

# **TEACHER AS CHANGE AGENT FOR CONSEQUENTIAL LEARNING: ONE KOREAN TEACHER'S AUTOETHNOGRAPHY ON THE DANCE-WITH-SCIENCE PROJECT**

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## **Abstract**

Consequential learning is an equity-oriented framework in which students create learning pathways to pursue what matters to themselves and to the communities they care about. In this paper, I seek to identify the moments of consequential learning from a story in which my students and I danced together to express a set of scientific knowledge: change in atomic configuration during photosynthesis while sustaining the total mass as consistent. Taking an autoethnographic approach, I examine the ways in which consequential learning was presented during the project and how I worked as a change agent to support it. Based on findings that show how students and I sought to transform science into a powerful tool to actualize what mattered to them while creating varied patterns of participation, I argue that, as change agents for consequential learning, teachers should take a stance on students as a rightful presence.

**Keywords:** equity, change agency, consequential learning, autoethnography

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Here is a story: my students and I danced with science during a school project (DWS project). The story entails precious moments that my students, colleagues, and I co-generated before, during, and after the five-day DWS project. The project was originally the brainchild of the school principal and teachers. During the preparation and implementation phase of the project, however, as my students became more engaged, they integrated their wants and expertise into it. Ultimately, they transformed it into something unique in which we danced together with science. Specifically, we co-choreographed a dance that expresses the process of photosynthesis, integrating scientific knowledge about atoms and the mass conservation during the chemical reaction. This study, taking an autoethnographic approach, relates the

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story of the DWS project to an equity-oriented conceptual framework, *consequential learning*. Accordingly, I seek to identify the moments for consequential learning from the story and reflect my role to support it. Two research questions guided this study:

- 1) Which moments emerged from the project and how did those moments present consequential learning?
- 2) How did I exercise the practice for consequential learning? What does this tell us about the teacher agency for consequential learning?

### **Positionality: Identity Expansion**

This study is a manifestation of my expanded identity from a teacher to a teacher-researcher. As a teacher-researcher, I examine how, in my past as a teacher, I exhibited change agency in support of students' consequential learning. I worked as a secondary science teacher in South Korea (SK) for twelve years before starting my PhD program in the United States (US) in 2016. Since I became a graduate researcher in the US and learned the equity-oriented pedagogical construct—i.e., consequential learning, I reflected whether and how my teaching had worked toward it. Analyzing my own teaching practices for consequential learning with comparative/reflective eyes was a most-necessary first step in calling for explicit and systemic support for consequential learning in SK or similar educational cultures.

The story of the DWS project was one of the highlights of my teaching years, but I did not reflect on the story in terms of educational research. It was a personally meaningful story that had a profound positive effect on my teaching practices as well as my relationship with students. I think I could have won the first place in a classroom teaching competition later in the same year based on the relationship we developed since the project. The story had changed something in my students and me, but I could not imagine that I would later conduct research on the story. Looking back, such a lack of imagination was due to my limited conceptualization of what it means to do educational research. I had understood research as a professional researcher's academic endeavor, beginning with a thorough set of research questions and designs as well as participants who have consented to be a part of the research. When I conducted the DWS project, I did not have research questions, designs, or participants. I did not seek to gather any data from doing the project.

Expanding my identity from a teacher in SK to a graduate researcher in the US, I encountered two kinds of tools for inquiry—*consequential learning* as a conceptual framework (Birmingham, Calabrese Barton, Jones, McDaniel, Rogers & Turner, 2018; Jurow & Shea, 2015), and *autoethnography* as a methodological approach (Boje & Tyler, 2009; Ellis, Adams, & Bochner, 2010; Youdell, 2010)—which helped me reframe my story as a meaningful case study for conducting educational research. First, consequential learning as an equity-oriented concept of learning motivated me to examine whether my proud story of the DWS project (and my teaching in general) really worked for equity and consequential learning. The words equity and consequentiality may exist in Korean, but their meanings as they relate to teaching and learning were an unknown-unknown to me; I even did not know that I did not know their importance. Since my understanding of those concepts was naïve, my teaching practice for consequential learning, if there were any, may have been sporadic and spontaneous. Nonetheless, if there were any moments that my teaching was working toward equity-oriented consequential learning, how did those moments present? To find the answers, I needed to examine my own teaching practices using consequential learning as a conceptual framework. Furthermore, relating students' consequential learning to teachers' change agency, I expect this examination to be also meaningful for other teachers who seek for change in their practice and researchers committed to support teachers' change agency.

Second, autoethnography offered me methodological grounds for reflecting on my story of the DWS project. Originally, I did not plan to implement the project as a well-structured educational research study. Rather, the story emerged and was authored mainly by my students' leadership. Moments of the story are unrewindable. The students who danced with me are scattered now, living their own lives. Four years have passed from when the moments first emerged. Thus, to me who did not have a methodological rationale for conducting research on this story, Youdell's (2010) autoethnography about her own ten-year old stories was a fresh surprise. She recounts, "... despite their taking place 10 years ago, they have been on my mind at various moments over the years, but I have not 'known' what to 'do' with them. ..." (Youdell, 2010, p. 97-98). I mirrored my own situation toward Youdell's (2010) living with the stories throughout her life moments while not knowing what to do with her past stories. Furthermore, her autoethnographic analysis to find the message in her past stories encouraged me to examine my past unknown-unknown of the DWS project's meaning. Thus, building on my identity expansion from a teacher to a teacher-researcher, I conduct this study, utilizing two tools for inquiry: consequential learning as a conceptual framework and autoethnography as a methodological approach.

