Utilization of E-Portfolios for Charting the Physical Literacy Journeys of Students in Secondary PE Classes

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Abstract

A physically educated person is characterized as an individual who has the motivation, competence, understanding, and knowledge to enjoy physical activity in a healthy way. Given that physical literacy (PL) development is a lifelong process, the recording of the process, called charting, has critical importance in PL development. This study aimed to explore features of student participation in an e-portfolio for charting PL and its impacts on student learning. Participants were 10 middle school students selected on the basis of gender, technological competence, and interest in physical education. Participants took part in PL charting programs for 10 weeks by utilizing an e-portfolio developed by the researcher. Data were collected from semi-structured interviews with participants and student work samples retrieved from the e-portfolio. The features of students' PL charting in the e-portfolio were categorized as (a) digital fumblers, (b) superficial participants, (c) passionate creators, and (d) journey reflectors, depending upon the levels of technological competence and motivation for PL recording activities. Participation in PL charting through an e-portfolio (a) enhanced sense of achievement and motivation for future PL growth in students, (b) enabled students to obtain tailored strategic support from the teacher, and (c) helped them perceive learning as continual growth. The findings of this study suggest an e-portfolio can be a viable tool for PL charting by providing opportunities to keep track of students' learning process and reflect on their PL-related learning activities.

Key words: physical education, physical literacy, charting, e-portfolio

Introduction

Physical education's (PE) ultimate goal is for students to learn and maintain a healthy and active lifestyle (Mitchell & Walton-Fisette, 2022). In this context, the characteristics of people who have learned PE are defined in terms of demonstrating physical literacy (PL) throughout their lifetime. The national standards for kindergarten to grade 12 in the United States define PE's goal as fostering physically literate individuals who have the knowledge, skills, and confidence to enjoy physical activities in a healthy manner (SHAPE America, 2013). Physical literacy can be described as the "motivation, confidence, physical competence, knowledge and understanding to value and take

responsibility for engaging in physical activities for life" (Whitehead, 2019, p.8). Rather than PL being a replacement for or in competition with the existing PE concept, it is a goal of the latter and a concept that clearly demonstrates physical activities' fundamental value (Whitehead, 2013).

PL develops over an individual's lifetime, a process metaphorically described as a "journey" (Whitehead, 2013). As the metaphor suggests, PL is not singularly achieved but a development to be nurtured throughout one's life. An individual's PL journey has the attributes of a process because it is distinct and unique (Taplin, 2012). To identify the PL journey that carries these process-related attributes, the term charting (Whitehead, 2019, p.74) is used over assessing. Charting PL has two purposes: a student identifying their own PL growth process and moving on to the next stage (Green et al., 2018), and the student receiving encouragement for past achievements from significant others involved in the journey and obtaining effective strategies for future PL growth (Keegan et al., 2013).

In order to charting PL journey, there should be specific tools. Countries such as Canada and the United States have been developing tools appropriate for charting PL because they recognize its importance. Canada is the frontrunner for developing PL charting tools (Spengler & Cohen, 2015) such as Passport for Life, Physical Literacy Assessment for Youth, and Canadian Assessment of Physical Literacy, all employed in schools. In the United States, PE Metrics, which include an evaluation sheet and guidelines to verify students' PL achievements, was developed (SHAPE America, 2019).

However, according to a systematic literature analysis of existing PL charting tools (Jean de Dieu & Zhou, 2021), 70% of evaluation tools do not consider all PL areas, focusing only on fundamental movement skills, long-term health and well-being, and athletic development. Furthermore, excepting Matrix, which was developed by the International Physical Literacy Association (IPLA), numerous tools include only young children or students as subjects. Hence, rather than tracking individuals' PL growth process, they only evaluate learning that occurs during certain periods in life. In the lifetime context, using such tools exposes their limitations regarding deviating from PL charting's essence and purpose (Giblin et al., 2014), which emphasizes consideration of the change process in the elements and attitudes related to individuals' PL (Whitehead, 2019). Although charting PL journey can be conducted by adopting diverse tools, each has its own limitation.

