Investigating the Impact of Designing and Implementing Culturally Aligned Technological Systems on Educators' Ideologies

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Abstract. Culturally sensitive educational technologies may be able to help improve under-represented students' learning and engagement when they are deployed in the classroom. However, there may be challenges integrating these systems into the classroom when the cultural components they incorporate are heavily stigmatized in contemporary society. In this on-going work, we are using an action research approach to investigate how involving teachers in the design of these technologies may not only affect the effectiveness of these interventions on students, but also teachers' own ideologies surrounding the targeted stigmatized cultural components.

Keywords: dialect, classrooms, teachers, culture, AAVE, action research

1 Introduction

The pervasive achievement gap between Euro-American and African American students is perpetuated by challenging and inter-related factors, including access to resources, socio-economic status, and racism (and vestiges of racism) in contemporary society [1]. One common manifestation of these vestiges of racism is a *deficit perspective* within the classroom, where the school system views certain aspects of a student's cultural background as a *challenge to overcome* rather than an *asset to leverage* [2]. For example, many African American students come into school as speakers of a non-standard dialect of English called African American Vernacular English (AAVE), which is rarely represented, or even accepted, within the classroom. Despite that AAVE has great cultural importance for its speakers and linguists regard AAVE as valid and grammatically consistent, it is common practice for educators to criticize or even shame students for their use of this dialect [3], such as by saying that they are speaking incorrectly, or even that they sound like they belong on the streets. However, some evidence suggests that when non-Standard English speakers are allowed to use their primary dialect within the classroom or when this dialect is represented in learning materials, students may improve on their task performance, academic engagement, self-efficacy, and even their use of Standard English [4, 5, 6]. While this evidence is promising, standard teacher training programs rarely incorporate enough background in language variation to prepare teachers for methods of incorporating students' dialect diversity into the classroom. For this reason, some researchers have proposed that culturally adaptive educational technologies may be a productive way

for students to gain access to learning materials that may best support their learning [7, 8, 9].

Despite the potential promise of these systems, a notable challenge in the design of culturally adaptive classroom technologies is ensuring that they work with, and not against, the teacher. There is substantial evidence that teachers may be hesitant to incorporate classroom interventions that expose their students to stigmatized cultural behaviors such as non-standard dialect use. This is often due to lack of appropriate teacher training about cultural variation, misconceptions about the role of non-standard dialect use in their students' lives, and concern that they might accidentally cause offense and put their job at risk. As interventions are less likely to be successful if teachers do not believe that the systems are helping them meet their own goals [10], this may make even the most well-designed educational technologies unusable in real classroom settings. In this work, we are investigating how an *action research* (AR) approach may be used to both design technologies that best meet teachers' needs, while also helping them develop more progressive and positive ideologies about cultural variation. By action research, we refer to the cyclical process of researchers working alongside community partners (in this case, educators) to create knowledge by *learning through action* – taking steps, reflecting on the outcomes, and iterating together [11]. In AR, the researcher works alongside the community partners to open up productive lines of communication and facilitate activities expected to create change, rather than as a distanced observer of subjects. This method will allow us to work alongside educators to quickly iterate on different ways of incorporating a technology that can use AAVE into the classroom. This will help us understand what social and scientific impacts these interventions may have on the classroom culture, as well as investigate how this collaborative design process itself impacts teachers' ideologies about their students.

2 Previous Work on Culturally Aligned Technologies

Over the past two decades, there have been a small but notable number of educational technologies that have considered how to align to students' underrepresented cultural backgrounds. These projects demonstrate some of the potential scope for the impact culturally-aligned technologies may be able to have on students. For example, Pinkard's work on literacy learning for young African American students resulted in two systems, Rappin' Reader and Say Say Oh Playmate, which leveraged students' culturally-based knowledge of rhythm patterns and clap sequences to acquire early literacy components through writing rap lyrics [7]. Rap lyrics were also applied in Gilbert's African American Distributed Multiple Learning Styles System (AADMLSS) program, which is an intelligent tutoring system that additionally uses gaming components to allow students to practice math word problems where explanations are provided via rap lyrics that use AAVE features [8]. Other educational technologies have began exploring the potential impact of dialect congruence on students' performance in other non-standard dialects, such as Mohammad's Trinbago Adventures for Caribbean students, where students are allowed to customize the

amount of dialect features they hear (and other cultural references) within the system [9]. Each of these systems has demonstrated success with the underrepresented population they had targeted, including both academic performance and student engagement. However, the teachers' response to these systems, and the potential impact that the deployment of these systems in the classroom had on the teachers over time, was either not performed or not reported.