### **Conceptual Framework: Consequential Learning**

Consequential learning is an equity-oriented approach, grounded in critical and sociocultural views of teaching and learning, which places human actions and interactions at the center (Gutiérrez, 2012; Holland & Lave, 2009). Such views attend to the relationality of power structure (Juwon, Teeters, Shea & Van Steenis, 2016; Lave & Wenger, 1991). Students' learning both shapes and is shaped by the relations with people, space, and resources, in which power structures are entrenched in a learning environment (Nasir & Hand, 2008; Rubel, Hall-Wieckert, & Lim, 2017). Studies reveal how the power structures of a learning environment can produce inequities through pedagogical approaches, for example, by essentializing student experiences—particularly those of marginalized students—in deficit-oriented ways (Howard, 2010); by positioning students as consumers rather than prosumers (i.e., producers, critics, and consumers; Toffler, 1980) of disciplinary knowledge and practice (Esmonde & Langer-Osuna, 2013); or by framing the outcomes of learning in ways that equate success solely with economic mobility rather than also considering social transformation (Nasir & Vakil, 2017). Consequential learning argues against such a hierarchical and binary perspectives and practices on students. Based on the literature review, I figure out three aspects of consequential science learning. First, students are legitimate members who have the power to create their own science learning. Second, science becomes useful when its knowledge and practices support students in learning about what matters to them. Third, teachers are agents who should make efforts to disrupt the power hierarchy and engage in continuous inquiry to enable consequential learning. I elaborate each below.

### **Students as Authors of Consequential Learning**

Consequential learning has grown out of a critical awareness of the inequitable power structures of a learning environment, calling for the transformation of the traditional paradigm of *who* the legitimate members are in deciding and defining *what and how* to learn (Juwon & Shaw, 2015; Bang & Vossoughi, 2016; Calabrese Barton & Tan, 2018). Consequential learning positions students as legitimate members who create consequences meaningful and useful to themselves and the communities they live in and care about. Particularly in informal science education, Birmingham et al. (2017) envision students as empowered creators of their own science learning, "who develop and leverage understandings

of science and their community as they work toward transforming local conditions” (p. 839). With their stance on students, they articulate consequential science learning as “learning opportunities where youth alter traditional patterns of participation in science (i.e., white-male dominated) to expand upon who and what areas of expertise are recognized and valued” (Birmingham et al., 2017, p. 819).

### **Science as Useful Tools for Consequential Learning**

In equitably consequential science learning, students make decisions and take actions on science that matter to their lives and their local community. They do so by 1) bridging—identifying the relevance between science and their own knowledge and practices across time and space; and 2) taking actions based on the bridged expertise. By bridging, students generate a relationship with science. By taking actions on the bridged relationship, students further empower themselves to determine which science knowledge and practices matter to them. They acquire the position of an epistemic authority and thus become responsible for their own rigorous engagement in science that matters to them. It is a transformation of the “relationships among science and community for themselves and others despite normative barriers experience in science” (Birmingham et al., 2017, p.818). Science, instead of playing a role as sets of authoritative knowledge and practices that students should obey, becomes a useful tool to serve students’ wants and expertise. Students work toward what they care about (Calabrese Barton & Tan, 2018; Feinstein, 2017), by “developing understandings and practices in science, as well as other areas of expertise, to take action based on their commitments to their community” (Birmingham et al., 2017, p. 819).

### **Teachers as Agents for Consequential Learning**

Teachers are one of the most crucial agents for student learning (Cochran-Smith & Lytle, 1999). Teachers interact directly with students on a daily basis. Accordingly, their practices are one of the most determinative elements of better support for students’ consequential learning. Those who seek to support students’ consequential learning should critically recognize and work for the vision of consequential learning with multiple actors (e.g., human actors—teachers, the students themselves, parents, and communities) and multiple practices (e.g., education policy, curriculum, programs, and discourse) (Juror & Shaw, 2015).

Consequential learning requires teacher agency –i.e., “the capacity of teachers to act purposefully and constructively” to direct the growth of themselves, colleagues, and their students (Calvert, 2016, p. 52). Teacher agency for consequential learning means, therefore, teachers’ capacity, willingness, and freedom to act purposefully for consequential learning. Teacher agency for consequential learning drives teachers to take actions for transforming pedagogical practices. They engage in consistent, practical, and communicative inquiry with students, enacting consequential learning “to break down the unequal power relationships across the spaces of their lives, as they seek to alter local and broader narratives regarding participating with science” (Birmingham et al., 2017, p. 819). Instead of normalizing unequal power relations without questioning, teachers need to exercise agency for continual pedagogical inquiry to enable consequential learning.

The inquiries that support consequential learning are not just the domain of teachers since consequential learning is relational between teachers and students. Teachers and students work together “to answer questions important to both, drawing on community resources in new and unexpected ways” (Goswami & Stillman, 1987, preface). Enacting teachers’ agency toward consequential learning should entail co-teaching and learning

between teachers and students “in order to bring about fundamental change in classrooms, schools, districts, programs, and professional organizations... to transforming the policies and structures that limit students’ access to these opportunities” (Cochran-Smith & Lytle, 1999, p. 280). Teacher agency for consequential science learning, therefore, will be exhibited as the capacity and willingness to engage in the inquiries with students about how science matters to students; what relevance they identify between science and their lives; and which actions they should take.