Given such limitations, an e-portfolio, a digitized portfolio used to reflect students' learning process and stimulate their learning activities (Wolf & Dietz, 1998), is worth considering as an alternative PL charting tool. An e-portfolio is appropriate for recording PL as it is founded upon constructivism, thus concretizing the process attribute. If students record and manage materials that they produce across their learning, they objectively observe their learning processes and recognize the process and outcomes (Heinrich et al., 2007). Furthermore, the advantages that are identified in studies on life-wide and life-long education (Banks, 2004; Baris & Tosun, 2011; Brouns et al., 2013; Cohn & Hibbitts, 2004; Rezgui et al., 2017) provide evidence that it can be used as a tool to record PL attributes that are fostered throughout one's lifetime. An e-portfolio systematically accumulates and manages information on a student's overall development according to their life journey and also encourages them to continue learning throughout their lifetime by enabling self-reflection (Baris & Tosun, 2011).

An e-portfolio arouses intrinsic motivation for learning (Barrett, 2007), which makes it a suitable PL charting tool for primary- and secondary-school students because they are at a life stage when PL is nurtured and enhanced (Whitehead, 2013). Charting through an e-portfolio allows "bite-sized" learning support (Banks, 2004, p.4), which is appropriate for primary- and secondary-school students and helps them control their learning because they are the subjects of interest (Banks,

2004). Primary- and secondary-school years, particularly middle-school years, are a critical period when serious discussions on lifetime health and physical activities should occur (Whitehead, 2013). By motivating students to independently search for and reflect on their unique PL journeys, an e-portfolio contributes to leading a healthy and active lifestyle. This study draws attention to the e-portfolio's value as a PL charting recording with the aim of using the e-portfolio in PL charting during PE class at school and examining middle-school students' charting behavior and learning effects. The exploration of features of students' utilization of an e-portfolio will provide understanding on how students participate and learn in e-portfolio for charting PL. It will provide implications for effective utilization of e-portfolio for charting PL.

The following research questions are posed:

a) What are the features of students' utilization of an e-portfolio for charting physical literacy?

b) What are the influences of the utilization of an e-portfolio for charting physical literacy on students' learning?

Methods

Development of an E-Portfolio

The e-portfolio was developed on Google Cloud in the form of a website and was designed by this study's first author. It has five main components: a PL portfolio page, Newsfeed page, Learning Management System (LMS) page, Board page, and Dashboard page. The PL portfolio page shows the overall PL journeys of individual students. The Newsfeed page posts updated news on students' portfolios and provides access to social media platforms. The LMS page contains teacher-created lectures on PE that the students can watch, the Board page shows various PE materials posted by the teacher that the students can search through, and the Dashboard page allows students to check and manage their e-portfolios. Students and teachers participating in this study accessed their e-portfolios through their G-suite accounts, enabling

Figure 1. E-portfolio structure and samples of students' PL portfolio pages

Table 1. Online physical activity and PL charting programs

Week	Online Physical Activity Program	Physical Literacy Charting Program	
		Topic	Purpose
1		Looking into our PL journey over my lifetime	Understanding the concept of the PL journey
2	Tabata exercise	Checking my position in my lifetime PL journey - Checking my sports predisposition - Testing my physical fitness level	Exploring my current PL journey
3		Tracking and reflecting on my past PE experience in elementary school	Examining my past PL journey
4		Finding ways to enjoy sport	
5		Looking into my favorite sports stars and moments	
6	Juggling activities	Exploring sport-related art work that I like	Searching for unique aspects in my PL journey
7		Finding famous quotes in sports that relate to my life	
8		Checking my sports characteristics	
9	Jumping rope	Creating my sports autobiography	Integrating past and current PL journeys
10		Interacting with friends after viewing their PL journey portfolios	Sharing my PL journey with others and interacting with each other.

