

UNDERSTANDING THE IMPORTANCE OF WELL-BEING AND STEAM

FINAL REPORT

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INTRODUCTION

Question

How to define well-being and best utilize this concept within the context of equitable ISL STEAM education.

Introduction

Members of the Well-Being Cohort did a preliminary review of the literature on well-being. Although there is considerable literature on well-being, there has been relatively little work specifically on well-being within the context of learning related to science, technology, engineering, arts, and mathematics (STEAM), either within or beyond the formal educational settings such as in informal STEAM learning experiences (ISL). For this preliminary review we have selected resources in three broad areas – research related to well-being in general, well-being in practice and well-being specifically applied to the study and support of ISL experiences.

KEY FINDINGS

Well-Being – General

There are currently many ways of thinking about and defining well-being. Many of the most prevalent definitions derive from the field of positive psychology (cf., Seligman, 2011), with proponents generally divided into two camps, both based on Aristotelian philosophy – those who favor a more *hedonic* perspective, e.g., feeling good, happiness

(e.g., Diener & Biseas-Diener, 2008, Dolan, 2014), and those who favor a more *eudaimonic* perspective, e.g., living a satisfied life, self-actualization (e.g., Eid & Larsen, 2008; Maslow, 1943; Ryff, 2014). There is also a third camp that has attempted to blend these two perspectives (e.g., VanderWeele, 2017). Although these perspectives provide insights into well-being, they suffer from similar theoretical problems – all derive from Euro-centric philosophical frameworks, and all tend to be hierarchical and privilege Western views about what constitutes “optimal” well-being. As a result, these approaches tend not to be broadly inclusive of non-Western cultural beliefs and practices (cf., Henrich, 2020).

Rather than framing well-being in purely psychological terms, with the primary purpose being the satisfaction of Western philosophical perceptions of a “good life”, we suggest that well-being is actually a fundamental, survival-oriented biological process that evolved to enhance fitness through the maintenance of balance with the world (cf., Falk, 2019). This evolution-based approach assumes that the ability to perceive well-being and act upon those perceptions has an ancient lineage, and thus humans have inherited a multitude of strategies and mechanisms for enhancing well-being, including those within the physical, social, intellectual and personal realms (Falk, 2021). However, even though the basic need for well-being is innate, its expression in humans is invariably emergent and learned and thus strongly influenced by cultural and lived experiences. In other words, although all people seek well-being, perceptions of well-being are highly subjective, and always individually and culturally constructed. The pursuit of well-being is not a goal that can be “achieved” but is rather an on-going process that all people engage in on a daily basis; each in his or her culturally, socially, and individually-specific way.

Well-Being – In Practice

Although there is currently no universally accepted way in which concepts of well-being have been integrated into STEAM or ISE research and practice, given the universal desire for well-being and its importance as a driver of human behavior, clearly well-being has significant implications for how one might best support equity-focused, Informal STEAM Learning (ISL) practices.

First, equitable practices are built on a foundation of holistic human well-being and depend upon collaborative processes, balanced power, and direct input from all participants (Administration for Children & Families, 2022; Organizing Engagement, 2015). Given the constructed, highly relative nature of well-being, any efforts designed to support equity must be conducted in ways that are respectful and solicitous of how differing individuals and communities define and actualize their personal, intellectual, social, and physical well-being (Donatuto, Cambell & Gregory, 2016).

Second, this holistic view of well-being suggests that there is a reciprocal relationship between well-being and learning. Accommodating well-being-related needs should be seen as both a prerequisite and an outcome of effective ISL experiences. In other words, the design and implementation of all learning experiences needs to be mindful of and accommodating to the unique well-being-related needs of ALL participants – both the learners and the providers, both children and adults (e.g., Goetz, et al., 2021).

Supporting equitable and meaningful ISL experiences requires understanding the incoming well-being-related needs and interests of both the learners and those facilitating learning. It also requires an awareness of how the affordances and constraints of the educational context will support or detract from all participants' long-term well-being. When done successfully, informal STEAM learning experiences can be highly satisfying, and result in long-lasting, definable, and measurable well-being-related benefits (e.g., Falk, 2024).

