



Article

# Bloom: Scaffolding Multiple Positive Emotion Regulation Techniques to Enhance Casual Conversations and Promote the Subjective Well-Being of Emerging Adults

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**Abstract:** This paper presents Bloom, a low-tech interactive artifact designed to enhance in-person social interactions among emerging adults. Drawing upon emotion regulation theories, the development of Bloom explores how multiple Positive Emotion Regulation (PER) techniques can be incorporated into an artifact that can effectively enhance users' subjective well-being in their routines. By grounding on autobiographical research through design, we discuss the design methodology employed to develop a prototype that supports five PER techniques, along with key design features, and experiences of using Bloom. The chosen PER techniques are as follows: (1) being immersed and absorbed, (2) engaging in a collective, (3) creating a savoring atmosphere, (4) sharing the positive experience with others, and (5) infusing ordinary events with positive meaning. Through daily observations and reflections, we discuss key design features that have proven critical in engaging ourselves in PER, the benefits of utilizing diverse PER techniques to enhance our well-being, and implications for future behavioral intervention technologies.

**Keywords:** design for well-being; emotion regulation; first-person method; positive design; behavioral intervention technology; subjective well-being; emerging adults



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## 1. Introduction

The period of emerging adulthood, characterized by an exploration and uncertainty of one's sense of self, is marked by a significant surge in mental health issues [1,2]. The COVID-19 pandemic has intensified this trend, with 50% of emerging adults reporting symptoms of anxiety and depression due to its lingering effects, particularly social isolation [3]. While emerging adults encompass individuals between 18 to 29 years old [1], this paper focuses specifically on the college-age population. In college environments, positive social interactions significantly influence mental health and are crucial for successful college experiences [4]. Supportive social connections have proven effective in enhancing subjective well-being during stressful times [5]. However, since the COVID-19 pandemic, casual social interactions have become increasingly challenging due to the emphasis on virtual interactions and social distancing. Even as in-person connections resume, many college students continue to struggle with casual social interactions [4]. This lack of social engagement can harm their well-being. Compared to older populations, emerging adults show fewer skills in handling everyday emotional experiences, likely contributing to these negative effects [6]. Additionally, this populations' phone usage during social interactions has negatively affected their relationships, leading to reduced relationship quality and

empathy [7]. In particular, “phubbing”—ignoring others to use a smartphone—has become an increasingly common phenomenon in emerging adults’ social situations. Phubbing disengages people from one another, making both parties feel less empathetic [8].

While there is ongoing debate on what constitutes well-being, this paper adopts the view from positive psychology that subjective well-being represents “perceiving one’s life as being satisfactory, and with more positive than negative affect” [9] and “evaluating one’s life as good, meaningful and worthwhile” [10]. The key question, then, is what kinds of positive social interactions one should pursue, and how designers can contribute. Focusing on the subjective well-being of emerging adults, this paper explores enhancing casual social experiences through the use of Bloom, a low-tech tangible interactive artifact that reduces phubbing and facilitates Positive Emotion Regulation (PER), i.e., uplifting and prolonging positive emotional experiences.

Emotion Regulation (ER) research is one of the fastest growing areas in psychology [11]. ER refers to “the set of strategies that individuals use to increase, maintain or decrease their affective experience, including the feelings, behaviors or physiological responses that make up a given emotion [11]”. This process involves monitoring, evaluating, and modifying emotional states. There is a growing interest in design and HCI research to develop and evaluate technology-enabled interventions that support users’ ER. This growing interest stems from the recognition that the ability to regulate emotions is critical to mental health [12]. As a result, technology-enabled ER has become integral to emerging fields like design for well-being [13], behavioral intervention technologies [14], and socio-emotional learning [15].

Despite growing attention to technology-enabled ER, the potential to combine design and HCI with the theoretical grounding and interventions from other disciplines (e.g., psychology) has yet to be fully realized. Existing design and HCI research has primarily studied the use of a singular ER technique in isolation [15], limiting the range of approaches to enabling ER. Here, “technique” refers to the concrete approach people use to manage their emotional intensity or duration. While people naturally use various techniques in daily life (e.g., practicing kindness and reminiscing pleasant moments), a recent literature review on technology-enabled ER [15] showed that most ER technologies predominantly rely on bio-feedback to downregulate negative emotions (e.g., guiding the user towards certain physiological states through breathing exercises with haptic interaction). Many such technologies depend on traditional psychoeducation approaches from existing therapies, with limited integration into users’ daily lives.

In our view, these previous approaches can be disadvantageous in enhancing users’ well-being. Since different situations require different ER techniques [16], focusing on one ER technique may be inappropriate when designing for dynamic situations that would require different ways of regulating emotions [17]. For example, college students may need to regulate their emotions in various contexts, such as positive self-talk for boosting confidence before presentations or projecting future successes to stay optimistic in the face of academic setbacks. In response, this paper aims to explore *if and how a technology employing multiple PER techniques can be developed to facilitate positive social interactions among college-aged emerging adults*. This paper addresses the following research question: *How can an interactive artifact be designed to scaffold diverse, contextually appropriate PER techniques, thereby enhancing social interactions among emerging adults?*

To examine how Bloom facilitates casual conversations in a shared living space, we chose an autoethnographic approach to capture these interactions’ subtle, private, and spontaneous nature. Casual conversations are highly context-dependent, often shaped by trust, intimacy, and freedom from external scrutiny. It was expected that autoethnography

could allow us to document these experiences from an insider’s perspective, ensuring an authentic account of how Bloom influences organic social interactions.

This paper first provides an overview of designing for PER and “autobiographical research through design” methodology, followed by a description of Bloom’s development process, an interactive artifact that enables five distinct PER techniques during casual conversations (see Figure 1). We then discuss lessons learned from building and testing Bloom, along with future research directions. This paper makes two key contributions: (1) exploring the added value of integrating multiple PER techniques into an interactive artifact in relation to emerging adults’ well-being and (2) delineating the design methodology applied to conceptualize an interactive artifact.



**Figure 1.** (Left): A phone placed on one of Bloom’s six sensors activates two flowers that guide users in regulating positive emotions. (Right): An interaction scenario showing how Bloom supports casual conversation.

## 2. Background

This section establishes the theoretical and methodological foundations that inform our research into designing for PER. We first review the theoretical underpinnings of PER, emphasizing its relevance to technology design. We then discuss experiential versus didactic approaches, highlighting their implications for fostering emotional engagement during casual social interactions. Following this, we outline autobiographical research through design as our methodological framework, a method that uniquely positions researchers as both designers and participants, enabling rich, first-person insights into subtle and personal emotional experiences. This review lays the foundation for Bloom’s design approach, which we reported in detail in subsequent sections.