Middle column note (spanning weeks 4–8): - Learn workout routine - Plan for workout - Perform workout task - Record and store results in Google Drive

them to store all learning activity data on their Google Cloud. Students were provided assistance with using their e-portfolio during their regular PE class. They used their e-portfolios during regular PE class time and freely outside class.

The students partaking in the class charted PL using the e-portfolio and ultimately created their PL portfolio pages (Figure 1) by documenting their PL journeys. Three particular elements were included in students' PL portfolios. First, a Google Drive folder ('My Journey Drive') was uploaded that contained materials on students' PE learning processes. The folder allowed students and teachers to check students' task performance through videos and documents. Second, another Google Drive folder ('My Journey NAVI') that included test results and diagnostic data describing various PL elements (e.g., PAPS data showing Korean health-related fitness, performance assessment data for

PE, an autobiography of one's PL journey) was created. Finally, factors that showed students' unique athletic nature (e.g., sports characteristics) or described how students enjoyed sports (sports art gallery, sports quotes, and sports video) were posted. The students could search and read each other's portfolio pages using the social media function on the Newsfeed page.

Programs for Charting One's Physical Literacy Journey

The students participated in two types of programs on the LMS page. Both programs ran three times a week for 10 weeks in an online version of regular PE class because of the onset of the COVID-19 pandemic. The first program students took part in was an online physical activity program, students watched a video created by researchers that explained certain physical activities (e.g., Tabata, juggling, jumping rope), carried

out tasks related to the activities, and uploaded video of themselves performing the task. The submitted performance tasks were saved, stored, and recorded to students' respective folders on the Google Drive to allow synchronization with teachers' folders, enabling teachers to examine students' learning processes and outcomes.

The other PL charting program had students watch a researcher-created video guide, enabling students to explore their PL journeys and document their self-reflections on the PL portfolio page. Students tracked their past learning experience on physical education, examined their current PL characteristics through given surveys. Specifically, students wrote an autobiography about their PE learning experience and reflected on their PL journey from the past to the present. Students also kept track of their health-related fitness level through PAPS (physical activity promotion system) and administered a PIEMSQ (Physically -Intellectually-Emotionally-Morality-Spiritually Questionnaire) test to identity their sport-related literacy characteristics. Also, they reflected on their PL journey

minutes long and contained an informative video for the teacher on a given topic, relevant learning materials, and a technical support video on e-portfolio updates. The students enrolled in both programs through the LMS page and received one-on-one real-time online support when necessary. Table 1 outlines the online physical activity and PL charting programs.

Participants

Purposive sampling (Patton, 2002) was used to select participants using the criteria of gender, technological competence, and past interest in PE. The three selection criteria helped researchers select students who had diverse characteristics that can influence on their participation in e-portfolio activities for charting PL. Gender was separated into male and female, and technological competence and past interest in PE were classified into low/medium/high according to pre-questionnaire responses. A total of 10 first-year middle school students (six girls and four boys) were selected based on various qualities (Table 2).

Table 2. Characteristics of Student Participants

No	Participant	Gender	Technological competence	Interest in PE before
1	A	Female	Medium	Medium
2	B	Female	High	High
3	C	Male	Medium	High
4	D	Female	High	Medium
5	E	Female	Low	Medium
6	F	Female	High	High
7	G	Male	Medium	High
8	H	Male	High	High
9	I	Male	High	High
10	J	Female	Low	Low

through reflective writing. Students were asked to describe what they learned about PL, how they learned, and plans for future improvement in PL.