## Methods

I undertook an autoethnographic approach to analyze the story of DWS project. Autoethnography as an autobiographical genre of qualitative research attempts to “discover the culture of self, or of others through self” (Ricci, 2003, p. 593). Foregrounding the self, autoethnography recognizes author’s own stories as a legitimate source of inquiry (Ellis et al., 2010; Spry, 2001), “in exploring multiple layers of consciousness, [and] multiple selves” (Boje & Tyler, 2009, p. 177). Autoethnography challenges the traditional ways of doing and representing research. This approach conceives research as a “political, socially-just, and socially-conscious act” (Ellis et al., 2010, p. 1), embraces cases that often emerge spontaneously (Youdell, 2010), and encourages researchers to use varying forms of evidentiary base (Ellis et al., 2010). In so doing, auto-ethnographers seek to provide readers with the richness of resonating insights. Considering the affordability and strength of autoethnography, I chose it to analyze my story that I did not originally intend as a research project but that turned out to deliver critical messages for consequential learning.

## Context

This project took place in an urban public middle school in SK, where I worked as a science teacher. The school had a small number of students due to a local particularity; it is in a low-income community whose population is shrinking due to a drastic regression in the local manufacturing industry. There were 88 students in total (7th graders: 17 boys and 7 girls; 8th graders: 13 boys and 23 girls; 9th graders: 20 boys and 8 girls). Most of the students came up from the same elementary school. They, thus, had developed a long-term relationship. The small student population and close peer relationship provided a context that facilitated this story. The number of teachers was similarly small. There were two science teachers, including me. The other science teacher, Mrs. Choi, held a senior leadership position. I taught all grades and she taught the two upper-level grades.

In SK, one academic year is composed of a first/spring semester that generally runs between March and the middle of July, and a second/fall semester between the middle of August and the middle of February (except for winter break, which takes about three weeks in the second semester). During the academic year of 2015, this story of DWS project covers three phases:

1. May-June, for the project design. I incubated the ideas for a dance project for the Free Semester week in August.
2. July, for the project preparation. After the final exam of the first/spring semester was over, I started to plan the project more specifically with my students.
3. August, for the project implementation. We implemented the project during the first week of the second/fall semester in August.

### **Portfolio**

I have developed ethnographic accounts from an extensive evidentiary that I call a portfolio that includes multi-modal materials garnered across the three phases of the project and afterward. They include project-related official documents, classroom teaching materials, photos and videos captured during the project, private journal written during the preparation and implementation of the project about plans, moments, and questions, teacher evaluation results from my students and their parents in 2015, classroom teaching competition video in 2015, and reflection notes I wrote for this study from 2017.

### **Analysis**

I used the portfolio 1) to develop ethnographic accounts that illustrate the actors and practices on multiple scales, and 2) to identify and analyze moments that present features of consequential learning.

First, I developed ethnographic accounts that described the DWS project—who acted, what, how, and why events happened—by closely looking at my portfolio. The accounts also entailed my recent re-engagement with the moment. I sought to develop detailed accounts attending to the interactions of the actors and the practices at multiple scales of spaces and time. Second, I identified the moments for consequential learning from the ethnographic accounts that I had developed by reflecting on my portfolio. By moments, I mean the instances in which the actors who directly or remotely engaged in the project worked either toward or against offering consequential learning experiences for my students. Each moment contained various actors (e.g., my students and me, the school principal and colleagues) and practices (e.g., teaching, learning, dancing, curriculum, and policy) interconnecting with one another.

### **Findings**

In this section, I explicate three moments that I identified as working toward consequential learning during each of the three phases (i.e., design, preparation, and implementation) of the DWS project. I introduce each moment with a short vignette and answer the research questions. Table 1 shows the summary of findings, which is an overview of my answers to the research questions.

#### ***Moment 1 from the Project Design: “Why not dance?”***

*One day in May, I was passing through a corridor, thinking, “How can the project be more fun?” Since the school principal had proposed starting the Free Semester in the coming August with a weeklong project in which every subject would have its own program for seventh graders, the big topic for teachers who taught seventh graders was how to do it. The corridor was full of the energy of students who were dancing and singing. As soon as they spotted me, they quieted themselves because most teachers would warn them not to dance or sing in the corridors. Once I went far past, they started to dance and sing songs again. I smiled. Then, an idea sparked: Why not dance? I might be able to collaborate with the PE (physical education) teacher for it. Having conceived this idea, I talked with the other science teacher, Mrs. Choi. She asked skeptically, “how is it related to science?” Feeling another spark, I replied to her, “what about asking our students for ideas? They might have creative ways to connect them. If so, we can prepare the project together!”*