Well-Being – Informal STEAM Learning

Overall, despite increased interest in, and considerable use of the term well-being within the ISL community, we could find relatively few examples of research or actual practice directly targeted at supporting equitable, informal STEAM well-being. Much of the current well-being-related research and practice has been in the arts, particularly in areas related to arts therapy. In particular, the arts community in the United Kingdom has been particularly active. The following are some notable examples of these efforts – Chatterjee & Noble, 2013; Cull & Cull, 2023; Dodd & Jones, 2014; Dragija & Jelinčić, 2022; Falk, et al., 2023; Frontier Economics, 2024; Fujiwara, 2013; Fujiwara et al., 2014; Gustafson, 2018; Latham & Cowan, 2024; Magsamen & Ross, 2023; Phelus, 2024; Staus, et al., 2021; The Happy Museum.

A major problem with most of the examples we could find was how they operationalized and defined well-being. Most utilized what we would consider an unduly narrow definition of what constitutes well-being, primarily focusing on deficits in people's mental and physical health.

PRIORITIES FOR FUTURE WORK

Overall, despite increased interest in, and considerable use of the term well-being within the informal STEAM learning community, there is confusion about both the definition of well-being and its use.

In general, we could find only a small amount of research and only a modest amount of actual practice explicitly focused on supporting equitable well-being-related outcomes in

general, and particularly limited amount of work within the area of informal STEAM education. Most of the well-being-related research and practice that currently exists has primarily focused on the arts rather than STEAM, and in a majority of cases, most efforts have utilized what we consider to be a narrow, Euro-Centric, Positive Psychology definition of well-being that primarily focuses on Western notions of mental and physical health rather than lifelong balance including personal, intellectual, social as well as physical dimensions of well-being. Even our three case study examples, each exemplary in its own right, do not fully center well-being as a primary goal. Clearly, more work in this area is needed.

CASE STUDIES

Case Study 1: *13 Moons: Developing an Informal Environmental Health Education Model in Tribal Communities*

Project Description

The Swinomish Indian Tribal Community (SITC) developed an environmental health and sustainability curriculum and guiding document titled *13 Moons: First Foods and Resources* (Copyright © 2019 Swinomish Indian Tribal Community), including a process model, educational resources, and program activities to support community-based environmental health outreach grounded in cultural values and practices. Supported by two NSF-AISL grants¹ the culturally relevant, place-based curriculum informed a range of programs designed to reach youth, adults, elders, and intergenerational groups through community-based events (traditional clam bakes and a tree medicines workshop), early childhood and afterschool program, high school and college internships, community garden, and an apothecary at an Elder center. The curriculum and process model build off Swinomish traditional beliefs and practices related to first foods and plants and are grounded in reciprocal relationships between people, nonhuman beings, homelands, air, and waters. Mainstream environmental education programs do not do justice to the ways in which Indigenous communities relate to and connect to the environment. *13 Moons* provides an alternative to mainstream informal STEM platforms and centers traditional foods, plants, and medicines that are important to community members in order to increase awareness and understanding of local environmental and health issues (Donatuto et al, 2020). The project reflects and

¹ Two-year NSF-AISL Pathways Grant (#1516742) in 2015 entitled “[Developing an Informal Environmental Health Education Model in Tribal Communities](#).”; and Native plants and foods

amplifies a community-defined understanding of holistic well-being based on Swinomish core values, beliefs, and practices. The programs are designed to reignite community members connection to land, place, language, and culture.

Key Outcomes and Impacts

An ongoing process evaluation was led by Native Pathways (Laguna, NM) and JKS Consulting / Reimagine Research Group (Corvallis, OR) based on goals and outcomes defined with the project leads and community partners. Key Outcomes for Swinomish community members include increased connection to traditional culture and lifeways; opportunities for intergenerational learning; building connection to community, land, and place; increased awareness and understanding of traditional foods and medicine plants; and increased motivation to implement healthy lifestyles, traditional practices and harvesting (holistic well-being). The evaluation process itself was guided by the Coast Salish Community / Indigenous Health Indicators (Donatuto, Campbell & Gregory, 2015), and outcomes measures were aligned to these areas.

The traditional foods framework developed through the 13 Moons project was successful in engaging community members in healthful practices through a culturally based lens. Community members experience the 13 Moons programming as a positive time for connecting and sharing time with family and community, which reflects one of the Coast Salish Community Health Indicators, or **Community Connection**, and serves as a foundation for intergenerational learning, which is also a key community value. Community members appreciated the focus on traditional foods and plants practices and beliefs, which they shared as an important component of cultural continuance, and represent another indicator of community health in Coast Salish cultures, or **Cultural Practices** (Campbell and Donatuto, 2015). Evaluation showed that the indigenous health indicator of **Balance** – which includes resilience, sense of place and identity - is also cultivated through the 13 moons program, particularly through the Clam Bake activities, in which connection to place and cultural identity were frequently mentioned as positive outcomes of participation. An area for strengthening engagement in community-based health is through **Intergenerational Education**; while this transfer of knowledge between elders and youth occurred to some extent, participants typically rated these areas lower, and qualitative data suggest that accessing the knowledge of elders and engaging more youth in the 13 Moons program would strengthen the program's pathway (Stein and Valdez, 2017).