### 2.1. Positive Casual Conversations Through Positive Emotion Regulation

The field of design and HCI has seen a growing interest in technologies that support PER [18]. These technologies are designed to assist individuals to enhance and prolonging their positive emotional experiences, leading to improved well-being [19]. Unlike traditional approaches to designing for emotion, which viewed users as people who underwent the emotional experiences being designed for, technology-enabled PER acknowledges that users actively use technologies to purposefully influence their emotional states [20]. PER specifically focuses on scaffolding opportunities for users to upregulate their positive emotions before, during, and after positive events [21]. For example, consider how someone might enhance their experience with a food delivery app. Before ordering, they might browse restaurants to build anticipation. During the meal, they can savor the food and appreciate the convenience. Afterward, sharing their experience on social media helps them relive those positive feelings. These examples show how technologies can support PER through various techniques, such as reminiscing and sharing positive experiences [22].

Casual conversation, as part of social interaction, has been recognized as a key factor in the flourishing of emerging adults. It helps fulfill their need for “relatedness” [23],

while shifting focus away from themselves and alleviating feelings of isolation [24]. Hence, Bloom was designed for emerging adults because of their difficulty regulating emotions in everyday experiences [6]. This population experienced the sharpest decline in mental health among all US demographics during the pandemic [25]. Their ability to enhance positive emotions is crucial, particularly in post-pandemic life, where higher levels of positive emotion correlate with greater resilience [26].

Note that PER is more than just having information about what to do. PER-enabling technology should focus on supporting experiences rather than giving instructions. In this regard, we focused on leveraging tangible quality of human–technology interactions to promote PER techniques. One advantage of using tangibility of interactions is the heightened level of engagement [27]; it creates a sense of intimacy and lowers barriers to adoption in daily routines [28]. The tactile nature of physical object interactions can be psychologically grounding, encouraging present-moment awareness [29]. This tangible engagement becomes especially valuable in social contexts: when friends interact with the same object, it creates a sense of community and shared purpose, reinforcing positive behavior [30]. Additionally, as symbolic representations, a tangible object can remind users of meaningful experiences [31]. Thus, it was decided to scaffold PER techniques into tangible interactions with an artifact as a resource that enables positive activities that facilitate PER.

## 2.2. First-Person Method: Autobiographical Research Through Design

First-person method, particularly autoethnography, is used across disciplines including anthropology, sociology, theology, and religious studies. It combines self-observation with reflexive analysis to gain insights into social or cultural issues [32]. This method involves researchers examining their own experiences to understand broader phenomena. This method has gained prominence in design and HCI by challenging the traditional separation between designers and users [33]: “users are not designers” and “designers are not users”. This designer–user divide emerged during the early days of usability research, which emphasized efficiency metrics and focused primarily on task completion. As the field evolved, designers broadened their perspective to include experiential aspects like hedonic pleasure, emotional resonance, symbolic meaning, and subjective well-being [34]. Within this expanded “humanity-centered” framework, the rigid distinction between designer and user has proven inadequate, particularly when exploring subtle, personal experiences that remain hidden from a third-person perspective [35].

First-person methods enable researchers to probe elusive dimensions of interaction by examining designers’ own embodied, lived experiences in natural settings. This approach offers rich insights that conventional observational methods cannot capture. In recent years, this methodology has gained recognition and support, as shown by initiatives like the ACM Transactions on Computer–Human Interaction’s Special Issue on first-person research [36], which highlights its value and rigor. Researchers have used this method to study diverse topics, including living without a mobile phone [37], a robotic pet [38], and sleep habits [39]. More pertinent to this paper, the method has illuminated experiences with designs for social relationships, e.g., [40,41], and technology’s social impact [42].

In this paper, we adopt autobiographical research through design as our main approach, combining it with research through design methods to gain insights from our personal experiences with Bloom. Neustaedter and Sengers [43] and Neustaedter, Judge [44] define autobiographical design as “design research drawing on extensive, genuine usage by those creating or building the system”. The authors note that “by ‘genuine’ usage we mean it is based on true needs of the researchers, rather than them pretending to have needs expected of targeted users” [43]. Through this approach, designers implement their

concepts in their daily lives, document their experiences, reflect critically, and iterate on improvements.

Research through design centers on reflection during the design process of artifacts—typically interactive prototypes—that “provide concrete embodiments of theory and technical opportunities” [45]. Creating these artifacts combines behavioral science theories and models (i.e., “true knowledge”, such as social psychology’s theories of ER and subjective well-being in the case of this paper) with engineering’s technical capabilities (i.e., “how knowledge”). The iterative design process yields both tangible outcomes and knowledge contributions through exemplars. These exemplars help transfer embedded knowledge and values into practical applications. Additionally, artifacts can uncover unexpected effects, revealing gaps in existing knowledge [45]. The artifacts are grounded in qualitative insights from personal experiences and ethnographies (i.e., “real knowledge”).

Through autobiographical research through design, the first two authors—who represent the intended user population of college students facing social interaction challenges during and after the COVID-19 pandemic—immersed themselves in Bloom’s development and use. This integration helped us understand emerging meanings in design practices through an iterative process of design, personal use, reflection, and refinement. While we could have used alternative methods like interviews or participant observation to investigate Bloom’s impact, each had limitations. Interviews require participants to recall experiences retrospectively, which can lead to memory biases and miss spontaneous emotional and behavioral responses [37]. Participant observation introduces an external presence that may disrupt the natural flow of social interactions, especially in private, intimate settings like shared living spaces [36]. Our approach intended to overcome these limitations by embedding the researcher within the experience, allowing for real-time reflection on interactions with Bloom.

The work of Gaver and Gaver [46] on living with a low-tech communication device and the study of Chien and Hassenzahl [40] on technology-mediated relationship maintenance exemplify our approach. Over a period, these authors traced the trajectory from building and testing their devices, through early trials and challenges, to their settled day-to-day use. Their work demonstrates how autobiographical research through design serves as a mode of knowledge production. In our case, through deep engagement with the design and personal use of Bloom, we aimed to understand how design practices can enhance social interactions and foster well-being. Like other first-person method e.g., [42,47], we examined how design features could stimulate and enrich casual conversations. Through this approach, we aim to contribute to intermediate-level theories [48,49] by documenting both our experiential account and Bloom’s development as an exemplar.