Table 1  
*Summary of Findings*

Project phase	The presentation of consequential learning	My practices to support students' consequential learning
Design	Indirectly expected at policy-level as what matters to students: <ul style="list-style-type: none"> <li>● Participation in learning to investigate one's talents and suitable future careers</li> </ul>	Noticing and foregrounding students' wants and expertise drawing on their cultural practices: <ul style="list-style-type: none"> <li>● Seeking to meet the policy and school's need (free-semester project) by embracing and promote students' knowledge and practice on dance</li> </ul>
Preparation	Students' using science to realize their wants and to peer-teach choreography: <ul style="list-style-type: none"> <li>● Asking a teacher (me) to change the project to support their wants</li> <li>● Finding the connection among scientific knowledge across three grades so that they can make dance to it</li> </ul>	Negotiating with different actors of school community to bring the change in school practices: <ul style="list-style-type: none"> <li>● Communicating with multiple actors who have different expectations about the project</li> <li>● Supporting students to develop the connected storyline of science knowledge and incorporating it into their choreography</li> </ul>
Implementation	Students' bringing one's expertise in varying areas: <ul style="list-style-type: none"> <li>● Recognizing themselves and being recognized by others as experts and meaningful members</li> </ul>	Supporting students to create and enact new forms of participation by recognizing students' different concerns, choices, and expertise: <ul style="list-style-type: none"> <li>● Listening to students' different concerns, choices, and expertise</li> <li>● Publicly recognizing/ appreciating different forms of participation students created</li> </ul>

**Presentation of Consequential Learning in this Moment.** This moment illustrates that consequential learning can be promoted at the policy level. Back then in 2015, the Free Semester was an initiative policy to make one of six middle school semesters free from summative assessments and prescribed curriculum. In general, the free semester is assigned to the youngest (i.e., seventh) graders' second semester in order to help students find their interested areas earlier and develop plans for high school choice, which was also the case of my school. During the Free Semester, students are presented with alternative curricula that allows them to explore their talents, competencies, and potential careers. On its website, the Ministry of Education in South Korea introduces the Free Semester policy by saying that it

“aims to enhance the happiness and well-being of students ... through experience-based subject activities (e.g., discussions, science labs, project-based learning) and Free Semester beyond-subject activities (e.g., career exploration and club activities).” Schools need to offer sufficient opportunities for students to meet a wide range of career paths (e.g., inviting experts from various fields). Accordingly, teachers are encouraged to support students in finding and developing their competency and talents through varied modes of teaching and learning.

This policy is the response to a problem embedded in Korean education. The Korean education culture has historically followed the centralized curriculum standards, summative assessments, and high-stake examinations for college placement. Such a culture has normalized content-heavy learning and competition-based evaluation while neglecting the consequences to students. To alleviate the issue, the Free Semester policy seeks to ‘free’ students from assessment to have them explore their talents and future careers instead of oppressing them with high-stakes examinations. The expectation is that students will connect and develop their Free-Semester experiences into their exploration of identity and future careers. Even though consequential learning at the student-level was not directly promoted, I relate the Free Semester’s systemic (i.e., policy-level) effort with the construct consequential learning because the policy was to engage students in the inquiry on consequential issues –i.e., what students do well and what and how they want to do by designing a potential career pathway.

**Practice for Consequential Learning in this Moment.** The above moment illustrates how the new policy program and followed school project challenged and encouraged me to attend to students’ wants and expertise that may drive consequential learning. On the one hand, the Free Semester policy challenged my old forms of teaching practice. Looking back, I had been a ‘normal’ teacher who emphasized that what I taught would appear in their regular examinations, thus, they should listen to and follow my instructions thoroughly. The Free Semester policy made me concerned about whether students would ‘gently follow’ my teaching. I had to rethink my normalized format for teaching practices in which I had held power as the mediator of the prescribed curriculum, high-stakes examination, and performance assessment. On the other, the new policy encouraged teachers, including me, to make changes or try new things in their teaching practices. Teachers can take advantage of the Free Semester to reorganize curriculums, make formative assessments genuinely interactive and relevant to students’ lives, and innovate their classroom teaching practices. Thus, when faced with the challenge of the Free Semester with feeling more autonomy as a teacher, I welcomed the ‘spark’ idea; integrating dance might encourage students to find the value in learning science.

Dance is a cultural practice relished by many Korean young people. Korean-pop (K-pop hereafter) music/ dance have permeated diverse aspects of young people’s lives. They enjoy watching K-pop dance group performance, and dancing and choreographing for themselves. People can easily access dance lessons through the on/offline instructional studios. Large online communities share dance-related information. With regard to the dominance of K-pop dance culture, however, there are legitimate concerns in several aspects such as the neoliberal and capitalistic assumption underlying the creation/recreation of the business-oriented K-pop culture, and sensational and/or biased ways in which music, lyrics, and dance present the body, gender, humanity, and ideas (Kim & Ryoo, 2007; Oh, 2014). While critically noting such legitimate concerns, as a teacher, I also noticed that my students’ dance culture represented resistance and self-expression. My students liked to dance. They

had formed large and small groups of dancers mimicking or revising K-pop dancers' choreography. Within the school community, dance was something that only the students, not the adults, possessed, valued, and shared. During break and lunchtime, students danced while singing songs. They instructed one another. They expressed emotions through dance. They united by practicing dance. Independent from the aforementioned concerns, dance provided some positive functions for my students. I was one of the teachers who understood them in that way.