The PL charting program comprised 10 sessions throughout the semester. Each was approximately 30

Data Collection

Data were collected through in-depth interviews with research participants and data accumulated in the e-portfolio. The former were semi-structured interviews

during which questions were asked to gain more insight into students' PL charting behaviors using the e-portfolio and how it affected students' PE. To better understand students' behaviors during PL charting, they were asked how they used the e-portfolio, what obstacles they encountered, and what factors motivated them while building their e-portfolios. Additionally, to investigate the effects of PL charting using an e-portfolio for students, they were asked about their perceptions of physical activity before and after tracking their PL using their e-portfolios and what changes occurred in their attitudes and actual lives.

Online data analysis incorporated information from students' e-portfolio pages, their learning activity data accumulated on Google Drive, and their self-reflection writing materials. The information was also used as data when conducting in-depth interviews on e-portfolio utilization effects.

Data Analysis

The data analysis framework of describing, analyzing, and interpreting—a process introduced by Wolcott (1994)—was implemented. Using the collected e-portfolio data as basic data, the researchers took turns reading the transcribed data from in-depth interviews several times, which were then documented, structuralized, and systematized. They also deliberated on how to present participants' input to properly and accurately capture the actual context in the field. Significant portions discovered during structuralization and systematization were coded. The initial codes were compared, and those that showed similarities were bundled together and placed in a subcategory. Subcategories that displayed similarities were categorized into an upper category. Through this process, the researchers reasoned out an explanation system. The characteristics of an e-portfolio and the philosophy behind PL charting were considered when interpreting the collected data.

To enhance data trustworthiness, the researchers shared the interview data descriptions and interpretations with the participants for member checking (Lincoln & Guba, 1985). Consistencies in data collection, analysis, and interpretation were reviewed through a peer briefing (Patton, 2015) with colleagues and two external reviewers with abundant experience in qualitative research in sports pedagogy.

Results

Features of Utilization of an E-Portfolio for Charting Physical Literacy

Students' e-portfolio utilization characteristics of students were categorized into four types: digital fumbler, superficial participant, passionate creator, and journey reflector.

Digital Fumbler

Digital fumblers were students who could not adopt the practice of using an e-portfolio because they had difficulties adjusting to a new online-based learning environment. In the past, they showed low interest in PE and exhibited low technological competence, which is needed to perform tasks online. Moreover, given the online learning environment elicited by the COVID-19 pandemic, these students had difficulty receiving direct technical and academic support from teachers, making adjusting to the e-portfolio environment additionally challenging. Because students showed extremely limited participation in the learning activity of recording their PL journeys in an offline environment, they failed to recognize in detail their unique PL journeys. Although the digital fumblers showed interest in indirectly experiencing their classmates' activities and exploring their PL journeys, they looked forward to learning in an offline environment in the future because online learning was too overwhelming.

Even though the teacher told us to watch an

instructional video on how to work on the new website and follow it, I could not even think about doing it myself because taking classes online (due to COVID-19) just seems really hard. I could have done it when in school by getting help from my teacher or friends, but doing it alone was too difficult. I think I only got around to checking my attendance on the attendance tab in Google Classroom.

(Student J, interview)

Friends who are good at using computers seemed to be having fun with this. It's a bummer because I think could have done it better if I were at school. When the teacher called me to school and showed me on paper what to do, I finally understood what to do and enjoyed it. My friends bragged about what they worked on. If this is redone in class at school, I think I could do it better.

(Student E, interview)

The fact that the digital fumblers remained in an offline setting means that they were unable to experience the e-portfolio environment's advantages. As they could not actively explore their PL journeys through e-portfolios, self-reflection on their journeys was not expected from them. However, these students showed interest in future PL charting activity and found motivation by indirectly experiencing their classmates' activities.

Superficial Participant

Superficial participants were students who restrictively or selectively used the e-portfolio in the most minimal areas to perform the given task. Such behavior is common in the early stages of use. These students built their portfolio pages by partially completing learning tasks by session. However, self-reflection on their journeys or personal and unique journey characteristics were not detected in their portfolio content. The activity's purpose for superficial participants was to simply complete the task even though they had sufficient technical skills to build an e-portfolio. These students only focused on the e-portfolio building activity and neglected the journey exploration and self-reflection.