### 2.3. *Experiential-Versus-Didactic Emotion Regulation Technologies*

ER technologies fall into two main categories: (1) “didactic” interventions that focus on explicit instruction and reflection (e.g., psychoeducation apps), and (2) “experiential” interventions that immerse users in interactions facilitating ER without direct instruction [15]. Most traditional systems use a didactic approach with explicit reminders, cognitive instruction, and self-reflection tools. For instance, systems like MyCompass [50] help users track their emotional states through journaling and biodata monitoring. The didactic category also includes structured learning tools like Unified Protocol [51] which guides users through self-reflection and ER practices.

In contrast, experiential ER technologies focus on non-verbal, implicit engagement. These include subtle interventions such as tactile biofeedback wearables in work contexts, e.g., [18] and video games, e.g., [52] that modulate users’ physiological states without explicit instructions. These systems tend to use implicit haptic or visual cues (e.g., ambient

lighting changes, vibration patterns, and graphics overlay) to guide users toward specific behaviors without verbal instructions [53]. While didactic systems work well in therapeutic settings, they require active cognitive engagement that may not suit spontaneous ER in everyday social situations like casual conversations. We, therefore, designed Bloom as an experiential ER technology that enables first-hand practice of PER techniques without explicit guidance, building on prior work in experience-driven ER [15]. We expected this experiential approach would better foster embodied ER practices in long-term, everyday settings. Below, we describe Bloom's development process and usage scenarios.

### 3. Developing Bloom: A Prototype to Facilitate Flourishing Conversations

This section details the design and methodological decisions made throughout its development. First, we describe our personal use of autobiographical research through design, outlining how integrating designer and user roles facilitated rich, embodied insights into casual social interactions, enabling continuous refinement based on firsthand experiences. We then report the process we followed to identify and validate specific PER techniques that informed Bloom's development. Lastly, we illustrate Bloom's key design features and interactions through concrete usage scenarios to demonstrate how these chosen PER techniques manifest during everyday interactions.

#### 3.1. Applying Autobiographical Research Through Design

Our process began with context immersion, as described by Chien and Hassenzahl [40], where we studied casual social interactions in a college residential setting. This initial phase used Experience Prototyping [54] to create scenarios where design and technology could facilitate PER in everyday conversations. Experience Prototyping helps participants reenact specific activities and explore factors that shape their experiences. This method proves particularly valuable when studying user experiences. By directly experiencing situations rather than merely observing demonstrations, participants can develop deeper empathy, becoming more aware of subtle influences such as technology, social dynamics, time constraints, and environmental conditions [55].

For example, we (the first two authors) explored how removing smartphones from conversations affected emotional engagement and social connectedness during a two-week exercise with our roommates. We faced down our phones on a coffee table during casual conversations on the couch, simulating conditions where Bloom might be used (see Figure 2). This experience prototyping approach helped us observe how Bloom could facilitate positive conversations through PER prompts. As both designers and participants, we gained unique firsthand insights into how our design choices influenced real-world usage and engagement. Since casual conversations in shared living spaces are deeply personal—people engage more authentically with those they trust—our approach enabled immediate iteration and adaptation, unlike third-person studies with delayed feedback. We documented our reflections and insights in a journal while iteratively sharing experiences and discussing the intersubjective nature of these interactions. Our roommates' participation provided valuable external perspectives, balancing the autobiographical aspects of the study with outside input [43]. Through this exercise, we simulated Bloom's intended function and gained insights into incorporating PER techniques into casual social settings.



**Figure 2.** (Left): College residential setting used for experience prototyping. (Right): Testing restricted smartphone usage.

### 3.2. Positive Emotion Regulation Technique Selection Process

We selected PER techniques for Bloom through analyzing casual gathering scenarios and iterative reflection. We identified contextually relevant techniques and assessed their potential value by observing activities and motivations during these gatherings. The selection process was guided by Yoon and Faulk’s typology of PER techniques (hereafter, PER typology) [56]. This typology is a validated framework designed to help researchers learn, compare, and analyze 25 different techniques. Each technique outlines ways design and technology can facilitate PER. This typology offers a vocabulary of PER techniques while enabling an empathetic approach to envisioning how design can enhance users’ positive emotional experiences.

Based on the PER typology, we evaluated various PER techniques while developing and testing early Bloom prototypes. This evaluation led us to select five techniques most relevant to Bloom’s purpose (see Table 1). In choosing these techniques, we ensured they worked harmoniously, avoiding any conflicting approaches [57] (e.g., delaying gratification versus indulging immediate pleasure). Our prototype testing assessed these chosen PERs were most effective at enhancing positive emotions during casual conversations (see Section 4 for details).

**Table 1.** PER techniques that Bloom encourages (excerpt from PER typology Yoon and Faulk [56]).

PER Technique	Description
Being immersed and absorbed	Becoming fully engaged in a positive experience or its aspects, existing only in the present. Example activity: Creating a mural at a school with students, focusing only on the act of painting together.
Engaging in a collective	Joining in, or contributing to the shared concerns of a group. Rather than feeling apart from a sense of communal purpose. Example activity: Participating in a marathon to raise money for a sick colleague.
Creating a savoring atmosphere	Creating or rearranging the environment to physically, psychologically, and socially support the intended positive experience. Example activity: Lighting candles and playing romantic music during your anniversary dinner.
Sharing the positive experience with others	Creating a ripple effect between you and others in response to positive experiences. Example activity: Encouraging your friend to try a terrific new restaurant you discovered.
Infusing ordinary events with positive meaning	Enriching day-to-day experiences with language, thoughts, and actions that promote positive associations. Rather than seeing experiences only in a functional way. Example activity: Inventing a nickname for your smart lamp so that you can speak of it playfully.