***Moment 2 from the Project Preparation: "We want to dance too"***

*In July, when the first semester's final exam was done, I started a discussion with my seventh-grade students about the Free Semester project in the coming August. I asked them, "Would you want to dance for the project?" "Yeah, absolutely!" "Then, to do so, we need to find the connection between dance and science. We can dance, for example, about plants, as we have learned the topic this semester. Or we can choose other topics. What topic can we dance about?" "No. We should dance with science?" "Yeah... Since the project is about experiencing subjects in different ways and helping you to find connections between the subject and you by doing so. If you do not want to dance, we do not need to do so." Then, a few hours later, three of the eighth and ninth graders came to my office and claimed, "We heard you will be dancing with the seventh graders. We want to dance, too!" A bit embarrassed, I replied. "Oh, the project is for the seventh grader's Free Semester... and we even did not decide we would dance." "We know that. But we want to dance. You are our teacher too, not just for them. And we can figure out how to make dance relevant to science." "Don't worry about making up dance moves. We have ideas!" Wracking my brain for ways to help this happen, I told them, "Ok, let's think about this together. I should talk with other teachers first..."*

**Presentation of Consequential Learning in this Moment.** This moment shows the mixed responses from the seventh graders and the older graders to my initial proposal of dancing with science. On the one hand, seventh graders, who were included as project members from the first place, expressed their hesitancy in dancing about science. They liked that they could dance, but they did not know how they would dance with science. In fact, that was the same with me. I had little idea how to express the abstract concepts and processes of science through dancing. After some prolonged conversation, we agreed that we wanted to dance even though we still did not know how to connect dance and science. On the other hand, older-grades students, who were not originally included as project members, sought to be included. They wanted to dance as represented by the three who visited my office. They knew their expertise in dance and choreography. Since they wanted to dance—since dance was *what mattered to them*—they were willing to take on the task of identifying the connection between science and dance. They were ready to teach their peers how to dance. Other students said they could teach the science related to dance. In short, they wanted to use both their own cultural expertise and science knowledge.

The dance with science became a shared narrative among students who wanted to dance, which I identified as the emergence of consequential learning. Once I said, "I need to talk with other teachers first," the uncertainty (i.e., whether they could end up dancing or not) made them eager to find the connection between science and dance. Finding the connection became an important intellectual and motivational task for them to be able to dance. One group of ninth graders led the initiative. They started from choosing an anchoring

topic: photosynthesis. Later, they said they chose the plant-related topic since they knew it was what seventh graders were learning and the project was originally for seventh graders. From there, they ‘mapped’ the science content across the three grades. Looking at the concept of photosynthesis from the seventh-grade science book, they connected it to the mass conservation during chemical reaction –i.e., the concept they were about to learn in the ninth-grade science content. Another eighth-grade boy who liked pop music proposed a song to me for developing the choreography. The title was ‘Sugar’ by Maroon 5. His reasoning was that Sugar was the product of photosynthesis. In short, students practiced consequential learning, using science as a tool to work toward what mattered to them.

**Practice for Consequential Learning in this Moment.** Students’ communal efforts for developing the connected storyline of science to dance encouraged me to exercise the agency through the practice of negotiating with power figures (i.e., the principal, the senior science teacher, and the PE teacher) to bring the change in school practices. Right after I encountered the three older students, I discussed their idea with Mrs. Choi, my colleague. I told her, “not only the seventh, but the eighth and ninth graders also want to dance. I do not want to discourage them.” She cautiously recommended, “If we can do it, we should. You need to discuss it first with the principal. If she allows it, I can help you. But, still, my one worry is whether you can manage them (students).” Mrs. Choi was a supportive senior teacher who was a great advisor, but we were both in a hierarchical system wherein the principal’s permission is a prerequisite to earning the legitimacy of educational practices, and still the norm was that students are those who need teachers’ management under prescribed curriculum. When teaching and learning plans deviate from the authority’s intention and expectation, it is not easy to actualize them. I needed to find a way to both reassure and satisfy the principal and other teachers so they would not be concerned about the idea of students’ ‘dancing’ when it was not normally encouraged as an activity in school.

To make our plan more convincing to the principal, students and I developed a multi-grade lesson connected to the dance choreography (Table 2). To the connection students had found between photosynthesis (seventh grade science) and the mass conservation before and after the chemical reactions (ninth grade science), I added one more content piece—basic atoms (eighth grade science) that participate in photosynthesis. The science storyline for dancing goes; 1) under sufficient light conditions, within chloroplasts in the plant cells, 2) three kinds of atoms—Carbon, Hydrogen, and Oxygen—participate in photosynthesis as parts of different molecules. 3) Before and after photosynthesis, atoms change their configuration but do not change the total mass since atoms do not disappear, nor are new atoms added. We developed the plan for co-teaching science contents and choreography (Figures in Table 2). I brought the plan to the principal in order to discuss how to include older graders into the project.

The principal looked skeptical at first. I told her how surprisingly students showed unprecedented engagement in science to find the cross-grade connections in the science content. She also had a meeting with student representatives to ensure their responsible participation. Finally, she allowed other grades to participate in the Free Semester project. Though it was only one hour of the afternoon session per day, my students and I thought it was a successful negotiation. After the permission in the late July, we started to co-teach the science storyline in my science classes. For the dance practice, I asked a PE teacher to help us and she offered the PE hours for students to choreograph and practice. They came up with concrete ideas on how to connect dance and science, along with how to choreograph, teach one another dance movements as a big group that includes most students of the school.