Several wise practices emerged from the development of the 13 Moons program and curriculum. First, the project team found success in building off existing events that have been well-attended and well received by the community, rather than attempting to create something new. For example, including activities at the Clam Bake and at community dinners allows the team to meet people within the community landscape,

where community members are already gathering. This models an important best practice of going out into the community rather than expecting community members to come to them. The team collaborated significantly with community members to help develop the framework and obtained input and guidance from tribal elders, which has been one of their main priorities, to make sure they are in line with cultural values. This is an extremely important process that has allowed the project to be inclusive of community voice, and thus reflects a program created with community rather than for community.

Case Study 2: Inquiry-Based Learning for Educators

Project Description

The Shedd Aquarium's *Science Educator Conference* (SEC) centers on hands-on workshops that introduce educators to inquiry-driven teaching techniques. This program promotes intellectual well-being through methods that engage curiosity, critical thinking, and problem-solving, essential components for enhancing cognitive growth and creating a sense of fulfillment for educators. By equipping participants with approaches that stimulate student engagement, SEC aligns with Shedd Aquarium's mission to connect science education with dynamic, real-world contexts.

Program Format and Content

The *Science Educator Conference* hosts in-person workshops like "Predict, Observe, Explain: Engaging Learners with Puzzling Phenomena", "Empathy and Education: Shedd's Role in Otter Surrogacy", and "Cultivating Inclusivity: Science Notebooks as Tools for Belonging" sessions, among others. These workshops provide educators with practical, inquiry-based techniques to explore and discuss phenomena directly connected to the aquarium's exhibits and science resources. This immersive environment allows educators to engage deeply with the content while applying new instructional strategies. By building skills that can be applied in their classrooms, participants can inspire a more interactive and curiosity-driven learning experience for students.

Key Outcomes and Impacts

The *Science Educator Conference*'s inquiry-based approach prioritizes intellectual well-being by addressing critical thinking and curiosity, which are fundamental to positive educational outcomes. Through interactive problem-solving and group discussions, educators experience cognitive growth and satisfaction, promoting a deeper sense of mastery over the subject. This intellectual fulfillment is also a powerful tool for student engagement, as educators return to their classrooms with innovative strategies and a reinforced commitment to effective science education.

The *Science Educator Conference* has shown measurable impacts in two key areas:

- **Practical Application:** Educators apply new, inquiry-based techniques to make science instruction more engaging, tailored to student needs, and meaningful within diverse classroom settings.
- **Resource Accessibility:** Participants gain access to Shedd's resources, fostering equity in science education by equipping educators from various backgrounds with ideas and materials for enriched STEAM learning.

Case Study 3: Culturally Sustaining STEAM

Project Description

In this design-based research project led by the High Desert Museum in Bend, Oregon (*Culturally Sustaining STEAM*, NSF DRL # 2115488), a collaborative team of researchers, practitioners, and evaluators is exploring how to co-create culturally sustaining, place-based, well-being-enriching STEAM family programming in rural communities. Four informal learning sites and their community partners in rural communities across the U.S. are each implementing and iterating a series of multi-day family STEAM programs that incorporate Culturally Sustaining Pedagogies (CSPs), an equity-centered approach that aims to perpetuate and foster families' heritage and community practices (Paris, 2012).

The term Culturally Sustaining Pedagogy (Paris, 2012) takes the work of asset-based approaches to creating learning experiences such as Culturally Relevant Pedagogy (Ladson-Billings, 2014) and Culturally Responsive Pedagogy (Hammond, 2015) a step further by not only seeking to understand and value, but to **actively sustain** a community's cultural practices, lived experiences, and identities (CDE, 2020; Paris, 2012). Throughout our project, we have been collaboratively refining our operationalized definition of CSPs for informal learning environments. Currently, our working definition focuses on three components of CSP programming: (1) Centering the values, worldviews, needs, experiences, knowledge, and interests of families; (2) Building a community where individuals feel a sense of belonging in both the program and informal learning spaces and environments; and (3) Ensuring that families leave with a deeper understanding of the broader community, their own communities, each other, and themselves (Cid, Siegel, Stein, Bonebrake, Trecha, & Oyenuga, 2024).