There have also been a small number of investigations that examine the impact of simply manipulating only the dialect used in a system. For example, in our own previous work, we have found that when AAVE-speaking 3rd grade students were exposed to a system that provided them with identical science examples in either Standard English or AAVE, students demonstrated an average of two standard deviations improvement on the quality of their own science reasoning when they heard the example in AAVE [12]. However, in follow-up interviews with teachers, we found that they would be very uncomfortable with deploying such a system to their students in the future, regardless of the potential learning benefits. The impact of a German non-standard dialect was also investigated with German adults using a virtual agent who either spoke in Standard or Non-Standard German, finding that participants aligned their own dialect to match that of the agent, but that the Non-Standard agent was viewed as more likable [13]. In our current work, we are performing a similar analysis, and investigating how 3rd grade AAVE-speaking students' language use, self-efficacy, language ideologies, and science achievement is impacted by a virtual agent who either exclusively speaks Standard English or code-switches between Standard English and AAVE based on context over the course of six weeks. Previous work with this virtual agent, Alex, found that even during one session with the character, students switched between dialect features based on context along with the agent – even though they did not perform this type of code-switching with their teachers [14].

3 Educational Interventions to Impact Teacher Ideologies

Our previous research (in preparation) has found that teachers would be very hesitant to expose their students to AAVE via an educational technology, regardless of the potential learning benefits to students. This is consistent with what other researchers have found about integrating non-technical curricula into the classroom. However, research suggests that if teachers feel that an educational technology is working to support their overall goals, it is possible that teachers may experience a *pedagogical evolution* [10], whereby the technologies in their classrooms may support and structure class activities that the educator previously did not think possible. The challenge, then, is identifying methods for integrating these technological systems into a classroom in a way that is able to work *with,* rather than *against,* educators.

To address this problem, some designers of non-virtual curricula have found it effective to host professional development workshops with teachers to help teach them about linguistic variation [4, 15]. When paired with this knowledge, teachers become able to not just host the intervention within their classroom (such as is often the case with technologies), but also become active facilitators of the learning activities with

their students. In fact, there is additionally evidence that when teachers have the opportunity to teach a pre-packaged learning activity involving linguistic variation to their students themselves, they develop a stronger positive change in their own ideologies compared to teachers who only attend professional development workshops [4]. These findings support the potential positive impact of action research on influencing teachers' ideologies, as action research involves many of these components, such as professional development discussions facilitated by researchers, reflection with other peer educators, and implementation of curricula within the classroom.

4 Investigating the impact of culturally aligned systems

The goal of this work is to employ AR approaches with urban elementary school teachers to promote a positive change in the often-negative classroom culture surrounding students from linguistically-diverse backgrounds. To do this, our approach will involve a combination of professional development workshops surrounding language variation, group reflection discussions about what learning goals they feel are important for their students to know regarding language variation, and hands-on activities to develop classroom activities to meet some of those identified learning goals. The classroom activities will involve the use of Alex, a virtual peer character capable of communicating to students about different science activities and some other social topics (e.g., video games) in either Standard English or AAVE (described above). Because one of the noted reasons that many teachers avoid talking about AAVE with students is many do not identify as speakers of this dialect, a system that is able to demonstrate dialect differences as a peer to the students may be a productive platform for helping to introduce this discussion. We additionally argue that providing educators with an existing technology that can be deployed differently in the context of different classroom activities may allow us to more efficiently iterate new ideas into the classroom.

In this planned work, we will work with approximately ten educators between two and four times a month for a full semester to facilitate and participate in these discussions and lesson plan design sessions. We will aim for teachers to deploy a new classroom activity surrounding the virtual character in the classroom approximately twice a month throughout the semester. We expect a large variation in the sorts of activities teachers design, for example, ranging from using the technology as part of a guided class discussion and worksheet, to a hands-on group activity where students are asked to make the character speak differently in different situations. The researchers and each of the teachers will observe how the students interact with the class activity, and bring their observations to the group discussion the following week. This discussion will spark teachers' iterations on their next class activity.

We will perform pre- and post-intervention measures including meta-linguistic awareness, language ideology, and dialect use for both teachers and students. These quantitative measures will be paired with qualitative measures of how different activities promoted different sorts of student interactions and responses and the types of interactions students and teachers shared throughout the lesson. We are currently

performing a pilot analysis of this process with three elementary school teachers at a local, urban 100% African American charter school to help prepare us for the upcoming semester-long study. Through this pilot and the full-length study, we aim to gain a better understanding of how culturally-aligned educational technologies, and the collaborative process of designing them with teachers, may impact the classroom culture in ways that support positive social change.

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5 References

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