***Moment 3 in Project Implementation: “May I do other things, not dancing?”***

*Not all of the students participated in dancing. There were students who did not want to dance, asking, “May I do other things, not dancing?” Their numbers grew until there were a dozen students. Initially, each of them had approached me either individually or in a group when I proposed the dance project in July. They said that they did not like dancing and/or they were afraid they were really not good at dancing. Since I did not want to force my students to dance, I appreciated them candidly sharing their concerns. We sought other ways for them to participate. I asked, “Would you be able to be a part of the project? If you think you do not want to even be a part of it, then we can find another way to make sure you are learning during that time.” They all said they wanted to participate but did not know how to do so. While preparing the project, we decided to explore what they could do. We worked together to think of ways each of them could contribute, aside from dancing, during the project week.*

**Presentation of Consequential Learning in this Moment.** Students differ. Even though most of the students were excited and willing to dance, some students were reluctant to dance. Recognizing the difference, I kept saying that students should feel comfortable in approaching me if any of them did not want to participate or wanted to be a part of the project in a different way. The students who did not dance found unique roles for themselves that were a better fit for them. They wanted to recognize themselves and be recognized by others as contributing members.

One of them found her job earlier than others did. During the preparation phase, she, as a ninth grader helped her peers and younger graders to understand the science concept related to the dance project. Since understanding was important to the group performance, students wanted to know the related science, and she was able to help them achieve that. During the implementation phase, she was an attentive observer of the dancers’ movements. She encouraged dancers and she came to control the music—at the request of the choreographers, she turned the music on and off.

One group of boys said that they wanted to produce the dance video. Dancers were very sensitive about being video-recorded ‘better.’ Dancers posed many requests to the video producers. Video producers patiently took the requests of dancers and worked to advance their skills in the video recording. When recording the videos they took the role of performance directors. They also took the responsibility to edit the videos and make 3-min video that showcases the Free Semester week including our dance performance.

Another girl found her job a bit later. During the preparation phase, while she was an attentive follower of the science content and choreography, she said that she still was unwilling to participate in dance. During the implementation phase, however, she was the person who took managed the t-shirts the dancers wore. I asked her to make sure everybody had the right size ordered, and to let me know if I needed to buy additional t-shirts. She took care of them, even setting up a spreadsheet to manage the number and colors of the t-shirts.

As we could from these cases, students found ways to contribute and exhibited their expertise to improve the project. Those jobs all played pivotal roles from which they recognized themselves as experts and were recognized as experts by others.

Table 2

*Multi-grade Lesson Connected to the Choreography*

Students' grade level	Lesson contents: Related scientific concepts	How the concepts were utilized for the choreography	The dance scenes that represent the concepts
7 <sup>th</sup>	Photosynthesis occurs under sufficient light conditions. In the case of plants, it happens inside of the cells that have chloroplasts, generating glucose chains-sugar and oxygen from water and carbon dioxide molecules.	Students expressed the processes of 1) Carbon dioxide molecules come into the plants through stomata (the pores on leaves or stems of plants for gas exchange), 2) Water molecules come into the plants through root cells, 3) Glucose molecules are generated inside of chloroplasts.	 <p>부리</p> <p>Figure 1. molecule absorption through root cells or stomata</p>
8 <sup>th</sup>	Molecules are composed of atoms. Atoms participate in varied chemical reaction. Three kinds of atoms—Carbon, Hydrogen, and Oxygen—participate in photosynthesis as parts of different molecules such as Carbon Dioxide (CO <sub>2</sub> ), Water (H <sub>2</sub> O), Glucose (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> ), Oxygen (O <sub>2</sub> ) molecules.	Students performed as one of three atoms or the cells that compose stomata or roots of plants. They expressed the different constituents through putting on T-shirts of different colors. Hydrogen: white, Carbon: black, Oxygen; red, Plant cells; green. Students chose those color matches referring to how their textbook depicts the atoms.	 <p>이 세 원소들이 광합성에 참여하는 주인공 원소!!</p> <p>탄소</p> <p>산소</p> <p>수소</p> <p>Figure 2. Introduction of three atoms that participating in photosynthesis</p>
9 <sup>th</sup>	Before and after a chemical reaction, atoms change their configuration but sustain the total mass (the number of each atom) as constant since atoms do not disappear, nor are new atoms added. Photosynthesis can be expressed as a formula; $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow (\text{Light energy}) \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	Based on the principle of mass conservation during a chemical reaction, each student could stick to one atom before and after the photosynthesis. Students expressed with their bodies that atoms change their relational positions while sustaining their mass and number of atoms before and after the reactions.	 <p>포도당</p> <p>염록체에서 흡수한 빛 에너지를 이용하여 포도당 합성!!</p> <p>Figure 3. The synthesis of one glucose in a chloroplast</p>

**Practice for Consequential Learning in this Moment.** This moment illustrates teacher agency exhibited as the openness to create the culture of mutual appreciation, through the practice of listening to, recognizing, and embracing students' critiques, concerns, and different ways of participation. That openness was for being a patient listener and recognizer, not acting as an authoritative and dominant figure, to support students' exercise of consequential learning that may emerge in varying ways.

Enabling the project on time while dealing with students' different and often conflicting desires/ideas required patience; I see the patience as a part of change agency. Patience was necessary to ensure that all the students understood the science concepts related to the choreography (e.g., the chemical reaction of photosynthesis), to continuously support student choreographers to create, polish, and teach the dance moves to all of the students, and to attend to students' inter-peer power dynamics entailed by conducting the big school project. In such a context, the patience to refrain myself from dominating the process draws on the trust in students' efforts and commitment for consequential learning.