I participated because I felt like I had to do the project for PE class. I think we had a class on it. I did it because it was compulsory and I had no choice. So I only did what was necessary to update the portfolio and moved on to other activities.

(Student H, interview)

I had things to write about but I don't like writing and ended up not writing much. But I did finish the portfolio page. I typed some things out and did what was necessary but it doesn't include anything profound.

(Student C, interview)

Superficial participant students could not wholly appreciate the significance of exploring and documenting their PL journeys. They were also unfamiliar with activities that required self-reflection. They partly recorded their PLs in the e-portfolio and had a partial awareness of their PL journeys.

Passionate Creator

Passionate creators were students who described their unique PL journeys in detail as explored through the PL charting program and enthusiastically shared them with friends, family members, and teachers. These students incorporated images, videos, texts, and other forms of depiction to effectively express their distinct PL imagery on the portfolio page (Figure 2). They took advantage of social media functions, such as Newsfeed, on the e-portfolio to actively search for friends' updated

activities, eagerly communicate with others online, and share their PL journeys with many others around them. Their activities were used as examples for other students and offered ideas on how to perform PL charting on the e-portfolio.

I wanted to present my work and make my friends think "she/he really put a lot of effort in it" when they saw my portfolio, which I think was my purpose for creating the portfolio. I had fun because it felt like posting things on social media. What I liked about this project is that it gave the opportunity to introduce PE-related contents to my friends.

(Student F, interview)

I came to find out unique points about myself related to sports. I was able to express myself pretty well by adding images or videos on those points on the portfolio page. I constantly showed my work to my family and they gave me compliments, which made me work even harder. If I asked "this is done well, right?" they would

say "yes, you did that really well. You should try this too," and I was encouraged to put in more effort.

(Student G, interview)

Some of my friends' portfolios were really pretty. By using short clips or videos, they showed their favorite sports stars or favorite imageries quite well. So, I asked those friends how they did it and worked on my portfolio with them.

(Student E, interview)

In fact, writing reflective journal takes time, and it is hard. But decroating my portfolio and sharing it with other people is fun and active. My friends, they do not read my reflective journal but they are interested in my decoration.

(Student G, interview)

Their motivation for using the e-portfolio stemmed from exploring their unique PL journey characteristics and sharing them with friends. These students, who effectively and regularly used social media functions,
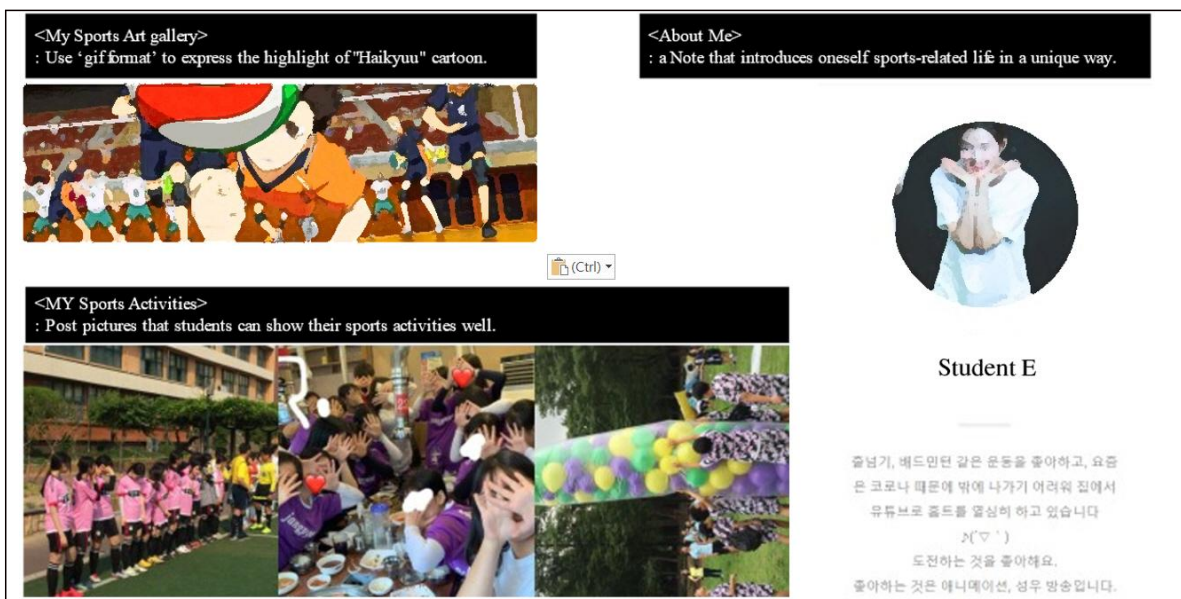