### 3.3. Process Prototype Design and Interaction Scenarios

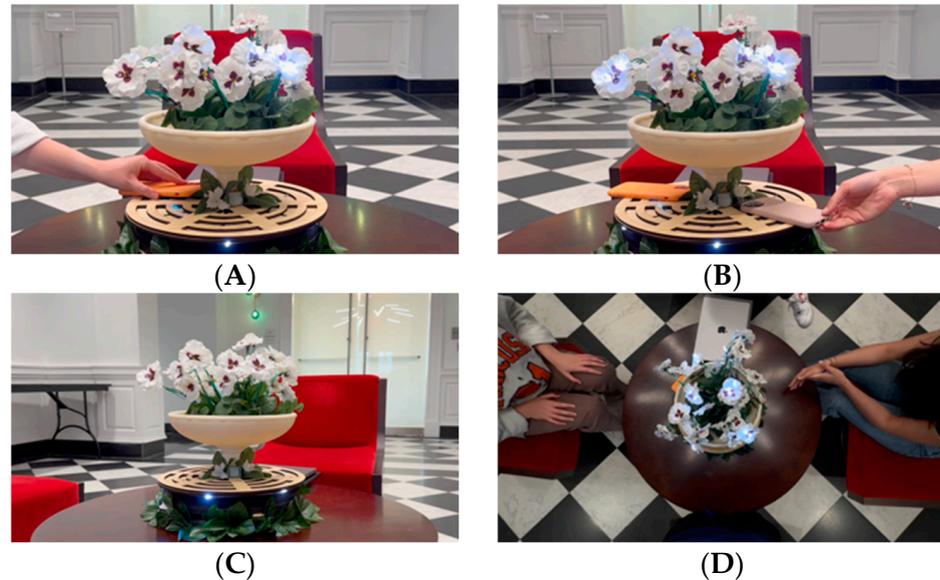
We designed each feature of Bloom to support the chosen PER techniques in complementary ways. The following interaction scenario illustrates how Bloom's features foster these PER techniques.

- **Late-night dorm room hangout:** After finishing their study sessions, a group of students gathers spontaneously in their dormitory lounge. They sink into the couches and place their phones on Bloom, ready for a relaxed conversation to unwind from the day.
- **Being immersed and absorbed:** As Bloom's flowers light up, the students become absorbed in conversation. They discuss lighthearted topics such as favorite music, campus gossip, and travel plans. Bloom's gentle glow helps them stay in the moment, free from phone distractions.
- **Engaging in a collective:** Each phone placed on Bloom activates more lights, a subtle reminder of their shared engagement. The collective lighting reflects the inclusive, relaxed atmosphere, making everyone feel connected to the group.
- **Creating a savoring atmosphere:** The soft, ambient light transforms the casual hangout into a warm, inviting space. In this relaxed mood, time seems to slow, and students feel comfortable sharing deeper thoughts about their future dreams.
- **Sharing the positive experience with others:** The group exchanges funny stories from the week, laughing and bonding over shared experiences. They often note how much they are enjoying this low-key hangout, with Bloom's light serving as a visual reminder of their time together.
- **Infusing the ordinary with special meaning:** Bloom elevates what could have been an ordinary late-night chat into something special. The device transforms a spontaneous gathering into a memorable moment, leaving the group feeling more connected and refreshed.

A key design decision behind Bloom was balancing efficiency (ease of use and accessibility) with novelty (how design can support multiple PER techniques). We focused on our question of how design could facilitate meaningful social interactions through various PER techniques, rather than creating complex technological solutions. While emerging technologies, such as AI-driven personalization or smart-sensing capabilities, could enhance Bloom's functionality, we prioritized low-friction approaches to support our rapid, iterative research through design process. This emphasis on simplicity enabled immediate and seamless integration during our prototype building and testing cycles, using it as a research means [45].

During our design process, we explored different interaction methods and assessed the prototype's usability before choosing glowing flowers as Bloom's key feature. We incorporated a biophilic element because it has been shown to enhance subjective well-being among college students [58]. We first tested sound feedback, thinking audio cues might help people stay focused during conversations. However, our early prototypes showed that sound created unwanted distractions, interfering with conversations instead of supporting them. We then tried haptic feedback with gentle vibrations, but this approach had limitations. Since haptics need direct physical contact with each person, they did not align with its aim of creating shared, collective experiences and were not suitable for subtle, ambient interactions. Light-based interaction appeared to be the most successful approach. Based on feedback from our roommates and our own testing, we discovered that glowing flowers created a welcoming, peaceful atmosphere while gently encouraging social connection. Light could be experienced by everyone without demanding attention, aligning with prior research that shows ambient lighting improves social cohesion through shared environmental awareness [59].

The top half of Bloom is a vase with a floral arrangement and two embedded LEDs in each of the light-up flowers, while the bottom half is a wooden disc that has six symbols where up to six phones can be placed. Each symbol has a light sensor that activates two flowers when a phone is placed on top, blocking light from reaching the sensor (see Figure 3A). This interaction was meant to encourage users to place their phone on Bloom to see the flowers light up (i.e., being immersed and absorbed; creating a savoring atmosphere; Infusing the ordinary with special meaning), and as more phones are placed on Bloom, more flowers light up, making the experience more aesthetic as more participants join (i.e., engaging in a collective; sharing the positive experience with others; see Figure 3B).



**Figure 3.** (A–D) (top left to bottom right) Usage of Bloom.

On the outer edge of the wooden disc, a ring of LEDs displays a breathing light pattern when activated by three motion sensors positioned where the vase meets the disc (i.e., creating a savoring atmosphere; see Figure 3C). These breathing LEDs are designed to attract users to sit next to Bloom. The wooden disc houses three Arduino boards and a battery underneath. Since we designed Bloom for social moments in residential communal spaces, we needed it to fit on a small table. The artifact had to be large enough to hold multiple phones while remaining unobtrusive. Through testing various vase sizes, we ultimately chose a 12-inch vase diameter for better coverage. We also tested wooden discs with different smartphone placement symbols. We invited our roommates, who had participated in earlier Experience Prototyping, to evaluate the discs and indicate which designs they found most appealing. The simplest pattern proved most pleasing, as it didn't compete visually with the flowers. See Figure 4 for a prototype diagram highlighting the two technology-enabled interactions on Bloom.

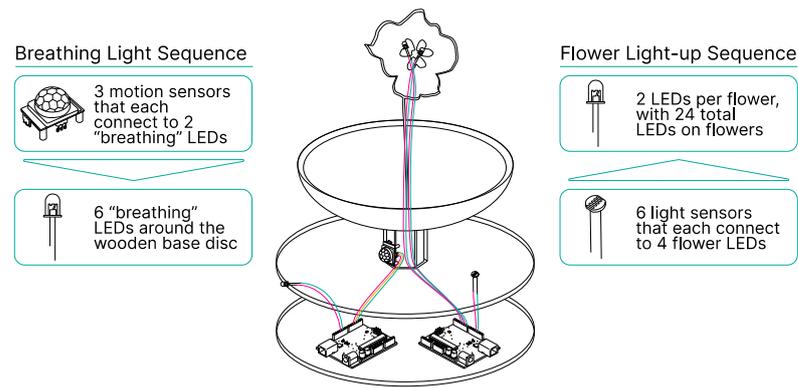


Figure 4. Prototype diagram.

