PURPOSEFUL PLAY: EVALUATION AND CO-DESIGN OF CASUAL MUSIC CREATION APPLICATIONS WITH CHILDREN

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ABSTRACT

The rise of digital technologies has increased interest in democratizing music creation, but current creativity support tools often prioritize literacy and education over meeting children's needs for casual creation. To address this, we conducted Participatory Design sessions with children aged 6-13 to explore their perceptions of casual music creation activities and identify elements of creative applications that support different expressions. Our study aimed to answer two key questions: (1) How do children perceive casual music creation activities and which elements of creative applications facilitate expression? and (2) What insights can inform the design of future casual music creation tools? Our findings indicate that children view casual music creation as involving diverse activities, with visuals aiding in understanding sounds, and engaging in various playful interactions leading to creative experiences. We present design implications based on our findings and introduce casual creation as "purposeful play". Furthermore, we discuss its implications for creative MIR.

1. INTRODUCTION

Digital technologies have sparked interest in democratizing creation as they enable diverse individuals to produce cultural objects [1–3], suggesting we may understand these tools as enhancers of human creativity [4–7]. For example, over the past two decades, there has been a rise in the development and study of Creativity Support Tools (CSTs) in the field of Human-Computer Interaction (HCI) [8]. Despite the abundance of music-related CSTs, including tools such as digital audio workstations [9–11], notation software [12, 13], style-specific composition/identification tools [14,15], and music generation systems [16,17], many fail to cater to children.

Children's creative experiences are often shaped by a limited understanding of social norms [18], implying that systems designed for adults may not fully support their creative endeavors. Moreover, many music applications designed for youth primarily focus on literacy or are deployed in formal education contexts [19, 20]. However, previous work highlights the value of informal and casual music experiences in education [21, 22]. Building on this work, we explore the potential of casual music experiences for children, focusing on casual music creation. We define casual music creation as *creative musical experiences prioritizing the process of enjoyment over product outcome*, drawing inspiration from Compton's research on casual creation systems [23, 24]. While casual musical experiences relate to informal learning [22], this study focuses on how music technology as part of CSTs supports these experiences, providing new ways for children's self-expression rather than skill development. Research shows that supporting creativity is vital for children, as it helps to foster children's identities [25, 26], develop confidence in their creative abilities [27, 28], as well as support brain development [29, 30] and social skills [31].

However, there is a gap in understanding children's MIR needs. This is particularly true in creative MIR, or the use of retrieved music information for creative purposes [7, 32], despite growing interest in creative applications [7, 33]. For instance, only two ISMIR papers address children: one develops the *Children's Song Dataset* for song synthesis [34], and the other involves children in designing a music organization app [35]. While these studies provide insights to children's experiences with MIR tasks, there is still a broader question about how children interact with MIR tasks to meet their unique creative needs. Building off this prior research in MIR, music education, and HCI, we utilized a method of Participatory Design (PD) called Cooperative Inquiry, a type of PD that focuses on designing technology *with* and *for* children [36]. As children are a growing user group of creative technologies, PD can generate developmentally appropriate design ideas and feedback [37, 38], boosting children's self-esteem through facilitating design in a casual setting [39]. We examine children's creative needs while using musical CSTs within creative MIR contexts through two PD sessions with children aged 6-13, addressing two questions: (1) How do chil-

dren perceive casual music creation activities and which elements of creative applications facilitate expression? and (2) What insights can inform the design of future casual music creation tools? This paper contributes to the democratization of music creation by addressing children's unique creative needs in casual music application design. Furthermore, we present a set of design principles to support more playful interactions with music and discuss their implications for future work in creative MIR.

2. RELATED WORK

2.1 Children's Musical Creativity

Creativity is the ability to generate original and valuable ideas [4]. In the realm of music, this translates to realizing such ideas through composition, analysis, or performance [40]. Scholars argue that musical creativity is embodied, meaning environmental factors play a role in shaping creative cognition in music [40–43]. Furthermore, music educator Peter Webster has suggested that musical creativity is more akin to creative processes, or what he terms as moving from a musical idea to a product [44].