Figure 2. PL journey created by a passionate creator

actively shared their one-of-a-kind e-portfolio PL journeys and recognized their distinct characteristics. However, their focus was on decorating and sharing their e-portfolios rather than taking the time to self-reflect on their journeys. In fact, the portfolio of the passionate creator lacked data on reflective writing activities, and did not faithfully answer the researcher's questions about reflection on the PL journey. Hence, their behavior was limited to creating a "fancy résumé" (Barret, 2007).

Journey Reflector

Journey reflectors explored their PL journeys and engaged in in-depth reflections. They documented what they recognized in their journeys through PL charting in detail and with sincerity. In their autobiographies, they displayed profound introspection regarding what they understood of PL. By reading the reflections expressed in journey reflectors' portfolios, the other students compared the contents with their own introspective writings and had the opportunity to engage in more in-depth thinking about their own PL journeys.

Sports have the presence of gods as they nourish the soul. I came across numerous sports-related videos when building my portfolio, and the sports in those videos had the power to bring tears to many people's eyes, make them joyful and sometimes leave lasting impressions. Sports had the ability to bring humanity together in this manner. After coming to such a realization, I came to recognize the incredible presence of sports and that they alone were sufficient to create a better world.

(Student D, writings in PL journey autobiography)

I realized that 'D' put much thought into writing her thoughts by reading her portfolio. I was actually quite embarrassed when comparing 'D's'

writing to mine. So, I decided to think more profoundly about this before starting on my autobiography. Maybe that is why my PE story was written better than before.

(Student A, interview)

Journey reflectors enjoyed reading and writing in general and were familiar with introspective activities. These students thought deeply about the self-reflection questions posed in each session's learning task and took an interest in writing their stories. Journey reflectors closely examined their PL journeys, discovered unique characteristics, and reflected on this in great depth. In such aspects, journey reflectors made it possible to verify in detail the effects of PL charting using an e-portfolio.

Effects of Charting a Physical Literacy Journey through an E-Portfolio

Enhancing a Sense of Achievement and Motivation for Future PL Growth

Students identified their strengths and weaknesses in their PL journeys by figuring out their current state, including physical fitness level and sports characteristics. This process motivated growth in students' future PL journeys. For example, students who determined their current physical fitness level actively explored programs to boost their level and formed workout groups with friends to exercise together.

My life changed a little. I used to be chubby and didn't go out much to workout. Of course, the test results showed that I was in a very poor shape fitness-wise. So, I went out immediately to work out. My friends and I came up with a plan to work out together every day and we actually carried it out. I lost 3kg, and my life became different.

(Student C, interview)

The students felt a sense of achievement by recognizing detailed records of their past PL journeys collected. The learning process data and completed portfolio page saved on Google Drive gave students a strong sense of accomplishment. By looking over collected records from the past that were accumulated in the e-portfolio, students could compare their past selves with their current selves and confirm their growth.