## 4. Evaluation: Experiences of Using and Living with Bloom

This section critically examines Bloom in real-world use, reporting how effectively it facilitates PER techniques in authentic social interactions. Our evaluation used autoethnographic and reflective methods to systematically document user experiences and identify areas for refinement, forming an essential part of our iterative research process.

### 4.1. Method and Data Analysis

During a one-week study, we conducted autoethnographic research [32] to examine how Bloom affected four aspects of interaction: (1) its effectiveness in encouraging the five PER techniques, (2) its role in fostering conversation engagement, (3) its impact on the space's atmosphere, and (4) the meaning we derived from Bloom-mediated social interactions. The study gathered data from four participants: the first two authors and their two roommates. After each Bloom-related conversation, all participants individually reflected on and discussed both their personal and shared experiences.

To complement our autoethnographic reflections, we used a brief daily survey that helped participants reflect on their experiences and provided structured feedback about Bloom's impact on social interactions. In design/HCI research, reflective surveys often help participants process their experiences and give systematic feedback without requiring strict quantitative validation [60]. Our survey contained three 5-point Likert-scale questions assessing immersion ("To what extent do you feel immersed and absorbed in this conversation?"), engagement ("To what extent does using Bloom help you feel engaged with who you're having a conversation with?"), and significance of conversations ("To what extent does this conversation having special meaning to you?"), as well as an open-ended question inviting participants to describe Bloom's impact in 1–2 keywords. While not intended as a formal quantitative study, this method provided a complementary perspective to our first-person insights, helping us gauge user perceptions in a structured manner (see Section 4.2.4, for the results). We documented our experiences with Bloom in a journal immediately following social interactions to capture in-the-moment reflections, reducing retrospective distortion and enabling richer, contextually grounded insights.

Importantly, the autobiographical research through design approach involved a dual role for the first two authors, who served simultaneously as designers and primary users. This duality allowed us to deeply engage with both the conceptual and technical development of Bloom and the experiential aspects of its use, providing nuanced insights into subtle emotional and interaction dynamics that might remain unnoticed from a third-person observational standpoint. However, this dual role also heightened the possibility of confirmation bias [61], as our perceptions and interpretations could be inadvertently shaped by our design intentions and familiarity with Bloom's functionalities. To minimize these biases, we actively involved our roommates as external participants whose perspectives

provided valuable counterpoints to our internal reflections. We systematically recorded their experiences through discussions and reflective surveys, further supplementing our interpretations. Additionally, by explicitly grounding our analysis in the established PER theoretical framework, we ensured a structured, theory-driven analytical approach.

The qualitative reflections were analyzed using a thematic analysis approach that integrated both inductive and deductive strategies [62]. This method allowed for the identification of themes that naturally emerged from participants' experiences (inductive) while also structuring the analysis around the five PER techniques guiding the study (deductive). To enhance reliability, the analysis process involved first two authors and refining themes to mitigate subjective bias. Discrepancies in analysis were discussed iteratively, ensuring interpretative consistency.

#### 4.2. Results

We (the first two authors) observed that interactions with Bloom facilitated all five intended PER techniques, occurring both individually and in combination (outlined in Table 2). This section describes our findings across eight areas: (1) initial experiences, (2) integrating Bloom into daily life, (3) contextual factors, (4) enhancing social interactions, (5) personal dynamics, (6) challenges and adaptations, (7) evolution over time, and (8) additional findings.

**Table 2.** PER techniques supported by Bloom and emergent behaviors.

PER Technique	Description
Being immersed and absorbed	Bloom fostered sustained engagement by removing external distractions and creating an immersive, uninterrupted experience. The soft lighting and slow transitions helped stay present in the conversation in a calming way.
Engaging in a collective	Bloom transformed individual engagement into a shared experience, reinforcing social presence. When multiple people placed their phones on Bloom, the light intensity increased, creating a collaborative interaction ritual—a collective moment of commitment that reinforced the feeling of being part of a group conversation.
Creating a savoring atmosphere	Bloom's lighting and slow, rhythmic feedback encouraged mindful reflection and emotional resonance; the glowing flowers made the space feel more intimate and helped appreciate the conversation more deeply.
Sharing the positive experience with others	Bloom functioned as a social cue for positive reinforcement, reminding everyone of their shared experience. Seeing the light respond to their presence reinforced the importance of their conversation, making it feel like a special, collective event.
Infusing ordinary events with positive meaning	Bloom elevated casual interactions by giving them symbolic weight. The physical act of placing a phone on Bloom became a ritualistic gesture, reinforcing social accountability and emotional investment.

##### 4.2.1. Initial Experiences

From the outset, we anticipated that Bloom would draw people in with its aesthetic appeal, combining floral arrangements with sensor-triggered glowing lights. We placed Bloom at the center of our coffee table, the heart of our communal area. Our dormitory's

layout, with four rooms surrounding the shared living space, made it visible from every corner. As the first thing anyone noticed when entering, its central location naturally invited interaction.

Seeing Bloom in action for the first time was truly memorable. We felt a powerful mix of awe, relief, and joy. As phones were placed on the device, watching the flowers light up was satisfying, creating an immersive, contemplative atmosphere. (i.e., *Being immersed and absorbed*). “Wonder” was how one roommate described it, capturing how such a simple interaction could be so engaging. The glowing flowers emerged as everyone’s favorite feature, earning enthusiastic responses. As another roommate puts it, “I find myself wanting to continue talking with the ambiance of Bloom in the background”. Though we initially set up test interactions, Bloom’s design helped these moments become natural over time. Conversations started with their curiosity about Bloom itself: our roommates asking about its construction, the glowing lights, or our building process. These discussions then flowed naturally into conversations about daily life and college experiences.

#### 4.2.2. Integrating Bloom into Daily Life

As Bloom settled into our shared living space, we noticed its presence transformed our quick passing interactions into longer, more personal conversations. Positioned at the center of our coffee table, it remained visible and accessible, naturally drawing us together to connect. Instead of just catching up while standing in the kitchen or hallway, we often found ourselves drawn to sit on the couch by Bloom, pursuing deeper dialogue (i.e., *Engaging in a collective; Being immersed and absorbed*).