To inform the design of family programming, informal STEAM learning practitioners from each site and their community partners participated in ongoing in-person and virtual professional development. During the workshops, the project leadership team worked alongside the sites, sharing knowledge and guiding them on how to develop programs for families based on CSPs. In turn, the practitioners from each site actively contributed their insights and experiences, helping to shape and refine the evolving definition of

CSPs. Building on this knowledge, practitioners and their community partners co-developed a series of multiday programs for rural families with children ages 8 to 11 years old. At each program, families participated in a variety of place-based experiences that were based on CSPs and STEAM, with a particular focus on science and art.

Key Outcomes and Impacts

We found that building STEAM family programs grounded in CSPs has supported equity in STEAM, specifically for families in rural communities. The programs have strengthened families' existing connections to nature and place by centering on the experiences of families and their communities, while emphasizing relationships with people and the rest of the living world. This approach has been further reinforced by using a place- and asset-based framework, which included connecting families to places with which they have a deep relationship, involving local STEAM professionals, and building on families' cultural practices.

The programs supported families' personal well-being by nurturing a sense of wonder and curiosity about the world around them. They provided tools and new perspectives to explore and see their familiar environment and existing practices in relation to nature and place. Families' well-being was further enhanced by incorporating art into STEM, offering them an additional avenue to engage with nature, the community, and themselves.

The programs' core focus on slowing down, centering relationships, and fostering a sense of belonging—rather than emphasizing content—helped support families' social well-being. Families left the programs with new and strengthened relationships: within their own families, across participating families, with community partners, and with the larger community. This was made possible by the time-intensive nature of the programs and activities designed for families, practitioners, and community partners to share their whole selves and learn from one another.

Through this project, we have found—and will continue to explore—that culturally sustaining pedagogical approaches, the integration of art into STEM, and family programming that supports personal and social well-being are promising practices for advancing equity in STEAM.

KEY REFERENCES

Some Key Resources

There is a quite sizeable literature on well-being, particularly those that define well-being through the Euro-centric lens of Positive Psychology. Two particularly notable examples of this literature are seminal articles by Seligman and Ryff, as well as notable books by Diener and Biseas-Diener and Eid.

Seligman, M.E.P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.

Ryff, C.D. (2014). Psychological well-being revisited: Advances in the science and practice of Eudaimonia. *Psychotherapy & Psychosomatics*, 83(1), 10-28.

Diener, E., & Biseas-Diener, R. (2008). *Happiness*. Malden, MA: Blackwell Publishing.

Eid, M. & Larsen, R.J. (Eds.). (2008). *The science of subjective well-being*. New York: The Guildford Press.

Recently, Falk sought to re-examine and re-define well-being through a more evolutionary, culturally and informal science education-relevant lens. These writings emphasize the multi-dimensional and situational nature of well-being and identify four key evolutionary milestones in the development of well-being processes, domains Falk has labeled as personal well-being, intellectual well-being, social well-being, and physical well-being. Key publications are Falk's three books and recent articles, one of which is listed.

Falk, J.H. (2019). *Born to choose: Evolution, self & well-being*. London: Routledge.

Falk, J.H. (2021). *The value of museums: Enhancing societal well-being*. Lanham, MD: Rowman & Littlefield.

Falk, J.H. (2024). Museums and well-being. *Standbein Spielbein*, 121, 19-23.

Falk, J.H. (2025). *Leaning into value: Becoming a user-focused museum*. Lanham, MD: Rowman & Littlefield.

As discussed above, the well-being literature directly relevant to Informal STEAM education is relatively sparse, but here we list a number of examples, all of which seek to operationally connect well-being to informal education-relevant practice. The Donatuto et al. article is exemplary for both its process and rigor. The Gustafson piece as well as most of the articles in the Phelus compendium are descriptions of educational efforts. The Happy Museum Project in the U.K. seeks to provide tools and strategies for promoting well-being-responsive museums. The Cull and Cull book is an effort to provide a framework for thinking about well-being in museums. However, as with most current efforts, there is a tendency in all of these pieces to equate well-being with health and wellness, rather than more expansive and inclusive approach we advocate; an

approach that recognizes that well-being covers a much wider range of human behaviors and does not privilege Western notions of mental and physical health.

Cull, R. & Cull, D. (2022). *Museums and well-being*. London: Routledge.

Donatuto, J., Cambell, L. & Gregory, R. (2016). Developing responsive indicators of indigenous community health. *International J. of Environmental Research and Public Health*, 13, 899-915.

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