seriously.

One Board member stated, "Over the years there have been corporations that want to get into the edtech space, and a lot of the products that they pushed out, it doesn't feel like there was a strong educator presence in it. It's more of a prescription from outside than a partnership, and that can be a little off-putting sometimes." Another said, "I've really enjoyed the people from Merlyn Mind. I feel that they're hearing us, and that's key. I feel like they're really taking the feedback and thinking about it."

Figure 2.

Practitioner Advisory Board Feedback

Legend: Strongly Agree / Agree

Categories:
- My context expertise as an educator was valued by the industry partner (Merlyn Mind). — Strongly Agree: 4, Agree: 2
- My context expertise as an educator was valued by the facilitators (Digital Promise). — Strongly Agree: 4, Agree: 2
- Through engagement with the PAB, I expanded my professional learning network. — Strongly Agree: 4, Agree: 3

From the industry perspective, Evan Lock reflected, "These teachers are in a world that is so different than the technology world. I think it's easy for a technologist to forget that. Getting involved with them early and often pays huge dividends. There's such a wealth of experiential knowledge, and it's so foreign to someone who is not a teacher. In a K12 context, it's a different world. To hear all of their experiences, that part is just incredibly valuable. I wish we had set it up much sooner."

Zach Rutta said, "The Practitioner Advisory Board provided a 'safe place' for our team to get insights from incredible educators. All board members were all very knowledgeable of the edtech space and were all eager to participate in sessions. They've provided helpful insight for several product/community/training projects and programs."

Practitioners learned more about AI and edtech

During the selection interviews, Board members share what was motivating them to join, and for many of them, it was a desire to learn more about AI. One board member shared that she wanted to "be on the cutting edge so that she can prepare her students for their futures, which will absolutely include AI." Another said, "I feel that AI is not being monitored or regulated to be free of implicit bias, and I worry about how it is being developed and used. This is motivating me to ask questions and want to be part of making the tools and assessments more meaningful to me."

In the post-participation survey, all six Board members stated that they either strongly agreed or agreed that through their engagement, they learned more about AI and its potential in education.

One contributing factor was the Board's interaction with learning sciences researchers and industry partners helped advance the Board's understanding of AI. One Board member said, "The most valuable part of participating in anything as an educator is the knowledge, but in this experience, we were actually able to talk to educators and also to people who aren't educators who have complementary understandings." Another board member reflected, "In teachers' college, we talked about the difference between theory and practice. Theory is the pedagogy, what people say works well, and then practice, what does it look like. You can't just have the ideas, but you also can't just be practicing without having any research base to what you're doing."

> "I loved the experience, loved the process. I learned more about AI in education, and now I really want to dive deeper into this and want to work with other companies and organizations, because as an emerging tech, we're going to see more and more of it."
> —Practitioner Advisory Board member

Practitioners also learned more about related technologies through their interactions on the Board. One Board member explained, "I learned about some innovative options that are out there that could make my life as a teacher easier. I think sometimes we just get lost in the grind of the day, so it's refreshing to be able to think outside the classroom about things that could make our lives in the classroom easier."

Industry partners learned more about working with schools and educators

The learning between the Board and Merlyn Mind was reciprocal. Two notable instances of this were with the agreements required for the practitioners to receive and use the device, and Merlyn Mind's onboarding and teacher support strategies.

With regard to the device agreements, Evan Lock explained, "We ran into delays and difficulties when we just passed [the contract] over to [the Board members], thinking that the teacher is going to do this; it's not costing anything. If there are issues, they'll come to us. That's just not the case. It's still going into the classrooms; we should have involved all of our account reps much earlier in the process. It reinforced that you can't just drop the contract on a school." In turn, Board members learned more about the process in their own school districts. One Board member said, "I'm always volunteering for projects or trying pilot things, so it's good to know what to look out for and what to get advanced permission on that I didn't know before I did this."

As the practitioners were learning more about AI and Merlyn Mind, Zach Rutta was learning about how to build an engaged teacher community. He explained, "Building trust and relationships with teachers and schools is essential for the success of Merlyn Mind. The Practitioner Advisory Board shared insights into the communities that they are a part of and how they are engaged, active members of this community. This was especially helpful as we built online community spaces and while we were planning our teacher appreciation campaigns. This also helped inform how we structure our training, involving personalizing our training to meet the needs of the specific school and/or teacher."