Placing our phones on Bloom became a shared ritual, occurring once or twice a day when we gathered. The act of setting down our phones and watching the flowers light up provided not only a pleasant experience but also made us more inclined to extend our time together (i.e., *Being immersed and absorbed*). As the first author recalled, “I didn’t feel the urge to check my phone like I usually do. It was available, but I just wanted to be present”. One notable aspect was how Bloom fostered a sense of autonomy and conscious decision-making in our interactions. We placed our phones visibly on Bloom rather than hiding them away. This visibility clearly showed us how our actions directly influenced Bloom’s visual feedback. Even when someone’s phone rang or a notification came through, we observed a tendency to check the phone quickly and then return it to Bloom, motivated by the desire to keep the flowers illuminated and maintain the shared atmosphere. The immediate feedback of the glowing flowers made us more conscious of our choices. It was not about locking phones away or forcing disconnection—it was about making a deliberate, active decision to place them there (i.e., *Infusing ordinary events with positive meaning*). This transparency and open-ended control encouraged us to leave our phones on Bloom, aware that we were contributing to an ongoing shared experience (i.e., *Engaging in a collective*).

#### 4.2.3. Contextual Factors

The effectiveness of Bloom varied significantly with the time of day and setting. While the low-intensity LED lights, particularly those around its base, were difficult to notice during daylight hours, it came alive in the evening. As dusk fell and natural light faded, these subtle lights became more visible and aesthetically pleasing. The glow seemed to signal a moment of confidentiality and trust (i.e., *Creating a savoring atmosphere*). The contrast between the darkened room and illuminated flowers produced a cozy, calming ambiance that enhanced our environment. Placed at the center of our living room coffee table, it became an integral part of our shared space, naturally enhancing everyday connections. Bloom’s presence encouraged our casual interactions to be more intentional and grounded.

It drew us into the moment effortlessly, creating an atmosphere where longer, more intimate, non-judgmental conversations could continue (i.e., *Engaging in a collective*).

#### 4.2.4. Enhancing Social Interactions

In a busy household of four roommates with conflicting schedules, genuine, uninterrupted deeper conversations were rare. We found that Bloom served as a subtle yet private invitation to pause and connect, prompting us to spend moments together in conversation, even during our hectic days. (i.e., *Engaging in a collective; Creating a savoring atmosphere*). Even brief 15 min chats became valuable moments as it created a safe space for open sharing. Through these spontaneous conversations, we gained unexpected insights into each other's lives and struggles, and became more aware of our daily moods and feelings, involving some sensitive topics like family relationships and career aspirations. Through Bloom's facilitated conversations, we discussed our feelings more openly, which created deeper emotional awareness and stronger personal connections. One of the most significant changes was the reduction of distractions, particularly from our phones. Placing our phones on Bloom not only kept them out of our hands but also signaled to each other that we were fully present and committed to the conversation, fostering a sense of accountability—both to ourselves and to each other (i.e., *Engaging in a collective*). Conversations became more intimate and open as the absence of interruptions encouraged active listening (i.e., *Being immersed and absorbed*). The feeling of full participation, especially when all of flowers were lit up, added a layer of satisfaction and positive reinforcement to stay engaged, making these moments feel even more special.

The daily reflective survey results also provided a helpful complementary perspective. When using Bloom, our engagement levels increased, with average ratings between 4 and 5 across the three survey questions, suggesting that Bloom deepened conversational involvement. Additionally, qualitative descriptors included terms like “enchanting”, “captivating”, “whimsical”, and “mindful”. The survey, while preliminary, provided a helpful signal that Bloom consistently supported conversational engagement and helped us recognize shifts in our interactions.

#### 4.2.5. Interpersonal Dynamics

Our roommates' individual personalities and preferences influenced how they engaged with Bloom, both in frequency and depth. One roommate showed particular interest in Bloom's design and functionality, frequently interacting with it. Another roommate took a more casual approach, engaging with Bloom only occasionally, which reflected her different comfort level with new experiences. These differences in engagement were not surprising, as personal dynamics shape how individuals approach new experiences. The varying levels of interest affected how Bloom was used in our space. The more engaged roommate fostered frequent interactions and encouraged participation, while the less engaged roommate's reserved approach influenced group dynamics differently. Though we never directly discussed the reasons behind these individual differences, personal inclinations shaped how Bloom became part of our daily routines.

#### 4.2.6. Challenges and Adaptations

Although Bloom functioned well and enhanced our social interactions, we faced several challenges that affected our experiences. The main technical issue was Bloom's need for constant power, which required a visible laptop (placed under the coffee table) and extension cord. This setup reduced its aesthetic appeal and disrupted the ambiance we wanted to create. The large laptop under the table and cables across the floor created visual clutter, detracting from what should have been a calming and immersive experience. During the first two days, interactions with Bloom felt somewhat artificial since we approached

it as an experiment rather than a natural gathering space. We sometimes felt obligated to sit near Bloom, leading to brief, less engaging conversations. Though these interactions were pleasant, they lacked the energy and depth of our more spontaneous gatherings.

An unintended but delightful adaptation emerged as our roommates began treating Bloom more like a playful toy. Instead of just using it to facilitate conversations, they often enjoyed experimenting with moving their phones around on Bloom, watching different flowers light up in response. This playful behavior transformed the experience, making us enjoy spontaneous moments of casual interaction together (i.e., sharing the positive experience with others). Though unplanned, this behavior revealed its versatility in engaging us and brought an unexpected element of delight to our experience.

#### 4.2.7. Evolution over Time

Our interactions with Bloom evolved throughout the week, shifting from an initial curiosity to a natural part of our daily routine. In the first few days, we used it about twice daily, with our conversations centering on its mechanics and construction. This period of intense interest revealed our appreciation for Bloom's aesthetic appeal and the enchanting ambiance it brought to our shared space. (i.e., *Creating a savoring atmosphere*). Over time, Bloom became less about its physical presence and more about the conversations it fostered. Instead of just triggering initial curiosity, it stimulated an ongoing shift in how we engaged with each other. One roommate shared, *"At first, we used it because it was new. But later, it became part of how we opened up, like we were making space for each other"*.

Through our direct involvement in building Bloom, we developed a strong personal connection to it. It became more than just an artifact; it embodied our efforts, creativity, and collaboration (i.e., *Infusing ordinary events with positive meaning*). Seeing it in action and observing how it influenced our social dynamics was particularly rewarding. Our roommates appreciated Bloom and enjoyed its presence, but they did not form the same deep connection, simply viewing it as a pleasant addition to our shared space. This difference highlighted how personal involvement in a project's creation can deepen one's emotional connection to the final product.