For children, there has been a particular focus on understanding their creativity in reference to composition [45–47] in music education contexts. Yet, musical experiences begin early in childhood and are increasingly impacted by popular music experiences with new forms of technology [48–51]. Therefore, children experience music via playful interactions in a variety of modalities [52]. Notably, social-emotional environments, especially those shaped by parents and teachers, can serve as catalysts for children's musical creativity through play [53–55], suggesting that children's musical experiences are impacted by their development, environment, and interactions with technology. While play and technology are crucial in music education and cognitive development, questions remain about how CSTs can enhance casual music experiences and whether these interactions impact children's creativity.

2.2 Creativity Support Tools

Creativity Support Tools (CSTs) are digital resources designed to enhance creativity [8]. Interactive musical systems (IMSs) have shown promise in supporting non-musicians' engagement in music making [56], but domain expertise can influence creativity [40, 57]. Hence, specialized tools have been developed to meet novices' needs, often incorporating critique [58], such as those for novice filmmakers [59] or digital painting systems [60]. Recognizing the importance of personally meaningful creative activities, referred to as "mini-c" creativity, there is a growing emphasis on integrating this perspective into CST evaluation methods [61, 62]. This acknowledgment underscores the significance of understanding children's creative experiences with musical CSTs and adapting design and evaluation approaches accordingly [63]. While technology's impact on children's creativity has been explored in areas like storytelling and video creation [64, 65], its effects on musical creativity remain relatively unexplored [50, 58, 66]. Though tools aiding children in music composition exist, they are often designed for general novices [63], even though previous work has suggested specific design recommendations for other musical acts by children, such as composition at home [45]. Previous research recognizes children's unique creative needs and the potential of CSTs to foster creativity and learning. However, there is still uncertainty about the differences between children's structured and casual creation with CSTs, and how these differences relate to creative MIR.

Pseudonym	Age	Gender	Ethnicity	Sessions
Annie	6	Female	Latino	DS2
Emma	9	Female	Black / White	DS1, DS2
Han	10	Male	Latino	DS2
Jayden	9	Male	Asian / Black	DS2
Keon	9	Male	Asian / Black	DS1, DS2
Liam	9	Male	Asian / White	DS1
Jin	13	Female	Asian / White	DS1, DS2
Taylor	10	Female	Asian / White	DS1, DS2
Seiko	10	Female	Asian	DS1
Zachary	8	Male	Asian / White	DS1, DS2

Table 1. Demographics of Child Participants

3. METHODS

3.1 Participatory Design

For this study, we utilized Cooperative Inquiry (CI) [36, 67], a Participatory Design (PD) method facilitating collaboration between designers and users, thus democratizing the design process. CI specifically emphasizes allowing children and adults to design as equals. This method offers insights into children's learning [67], empowering them to articulate thoughts on complex issues such as family finances [68], gender [69], and creativity [70, 71].

3.2 Participants

The **KidsTeam UW** co-design group comprises adult design researchers (investigators, master's students, and undergraduate students) and 10 child participants, using pseudonyms for confidentiality (see Table 1). Children were recruited through mailing lists and snowball sampling with parental consent and child assent obtained. The research received approval from the university's Institutional Review Board. Two 90-minute design sessions were held in January and February 2024, with five to eight adult facilitators serving as design partners in each session.

3.3 Design Sessions

Our design sessions started with a 15-minute *Snack Time* for socializing, followed by a 15-minute *Circle Time* featuring a "Question of the Day" to warm up for the design activity. Then, participants engaged in small group design activities for 45 minutes in *Design Time*, followed by a 15-minute *Full Group Discussion* for presentations and reflection.