In particular, I explicitly appreciated the students who took different forms of participation so that the majority of students who were taking part in the dancing could respect that other forms of participation were as important as dancing. Instead of offering one option for participation, I encouraged all of the students to be part of our student-led dance project in different ways so that each student shared in the learning consequence—the completion of the dance, the recorded dance video, and/or the learned science content on photosynthesis. Students were dancers, choreographers, science teachers, costume coordinators, photographers, video directors, schedule managers, mutual encouragers, and critical advisors. I trusted my students, encouraged them to take on different and multiple roles, and respected their contributions, asking for help and expressing appreciation.

## Discussion

The consequence of the DWS project is that my students danced with science. They learned the connected storyline of science related to photosynthesis, and they choreographed and danced based on the science story. In the literature review above, I described three aspects of consequential science learning: students, science, and teachers. How, then, do the findings from the three phases of the DWS project relate to these three aspects of consequential learning?

First, students spelled out what mattered to them (e.g., “we want to dance too,” or “may I do something other than dance?”). They authored their pathways of consequential learning when they identified what they desired (Tuck, 2009). Instead of passively accepting the limited opportunities, they sought to address their desire. I specifically attended to the action taken up by the older students (i.e., the eighth and ninth graders). As moment 2—“We want to dance, too”—illustrated, the older students were not included as participants in the project at first since it was being planned for seventh graders who would be starting their Free Semester. However, the older students who wanted to dance in the project created their own learning pathways while exhibiting different forms of expertise. Some of them found the connection among the science content and taught it to their peers. Based on the connection, some of them created choreography and taught their peers the dance movements. Still others found different ways to participate and contribute to the project. In each style of participation, students created, tested, revised, and negotiated their learning pathways by interacting with peers, teachers, the science content, and the choreography.

Second, science was a useful tool for students to realize what mattered to them. Science became important to the older students because it would enable them to be legitimate members of the DWS project. They used science as a tool, positioning themselves as an epistemic authority.

Even when I (i.e., the traditional curricular expert to my students) did not know how to make the connections within the science content, students formed inquiry groups by themselves to search for a connected storyline of science content across grades. As they identified the usefulness of science to actualize what matters to them, they exhibited an unprecedented engagement in science. When they finally figured out how the science content in the different grades could be connected and expressed as choreography, they exclaimed over the joy of achievement. They taught me that the concepts of photosynthesis, atoms, and the laws of chemical reaction could coherently inform one another. The science concepts that had previously been disconnected when taught by teachers in grade-bound classrooms became a meaningful story that has consequential meaning to students' choreography.

Third, the story illustrates the ways I exhibited change agency by seeking to disrupt unequal power relation. Initially, the Free Semester policy urged me to disrupt the power I held. I was challenged to change my old teaching practices that gave me epistemic power over students. In doing so, I recognized dance as the students' cultural practice and responded to it by respecting and foregrounding their expertise in dance, choreography, and other forms of participation, through which I see the features of culturally responsive practices (Kea, Campbell-Whatley, & Richards, 2006; Ladson-Billings, 1994; Villegas & Lucas, 2002). The recognition of students' culture sparked me to imagine "why not dance?"; that is, to consider integrating dance into the school project. To realize the DWS project, I kept communications open with the principal and my other colleagues, asking them for help as needed. I also continued to communicate with students to facilitate their various forms of participation.

I should specifically explicate this 'teacher' aspect of consequential learning. As illustrated so far, a teacher's change agency entails continuous and complicated works of disrupting and negotiating power relations. If so, which stance should the teacher agency for consequential learning ground in? I suggest an equity-oriented stance on the students:

*Rightful Presence.* The construct, rightful presence, emerged from studies that concern critical justice for the communities of borderland and refugees in welcoming host countries (Squire & Darling, 2013). Even though the refugees who temporarily settled in the host countries gain limited institutional rights, such rights do not guarantee the full citizenships, but may regenerate varying forms of injustices. While the majority of host countries might officially position themselves as benevolent neighbors, there still exists the host-guest line that confines newcomers as guests who have little ownership of spaces and choices (Barnett, 2005).

This host-guest binary can be projected to the context of traditional teaching and learning. At best, students would be guests who are more welcomed when they try to conform themselves towards the majority culture. Power dynamics are at play in the classroom, where teachers hold the authority who determines the rules, routines, knowledge, and practices. In particular, science classrooms that prioritize disciplinary content and practices are prone to becoming spaces that marginalize students both epistemically and ontologically. Epistemically, students are implicitly forced to accept the dominant ways of science knowledge and practices without question. Thus, ontologically, students are only legitimate when they function as successful receivers of what the science classrooms prepared to give them. Here, without realizing it, teachers might play the role of an oppressor who represents the majority culture, routine practices, and rules.

Rightful presence is a perspective that views students "as [having] legitimate membership in a classroom community because of who one is (not who one should be), in which the practices of that community work toward and support restructuring power dynamics toward more just ends through making injustice and social change visible" (Calabrese Barton & Tan, 2019, p. 3). Students are a rightful presence who can claim to have consequential learning

experiences not because they are expected to do desirable things, but just because of who they are. Since students are a rightful presence, what they want from their learning—in other words, what matters to them—should be of the utmost concern to the teachers who aim for consequential learning. This construct positions students not as guests but as authors of their own learning. Doing so associates students' cultural knowledge and practices (e.g., in the DWS story, the students' expertise in dance) with disciplinary knowledge and practices (e.g., in the DWS story, photosynthesis, the concepts of atoms, and mass conservation during chemical reactions), thus, enabling students to develop a hybrid of cultural and disciplinary knowledge.