> Looking at my PL journey drive makes me think, "I really did put much effort into it." I did so much more than I was aware of, and my self-confidence is growing with the collection of my activities, thinking "I worked really well as shown here." If I hadn't kept a record and tracked my activities, I would not have realized how much effort I put in.
>
> (Student D, interview)

These findings on the effects of utilizing e-portfolios on students are meaningful because the purposes of documenting PL coincide with the PL charting goals (Green et al., 2018) of recognizing and celebrating one's process during the journey and gaining the self-confidence to achieve future goals. By providing students an opportunity to explore their PL journeys, an e-portfolio brings shape to recognizing their journeys and enhances the sense of accomplishment and motivation needed for future PL growth through the manifestation of the PE learning process and growth.

Obtaining Tailored Strategic Support from Teachers

Because the PE teacher could search through the detailed PL journey records posted in students' e-portfolios, students were offered personal and direct support to support PL growth. First, they received support appropriate to their individual skill level. The learning process and outcomes accumulated on individual students' drives provided teachers with detailed information on whether each student could achieve the goals of physical education. For instance, during juggling, the teacher could identify individual students' levels by checking their performance results for each learning task through the e-portfolio dashboard's management function, allowing the teacher to provide tasks tailored to each student's level to help them advance to the next stage.

> During the juggling lesson, I was able to throw and catch two items but had difficulty with the cascading motion when using three items. So I could not submit my performance task on it. My teacher saw that on e-portfolio and explained to me what I was doing wrong in the following lesson. After practicing based on what the teacher had told me, I was able to do the cascading motion. I remember realizing then how useful it could be to film a video and submit it.
>
> (Student D, interviews)

The students also received tailored support from the teacher that was appropriate for their unique characteristics of enjoying sports. By describing in the e-portfolio how they distinctly participated in sports, the students informed the teacher of their PL journey's unique aspects. Even students who lacked interest in participating directly in sports during face-to-face classes became aware of how they personally enjoyed participating through the exploration activity. They requested and received support from the teacher regarding how they appreciated sports.

> I had no interest in PE class because I was not good at exercising. It got me thinking that I am

not involved in PE at all. But the teacher said reading online cartoons and comics on sports was also a part of it, which made me look into things related to volleyball, the sport I enjoy. I came to read a comic series titled *Libero Revolution* since the teacher told me about it. Now that the teacher knows that I enjoy reading volleyball comics, I look forward to more recommendations.

(Student F, interviews)

The e-portfolio provides an environment that clearly manifests students' individual learning demands (Heinrich et al., 2007) and facilitates sharing the learning process and outcomes through online interactions between students and teachers (Barbera, 2009). Thereby, students received tailored strategic support from their teacher through PL charting using the e-portfolio.

Perceiving Learning as Continual Growth

Through the use of the e-portfolio, participants fostered a sense of participating in physical activities throughout their lifetime—a philosophical concept of physical literacy. First, they identified the connection between past and present PL journeys. Project tasks such as tracking PE behavior during elementary school and creating a sports autobiography encouraged students to understand learning as a continuous process rather than something segmented between elementary and middle schools.

I thought I didn't do any PE activities when I was younger. However, when looking back through the program, I realized that I had done so much more than I had thought. It was quite meaningful to reflect on past PE activities. I practiced Taekwondo and jumped rope a lot since I was really young. I came to realize that my past activities are helpful to the current PE class.

(Student A, Interview)

The students understood and extended their perceptions of the PE journey to their entire lifetimes. Previously, they had limited PE to their primary- and secondary-school lives; however, after watching an e-portfolio lecture on the lifetime PL journey, they expanded their sense of time for PE.

To be honest, I didn't know that people could learn physical education as they got older. There were elderly people taking PE lessons in the video shown during class, and that made me think PE is something we do for life. I realized that PE is something we must engage in as a baby and until we grow old. The PE classes we took during elementary school and the PE classes we now take in middle school are all preparations for lifelong PE.