Child	App Name	Description
Annie	Color Block	Users compose by dragging and dropping colored blocks. Users can download the music to share.
Emma	Cat Choir	An app where users may drag different clothing representing different sounds onto cats to compose songs.
Han	Mixtape	Users create and share "mixtapes" by pulling music from streaming services and creating playlists. Also allows for composing with provided sounds and AI.
Jayden	Untitled	Users organize their music and can search, filter, and create albums. They can also remix other songs.
Keon	Untitled	An app to store music files, allowing users to drag and drop music files from other apps.
Jin	Dreamer	A music composition app that acts as a game where users are able to manipulate different environments to create music for a story.
Taylor	Sing-a-Song	Users can create songs by dragging instruments onto tracks and export them with a video or animated characters. Others can remix these songs.
Zachary	Piano God	An app meant to help pianist practice songs using animations to tell users which keys to play.

Table 2. Descriptions of Applications designed by children in DS2

3.3.1 Design Session 1: Playing with Casual Music CSTs

Design Session 1 (DS1) took place in January 2024. We asked the children to play with four different casual music tools to elicit their feedback on different types of casual music applications. The first is *TextAlive* [72, 73], a website that automatically synchronizes lyrics text with music, detects timing information of beats and other musical elements, and allows users to interactively create "lyric videos" – music videos in which lyrics animate in sync with the music. The second tool, *TextAlive Flow* [74] (available on tablet and desktop), is an extension of *TextAlive* that has a more casual user interface. It allows users to touch the screen to change the video's visuals (typography, colors, motion patterns, etc.) while listening to the music. *Incredibox* [75] lets users create songs by dragging and dropping outfits onto animated characters, combining pre-recorded beatbox sounds and melodies. Lastly, *Sketch-a-Song* [76] is a tablet application that lets users tap and drag to add different pitches and sounds. These tools were selected to allow children to engage with various modes of interacting and making with music. During the session, we captured what the children liked, disliked, and design ideas for each app on a sticky note, organizing them into thematic groups on a whiteboard [36].

3.3.2 Design Session 2: Designing Casual Music CSTs

Design Session 2 (DS2) took place in Februrary 2024. We asked the children to "*design a casual music creation app*." We asked them to define what their app allowed them to do with music, and develop a user flow including how they moved between the homepage, creation interface, and to sharing their creations with others. We derived these design aspects from the themes that arose during DS1. Before breaking into our design groups, we shared an example of what a user flow looked like using *TextAlive Flow*. We supplied the children with a large bag with different craft materials and paper, asking them to engage in low-fidelity prototyping of their application [77].

3.4 Data Collection and Analysis

Our hybrid design sessions utilized Zoom for video and screen recordings across three computers for each design group. We recorded a total of 6 hours and 10 minutes of video. Researchers also documented creative artifacts with a camera and took notes on a legal pad. Children's thoughts were summarized during group discussions and collected on a *Google Slides* deck.

We utilized an inductive qualitative approach for data analysis [78]. The initial codebook was developed by the first author through inductively coding recorded session videos. Codes like "*Musical Activities – Remixing*" and "*Control – Variety of Options*" were included in the first iteration. Subsequently, two authors conducted consensus coding [79] on design artifacts, researcher memos, and session videos, adjusting the codebook as needed. In cases of disagreement, a third team member resolved discrepancies. This process led to the final version of the codebook. For example, we applied the code "*App Elements – Control*" to the quote "*when you could see or hear a difference, it makes you feel like you're in more control*." Further descriptions of design artifacts and applications of our codes can be found in our supplemental material. [1]

4. FINDINGS

4.1 Children's Perceptions of Casual Music Creation

Consistent with previous work [48,52], children saw music making as a holistic, process-focused experience [44], and expected to engage in multiple musical activities within a single app. Composing was the most referenced activity, as all DS2 apps except Keon's, which stored music files, involved music composition. Listening to music was also prominent (Han, Jayden, Jin, & Taylor, DS2). Remixing, proposed only in Taylor's and Jayden's apps, was the least suggested activity.