#### 4.2.8. Other Findings—Additional PER Activities

Our analysis of Bloom revealed that it supported additional PER techniques beyond the five we originally designed for. Based on the typology of PER techniques [56], two unexpected behaviors were observed: Self-Congratulation (i.e., taking pride in their role in creating positive experiences) and Temporal Awareness (i.e., consciously appreciating the uniqueness and value of fleeting moments). The act of creating and seeing Bloom function elicited pride, as the first author remarked, *"After going through building all of it, just being like, 'Oh, thank God, it actually works!'"* One roommate appreciated Bloom's ability to enhance brief moments during stressful times: *"It was really nice, especially towards the end of the year when things were getting pretty hectic, to just kind of have a nice, positive, little 'together' experience"*. The other roommate described moments of wonder while interacting with Bloom: *"There was something unexpectedly delightful about it. Each time I placed my phone and watched the lights bloom, I felt like I was catching a small, joyful surprise—something unique that would only last a second but stayed with me"*. These unexpected outcomes revealed Bloom's potential to support various PER techniques, suggesting further avenues for PER through design.

## 5. Discussion

This paper explores how a technological artifact supporting PER techniques could enhance casual conversations among emerging adults to promote well-being. Bloom's design

offers an alternative approach to ER technologies by incorporating multiple PER techniques into a tangible artifact, rather than relying on a single ER technique in isolation. We chose to include multiple PER techniques because different situations call for different ER techniques [16]. For dynamic and private settings like casual conversations, offering various ways to regulate emotions increases the likelihood of improving well-being. Rather than following traditional psychoeducation methods, such as cognitive behavioral therapy, we sought to foster conversation engagement through insights gained from autobiographical research through design.

A key observation during Bloom's evaluation was its ability to mitigate phubbing, i.e., the habitual act of snubbing conversation partners in favor of using a smartphone [8]. Simply placing phones aside during conversations and ambient presence encouraged them to put away their phones, remain engaged, and sustain deeper conversations. This aligns with prior findings on socially embedded interventions that subtly shape behavioral norms by reinforcing attentional focus and collective presence [63]. Overall, it created an atmosphere that prompted more intentional social engagement, turning moments into a shared ritual, a symbol of our commitment to being present with each other. While our experiences with Bloom aligned with the five PER techniques, we acknowledge that its effectiveness varied with individual preferences and group dynamics.

### *5.1. Methodological and Theoretical Contributions*

By integrating autobiographical design with research through design [43], Bloom exemplifies how first-person methods [35] offer unique personal and emotional aspects of design interventions. The approach proved particularly valuable for exploring the subtle, experiential qualities of technologies that scaffold PER techniques. A key strength of this study was the researcher's dual role as both designer and participant, which yielded deeper insights than traditional observational studies could achieve. Casual conversations in shared living environments are deeply personal and sensitive; participants engage more authentically with people they trust and know well. An external researcher, even as a passive observer, would disrupt this natural social dynamic. By participating as intended users—emerging adults navigating post-pandemic challenges—we could observe the subtle emotional shifts, spontaneous conversational patterns, and relational dynamics that Bloom facilitated. Specifically, we have shared our week-long experience living with Bloom, from building and first trying the device through early challenges to our daily routines. We detailed the key features of Bloom and explained how their usefulness depends on our physical and social contexts, particularly our relationships with roommates. This first-person perspective enabled deeper reflection on how design decisions influenced user engagement and how Bloom evolved over time. We believe this account is a contribution in its own terms as a resource for designers and researchers seeking to build or study similar technologies.

While existing ER technologies primarily focus on bio-feedback mechanisms or negative emotion downregulation [15], Bloom integrates multiple diverse PER techniques to foster positive emotional engagement—a proactive and intentional effort to upregulate and extend positive emotional experiences before, during, and after events [21]. This shift acknowledges that promoting well-being goes beyond reducing negative affect. It requires actively enhancing positive emotions such as joy, connection, and satisfaction [64]. Incorporating multiple PER techniques reflects that well-being is dynamic, requiring flexibility to adapt to varying emotional and social contexts [16]. Departing from didactic ER technologies that require deliberate cognitive engagement, Bloom functions implicitly, allowing users to regulate emotions without breaking conversational flow. First-hand experiences facilitated by Bloom creates a non-intrusive collective ritual, reinforcing socially

situated ER rather than individualized experience. The autobiographical lens enabled us to observe how multiple PER techniques collectively enriched casual conversations, elevating routine experiences into socially resonant interactions. To our knowledge, this aspect contributes to group-based regulation that has been underexplored in prior work. In the following, we describe three key interaction qualities that led to Bloom's acceptance by us and our roommates.

### *5.2. Key Interaction Qualities of Bloom That Contributed to Facilitating Casual Conversations*

We aspire to contribute to intermediate-level knowledge [48] by connecting PER theory with practical design interventions. We annotate our experiences with Bloom to highlight three key interaction qualities that shaped its effectiveness. This approach enhances the transparency of our findings while providing actionable insights for designers creating PER-enabling technology.

#### 5.2.1. Social Accountability

Comparing to other technologies designed to support social interaction and reduce phone usage, Bloom's unique strength lies in its social accountability. Unlike apps or phone settings that rely on personal willpower and can easily be overridden, Bloom introduced an element of motivation rooted in social dynamics. The physical act of placing phones on Bloom and the shared experience of watching the flowers light up created a subtle but effective form of social responsibility. The presence of others and the collective effort to keep our phones on Bloom made it more challenging to disengage by checking our devices. This aspect encouraged us to stay present and fully engaged in our interactions, making Bloom more effective than other tools that focus solely on individual discipline.

#### 5.2.2. Autonomy and Open-Endedness

The design of Bloom was to be inspirational rather than prescriptive. Building on existing approaches to facilitating social interactions e.g., [65], the artifact's ambiguity and open-endedness intended to encourage users to explore its features, which nudges them towards PER activities. Incorporating technology into everyday items holds the risk of introducing further complexities into the users' lives. Therefore, Bloom's design was streamlined to prevent overstimulation and decision fatigue. Bloom worked because it did not force users into specific behaviors or rely solely on individual willpower. Instead, it gently nudged people toward making positive social choices by leveraging social dynamics and offering an unobtrusive way to enhance existing interactions. It encouraged an atmosphere of attentiveness and connection without imposing strict rules. It fostered a sense of autonomy in our interactions, allowing us to make deliberate choices about our engagement. The open-ended control—meaning that Bloom provided subtle interaction cues without strictly enforcing how or when interactions should occur—made us feel like we were opting into a shared experience rather than conforming to prescriptive usage rules. The way users adapted Bloom for playful interaction suggested that flexibility and user agency are crucial components in the design of such technologies. Recognizing that Bloom was well accepted as an enhancer can inform future developments, ensuring that the technology aligns closely with users' social dynamics.