Coming back to my story, I found that I needed to re-enquire whether and how I, as a teacher, positioned my students as having a rightful presence during and after the project. On the one hand, it is true that, during the project, I figured out what my students wanted to do and I sought to reflect my students' voices to transform the project. On the other, my efforts to respect what mattered to my students were not sustained after the project. I cannot deny that my pursuit for consequential learning may have been related to an external purpose: to have the project completed successfully by making students to be collaborative with me. I expected that my students would listen to me as much as I listened to them. The purpose was temporary and external rather than equitable and consequential in long term. As I mentioned previously, my relationship with students following the project became more communicative and collaborative, but the reciprocity of relationship was still limited. I considered the newly developed relationship as an opportunity that could 'benefit' my teaching (e.g., winning first place at the classroom competition or earning a good result from students/ parents' annual evaluation) rather than as a way to encourage my students to seek other opportunities for consequential learning.

This self-reflection regarding rightful presence is less meant to blame myself, but more as a means of encouraging all of us teachers to critically self-examine our practices in terms of our stance on students; that is, how we teachers view students and whether we acknowledge their presence as already being fully rightful. Since rightful presence is still a novel construct in education research, we need to further investigate the meaning of rightful presence in terms of consequential learning.

## Conclusion and Implications

### *Teachers as Actively Vulnerable Beings*

This autoethnographic study posits the ways in which a teacher exhibits change agency for consequential learning in order to challenge the old forms of teaching practices and disrupt unequal power relation. Change agency for consequential learning was enacted through multiple practices: 1) noticing and foregrounding students' wants and expertise drawing on their cultural practices; 2) negotiating with different actors of school community to bring the change in school practices, and 3) supporting students to create and enact new forms of participation by recognizing students' different concerns, choices, and expertise. Considering the construct rightful presence, I critically reflected the extent to which I supported students' rightful presence before, during, and after DWS project, and discussed that teacher agency for consequential learning should ground in the notion of rightful presence.

Laying the foundation for a rightful presence is not an easy task; it may make teachers be vulnerable. Before the project, I was usually far from vulnerable. I was a confident and competent teacher. My teaching and assessment plans were clear, certain, and firmly set. However, during the project, my effort to integrate students' wants into the project made me vulnerable. Each phase of the project was full of uncertainty, unexpected events, and embarrassment. Moreover, even though I thought I was doing my best to support what mattered to my students, I now am

realizing that the support was limited in terms of rightful presence because I focused more on my own benefit rather than continuing to support consequential learning after the project. Such a late realization made me feel embarrassed, and thus, again vulnerable.

However, we may need to embrace the vulnerability as the feature of teacher's effort for consequential learning. Consequential learning centers on what students claim as what matters to them. Their desires vary across individual students; thus, they frequently compete with one another, and/or clash with policy, teachers, or parents. That will create conflict, tension, or misunderstandings as the source of teachers' feeling vulnerable. If the vulnerability follows the practice for consequential learning, I encourage us teachers to be more actively being so, through which I believe we teachers can engage in much more transformative communications with students to disrupt traditional power relation and redistribute epistemic authority.

### ***From Spontaneous to Mindful***

When I was a teacher in SK and when I did the DWS project with my students, I had little understanding on concepts such as equitable and consequential learning. This might be similar for other Korean teachers. In the larger scale of the education culture in SK, the educational norms have focused on short-term academic achievement represented by grades and the rankings of high-stake examinations. The ultimate question about why students' academic achievement matters, and what teachers should use as the groundwork for their students' learning consequential to their lives has been asked less often. Thus, teachers' lack of consciousness about equity and consequentiality may have been inevitable under an educational culture like SK's, which centers on the students' normative achievements and the teachers' accountability for them.

However, as I learned through the story of the DWS project, even when teachers are not aware of the concept, they may have made practical efforts that can be considered as the support for students' consequential learning. If teachers are encouraged to be more explicitly aware, they may be able to exhibit their change agency for consequential learning more openly and frequently. In this regard, I particularly suggest that the 'awareness' on the importance of students' consequential learning and teachers' role as change agents should be emphasized during the teacher-education stage. Looking back on my own experience of teacher-education programs (e.g., teacher preparation/induction programs, professional development, or teacher lesson studies), there was little emphasis on equity or consequential learning. The main discourse was about how to pass the teacher bar exam, manage students well, complete the curriculum as planned, or achieve a better teacher evaluation result that would exempt teachers from a punitive reinduction program.

Under such an educational culture, the emergence of this story of the dance-with-science project is a rare case in which students intensely pursued consequential learning. Encouraged by this story, I call for a new discourse around equity and consequentiality in SK education or other similar contexts. That call does mean less to criticize what has not been done, but more to identify what has been done and how to develop teachers' change agency. This study suggests methodological (the autoethnography) and pedagogical/analytic (consequential learning) approaches useful and necessary to apply in an educational context in which those approaches may definitely have existed but stayed implicit, simplified, or abstract. By making them explicit, nuanced, and concrete, this study ultimately proposes a way to reflect on and develop educational practices that directly support students' consequential learning.

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### **About the Author**

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