Children's views on the applications were shaped by their past experiences with music and technology, indicating their preferences often reflect experiences with other applications such as music streaming apps [48], as well as their cultural backgrounds and existing knowledge [80]. For example, many applications from DS2, shown in Table 2, also included references to other applications. Emma and Taylor's applications referenced *Incredibox* and *Sketch-a-Song* respectively, imitating the drag and drop features for layering musical sounds. The interface of Zachary's application was similar to the application *Syn-*

[1] Our supplemental material can be found at: `https://doi.org/10.17605/OSF.IO/5DNS6`.

thesia, with falling blocks that demonstrated which keys to play on a piano keyboard. Additionally, there were various ways suggested to supplement listening methods that were similar to other applications such as organizing playlists (Han & Jayden, DS2) or watching music videos (Jin & Taylor, DS2). Additionally, some of the children referenced their previous music education experiences. In our study, Jin, who has taken piano lessons, found *Sketch-a-Song* limiting due to its representation of musical pitches stating it felt "*pedantic*" (DS1). Zachary's app included a piano in the interface, including letters for the different keys. Similarly, Annie included *solfège* (i.e., do, re, mi) as the notes for her app "Color Block."

While the children's interactions initially focused on the process of exploring with music, they mentioned the importance of these customization options to give them a sense of control as they created. This was especially important as the children formed creative products. As an illustration, reflecting on *TextAlive* and *Sketch-a-Song*, Taylor noted "*You can't create your own song [in the apps], you're just designing it, and even then, you don't have much control over it*" (DS1).

4.2 Visuals as a Bridge to Music

Within our sessions, we found a connection between visuals and sounds, with children noting that the aesthetics of an application changed the way the music was perceived. For example, Jin stated: "*I liked changing the colors because even if you're given this format [in TextAlive Flow], since colors have a strong effect on how music is portrayed, you can change the whole vibe, even if you are restricted*" (DS1). Other children noted changing colors to fit their experience was important demonstrated by three distinct sticky notes expressing appreciation for "*many options for colors*," "*all the color options*," and "*cool color range*" when discussing customization in *TextAlive*. During DS1, an adult co-designer also noted that children also became visibly excited when able to use animations in using *TextAlive* and *TextAlive Flow*, as evidenced by a sticky that read the options for animation in *TextAlive Flow* "*are cool*" and another that they liked the "*active lyrics*" as they moved across the screen (DS1 – Sticky Note[2]). Animations also were added into some of the children's apps, such as Zachary, who had boxes that represented musical notes "fly down" from the top of the screen.

Furthermore, the children in our study showed a propensity toward characters and narrative to support their experiences with music. Children noted the reason they enjoyed *Incredibox* was because they "*liked [the] incredibox character's designs*" (DS1 – Sticky Note). Yet, other children highlighted with their dislike of the "*bad outfits*," (DS1 – Sticky Note), suggesting they would like other options that suited their ideas. Children extended the idea of characters into their own apps, such as Taylor and Emma who included an option to have animated characters sing or perform the song the user created (DS2). During the full group discussion in DS1, Jin summed up the importance of the visuals noting, "*when you could see or hear a difference, it makes you feel like you're in more control of what is going on*."

Our analysis further suggests that the visual aspects of an app act as a bridge to better understand musical possibilities. One sticky note from DS1 captured that the kids disliked that the "*MVs [referencing the animation of the characters in Incredibox] don't seem to match/vibe [of the music] naturally*" with the sounds and that it was distracting that the people were "*not wearing clothes before you dress them*" (DS1). In DS2, children also considered colors and aesthetics in their own designs. The sounds in Emma's remixed version of *Incredibox*, "Cat Choir," were all related to cats and cat activities (e.g., scratching, meowing, and purring), to match the sounds to the visuals of cats. Similarly, Annie used different colors to represent different pitches. Jin created the app "Dreamer," a game that lets users play through a young girl's dreams. Each dream had its own visual aesthetic or "*vibe*," corresponding with the sounds and instruments, such as clam shells as percussion instruments in an "*aquatic dream*" as seen in Figure 1.