#### 5.2.3. Fit with Context and Enhanced Visibility

Bloom is entirely contingent on the usage contexts and the nature of our relationships. Its effectiveness was significantly enhanced by the environmental context in which it was placed. The interplay of its subtle lighting with the ambient conditions contributed to its ability to create a soothing and engaging atmosphere. Bloom seamlessly integrated into relaxed, casual settings and made its strongest impact during evening hours. This

integration enriched our daily lives while demonstrating how environmental factors shape the effectiveness of interactive designs. The early prototypes were designed with a familiar, welcoming, and nature-inspired aesthetic that could enhance the surrounding atmosphere. These biophilic design elements may serve multiple purposes: catching users' attention, encouraging them to display the device prominently to prevent neglect, and helping reduce stress that often leads to compulsive smartphone checking [66].

### 5.3. Limitations and Future Study Directions

While our findings suggest that Bloom can facilitate multiple PER techniques in casual conversations, its long-term impact remains uncertain. Since the study sample was small and tested over a short period, the results may be influenced by reporting bias and memory inaccuracies. We also have not explored how Bloom integrates into group routines without a designated facilitator. Future research should investigate its use in diverse social contexts, examine how engagement evolves over extended periods, and determine whether any benefits endure beyond early novelty effects. As noted in prior research, habitual behaviors such as phone-checking are deeply ingrained, and users may gradually return to old patterns once the novelty of an intervention fades. Future research should explore how Bloom's influence evolves over extended periods, whether users develop sustained behavioral shifts, and how social accountability might support continued reduction of phubbing beyond the initial adoption phase.

Although autoethnography provides rich experiential insights, it inherently carries risks of subjectivity and limitations in terms of generalizability. The researchers' dual roles as designers and participants could heighten confirmation bias [61]. We aimed to mitigate these issues by incorporating external perspectives from roommates, documenting interactions immediately after they occurred to reduce retrospective distortion, and grounding our interpretations explicitly in established PER theories. Our collaborative autoethnographic process can also be considered akin to duo-ethnography [67,68] in design and HCI literature. In duo-ethnography, researchers critically examine shared experiences through reflective dialogue, enriching insights through intersubjective reflection rather than isolated introspection. This approach facilitated nuanced insights into emotional and relational experiences, but simultaneously shaped the interpretive outcomes by the particular dynamics between the two designer-researchers. The dialogues, negotiations, and interactions engaged in throughout the design conceptualization and evaluation inevitably influenced interpretations. Therefore, insights and thematic patterns identified here might differ if other designers or pairings had undertaken the study.

Future studies could expand beyond the duo-ethnographic approach, incorporating additional perspectives or triangulating findings with external participant observations or semi-structured interviews in other shared living environments. Because the privacy-sensitive context necessitated an autoethnographic approach, broader research in communal settings could further validate and complement introspective insights, and deepen our understanding of Bloom's effect on well-being.

Additionally, our approach may have inadvertently induced social desirability bias. Although we saw no major discrepancies in how Bloom was perceived by the four participants, future studies with larger and more varied samples (e.g., diverse age and cultural backgrounds) are crucial to establish whether these findings can be replicated. Thus, we offer our experiences with Bloom as an exemplar, not a recipe for success. Autobiographical research through design for social interactions technology is still an emerging area. We hope our contributions compensate for these constraints.

Psychological literature shows that people under stress or anxiety have less emotional flexibility, which makes it harder for them to initiate PER behaviors spontaneously [69].

This occurs because stress tends to narrow cognitive and emotional responses to focus on immediate coping [70]. Similarly, emotional receptivity to PER interventions can vary significantly based on psychological resilience and contextual factors [71]. Future research should investigate how Bloom might accommodate or adapt to users who initially show resistance or lower receptivity to PER, potentially through tailored scaffolding or progressive introduction strategies that acknowledge emotional variability and stress conditions. Users' openness to PER could be measured through self-report acceptability and engagement indicators, e.g., the frequency of intended activities and time spent [72].

Although this study sheds light on Bloom's perceived impact on social interactions, we did not systematically record the frequency or duration of use. Our findings suggest that Bloom was actively employed during extended conversations, yet individual usage patterns were not logged. Future research could fill this gap by implementing passive sensor-based interaction logging to gain a more comprehensive understanding. While Bloom's design emphasizes simplicity, subsequent iterations might integrate advanced features, such as AI-driven adaptive interactivity. For example, Bloom could adjust its visual or sensory feedback based on group dynamics or conversational tone. Any enhancements, however, must preserve Bloom's unobtrusive nature as a facilitator of social interaction. Further research is needed to verify whether using technology to incorporate multiple, diverse PER techniques offers greater effectiveness than traditional ER interventions. We plan to investigate Bloom's capacity to foster meaningful discussions, promote sustained subjective well-being, and adapt to various social settings and demographics. Although its appearance may become mundane through sustained use overtime, we expect it would remain novel through its ability to enable varying conversational scenarios.

## 6. Conclusions

This paper explored how to increase subjective well-being in emerging adults through developing an interactive artifact that scaffolds multiple diverse PER techniques in casual conversation settings. This paper provided an overview of designing for PER and the development process of Bloom, along with findings from a study assessing its effectiveness. We selected five PER techniques to support through an iterative design process where we continually reassessed the combination of techniques used. By aligning Bloom's features with the five PER techniques, we demonstrated how they can be scaffolded in interactions. Our findings suggest that using Bloom can increase users' well-being through presenting multiple opportunities to upregulate positive emotions. As emerging adults navigate life's complexities, the use of tangible artifacts that scaffold PER techniques provide a compelling avenue for facilitating positive experiences. We suggest that future designers scaffolding multiple PER techniques should remain flexible regarding their initial selection of techniques. The iterative design process itself might reveal additional or alternative PER techniques. Designers should therefore remain open to reconsidering and adjusting their initial choices. Simultaneously, designers may find it worthwhile to start with a wider range of relevant PER techniques and narrow them down as the prototypes become more concrete with users' involvement and input. As designers, we hope that our work in this emerging area is a starting point for further investigation into designing well-being-enhancing technologies, and the development of design methodologies that aid designers in creating positive user experiences.

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