> "We didn't derive [the research] questions because the literature told us to. We derived those questions because those were the right questions to ask, both because they come from the educators and they're rooted in what the industry partner needs."
> —Dr. Kylie Peppler, UCI

Participants enjoyed networking and collaboration

In our interviews, Board members shared how the experience helped them grow professionally. One Board member stated, "There was a good mix of different folks and stakeholders, educators from different areas in the country. I'm learning a lot from the Board member who is in charge of the technology for her district." Another Board member spoke about how she had the opportunity to attend a conference and speak on a panel about AI. She said, "I would not have had that opportunity if I wasn't a part of this group. The networking I was able to do there was so valuable."

In one group activity, Board members gave feedback on pre-publication drafts of short papers on AI. One Board member said, "It was really interesting looking at [the topics] from their perspective and then adding the educator's lens. I found that collaboration to be pretty unique." Board members collaborated on the document in different ways. One individual expressed a preference to add their comments until others started because they wanted to be sure they were on the right track while another expressed the same preference just to have the opportunity to see how their colleagues responded. Still another individual expressed curiosity about what the process would look like if all educators read and added comments together, through a live discussion.

The authors also valued that collaboration. Dr. Fusco stated, "It was great having educators review the writing we did before it was published. We work to write in an inclusive style and narrow the gap between research and practice. It was good to see what educators resonated with or what they wanted us to clarify." Dr. Ruiz added, "We realize that the practitioners on the Advisory Board have already come a little closer to the Research and Development world by applying to be part of the Merlyn Mind Practitioner Advisory Board, but their perspectives as current practitioners who are in touch with students and their families was very valuable."

Opportunities for improvement

While the experience was overwhelmingly positive, there were several noted opportunities for improvement. We are publishing these preliminary results of our RPIP work after only six months of engagement with the Advisory Board, and due to procurement and contracting delays, advisors did not receive their devices during the first phase of this work. While practitioners had visibility to the product's design, onboarding process, and functionality, these didn't satisfy their curiosity and interest in working directly with the tool.

Practitioners indicated, on the whole, that the activities they engaged in through the Advisory Board were consistent with expectations established at the beginning of the project. One person, however, indicated they disagreed with this and indicated that they disagreed with the statement that they were provided with meaningful opportunities for collaboration. One Board member indicated they were not able to help Merlyn Mind refine their product based on real-world settings. While the practitioners imagined circumstances and situations where the device would or would not be useful, some felt that not having access to the device limited their experience and ability to contribute.

Planning for the possibility that device distribution will be impacted is critical. Device distribution is dependent on several factors, some of which are out of the industry partner's hands. In the absence of devices, the Advisory Board could consider and discuss various use cases, examples of specific situations where the device could be used.

We expect that continued engagement with the Advisory Board, including in-classroom product use will yield even more positive results. One practitioner expressed, "Six months might be too short." A longer engagement would not only help ensure that practitioners have opportunities to engage with the device but also create opportunities for deeper discussions.

We also recognize that the educator engagement described in this paper is just a small step toward the full execution and potential of participatory research and design. For example, currently, teachers are a proxy for their students in these partnerships.There is an untapped opportunity for partnerships with students. As more partnerships are established, it is also essential to center the voices of those who have been historically and systematically excluded as we create intentional feedback loops between edtech developers, learning sciences researchers, and the communities they serve.

The Future of Industry Partnerships

At Digital Promise, we are very excited about the possibilities that RPIPs hold for the future of edtech. In this white paper, we've described one such partnership and perceptions of its impact from those participating.

We have seen that increasing educator engagement in edtech development through RPIPs has transformative benefits for all parties. Through intentional feedback loops among developers, practitioners, and learning science researchers, **developers can make better products, researchers can create more relevant knowledge for the field, and practitioners can improve their practice**, both with the specific technology being designed and more generally in their technological pedagogical knowledge[2]. This means edtech goes to market that is more likely to be used, used well, and have positive impacts on learners. We believe that RPIPs are a replicable model, and through more ongoing partnerships of this nature, positive impacts will continue to be revealed and reinforced.

[2] Technological pedagogical knowledge is "An understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies" (Koehler & Mishra, 2009).

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