(Student B, Interview)

By integrating and understanding their past and present PL journeys and envisioning their future journeys, the students came to appreciate the philosophical concept of PL that seeks continuous nurturing throughout one's lifetime (Whitehead, 2019). Through this realization, they perceived learning in PE from the context of their entire lifecycle. The fact that the e-portfolio offered students an environment in which to systematically and accumulatively manage their individual learning histories by each life stage (Baris & Tosun, 2011) motivated them to reflect on their learning in relation to their past learning process (Whitehead, 2013). This process also strengthened students' perceptions of lifelong PE by helping them clearly identify what should be done for future learning.

Discussion

This study investigated how students operated PL charting that used an e-portfolio and its impact on PE. The following implications can be drawn from the study's findings. First, students' technology literacy—defined as the ability to effectively use technology (e.g., digital device) to accomplish required learning tasks (Davies, 2011)—was determined as a prerequisite to e-portfolio utilization because it is a necessary basic skill for this type of PL charting. Therefore, fostering technology literacy is essential to lowering the barrier for entry into a digital environment for the digital-fumbler-type students.

Second, it is possible that students were limited to just creating "fancy résumé" (Barret, 2007) when they lacked reflection in PL charting using the e-portfolio. The e-portfolio's social media function is important because it provides an environment in which students can share their perceived PL journeys with friends, parents, and significant others. However, the passionate-creator-type of students exhibited the tendency to solely focus on expressing their individuality through their e-portfolios and sharing them on social media. This observation suggests the need for reflective questions and continuous teacher support for students such as superficial participants and passionate creators who lacked in-depth reflection (Whitehead, 2019).

Third, the e-portfolio was effective for PL charting in terms of reflection, expression, and repository. First, the Google Cloud-based repository enables users to effectively save and search through students' ongoing works. In particular, the e-portfolio is superior to existing tools in terms of expression as it embodies the PL attribute that each student's PL journey is unique (Taplin, 2012). The students were able to express their personal PL journeys that they proactively explored using various formats. Finally, the e-portfolio environment effectively tied together learning and reflecting. The aforementioned e-portfolio benefits demonstrate that it could be used as a complementary alternative to existing PL charting tools.

Finally, the charting of PL through an e-portfolio enhanced students' learning in terms of increasing students' sense of achievement and perceiving learning as continual growth. Recording and charting students' PL journey helped students focus on the learning process and promoted their continual growth mindset for setting goals for future growth and appreciating past learning journeys (Baries & Tosun, 2011; Green et al., 2018). Additionally, teachers used the e-portfolio as part of process assessment and provided individualized support for each student depending on their individual learning journey.

Conclusion

This study was designed to explore features of students' participation in PL charting activities using the e-portfolio and its educational effects. Using the e-portfolio was found to enable students to examine their PL journeys, recognize unique characteristics in their personal journeys, and introspectively reflect on them. Additionally, providing technological support for students to be initiated into the e-portfolio environment, monitoring students' specific features of utilization of their e-portfolio, and providing in-depth reflective questions were found to be critical to ensure effective PL charting through e-portfolios.

The current study has limitations in that it was conducted in a relatively short period of time. Given that the value of the e-portfolio as a PL charting tool may become even more evident during and after their entire school lives, there should be longitudinal studies examining the impact of PL charting through an e-portfolio on an individual's changes in "motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for engaging in physical activities for life" (Whitehead, 2019, p.8).

Moreover, future studies should examine the influence of significant others, such as teachers, parents, and classmates, on students' PL charting. Specifically,

studies should examine how teachers, parents, and classmates make use of PL journeys accessed through e-portfolios and what types of educational support they provide to enhance students' PL journeys. Inquiry into the interactions between students and their significant others through an e-portfolio will provide insight into the influence of significant others on students' PL growth from a lifelong perspective.

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