4.3 Interface Preferences and User Interactions

Children also showed a preference for direct interactions, preferring the ability to manipulate elements through touch, drag, and drop actions. For example, Taylor noted that she "*like[ed] touching [the iPad] instead of the mouse because the mouse was harder to use*" (DS1). Similarly, many of the children's designs in DS2 also included the ability to drag and drop elements, such as the outfits that could be dragged onto cats in Emma's application or the color blocks that could be dragged in Annie's app.

When the gulf of execution [81] in the interfaces was large (i.e., the interfaces do not afford what happens when manipulated), children became frustrated. For example, some disliked the "*confusing*" parameter tuning interface of *TextAlive* that appears next to the video, sometimes forcing them to tweak parameters indirectly. They favored the more direct control of *TextAlive Flow* instead, which allows them to touch the video and change the parameters with their hands. They recommended design enhancements to improve interface usability, citing dislikes such as the absence of instrument labels and clarity on color-to-instrument/note mapping in *Sketch-a-Song* (DS1 - Sticky Note). In contrast, Emma noted a preference for *Incredibox* because it was "*less frustrating*" and "*ignited creativ-*

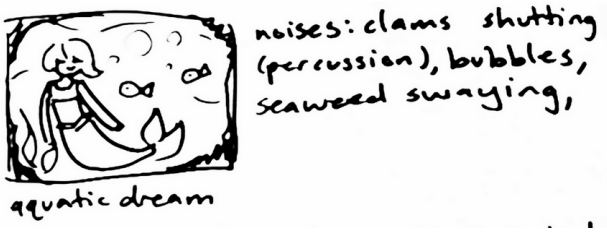

Figure 1. Jin's app "*Dreamer*" from DS2

[2] We use "DS1–Sticky Note" to refer to Likes/Dislikes/Design Ideas captured on stickies during the design activity that were not attributed to a specific child, but instead to the design group.

ity" by representing sounds with symbols rather than traditional instruments (DS1). This suggests that achieving a balance between visual interface design and a certain level of ambiguity is crucial to foster casual creative experiences.

4.4 Sharing and Casual Creative Experiences

In our study, participants highlighted the importance of sharing their creations and ensuring the quality of the final product. For example, children suggested that a sharing option should be added to *Sketch-a-Song* (DS1 – Sticky Note), a feature present in the application, though many of the children were unable to find it. During DS1, another adult facilitator noted some children physically left their groups to share their creations with friends, explaining interesting interactions and experiences documenting their creative choices while using the apps. Taylor and Seiko requested time to share their song from *Sketch-a-Song* with the entire group, indicating pride in their work (DS1), and noted that they felt that it sounded good enough to share. In DS2, Emma, Han, Taylor, and Jin incorporated features allowing users to share and listen to others' creations or playlists in their apps as well. Jin and Taylor's apps even enabled users to create songs with accompanying videos inspired by others (DS2). This suggests that though children were exploring, they also wanted the output of these casual systems to sound good enough to share with others.

5. DISCUSSION

5.1 Purposeful Play: From Process "to" Outcome

Children in our study attempted to balance exploring the possibilities provided by the application with creating personal intermediate outcomes to help express themselves, seeing casual interactions with music as a form of *purposeful play*. We suggest that casual creation is better understood as a "process to outcome" rather than "process over outcome," as we initially stated. In this view, children see themselves as designers of creative works, with the play experience focused on expression.

In our findings, we observed that children wanted the ability to have some sense of control over their experiences (4.1) but that these came via scaffolds such as the visuals of the application (4.2) and interactions with the application (4.3) that lead to shareable outcomes (4.4). This conception of supported play aligns with previous work within music education [22] as well as MIR. Cunningham and Zhang, who conducted PD sessions with children to create a music organizer called *Kids Music Box* suggested the final design of their application offered a "*playground*" for interaction while listening to songs [35, p.190]. Similarly, *PlaceAndPlay*, an application design for creating and recording music, focused on children's ability to simply try things out, with their results noting "*all children had a great time when allowed to just play with the system*" [82, p.738]. Facilitating children's enjoyment and understanding of musical involvement entail not only promoting play but also nurturing their comprehension of cultural contexts [18] and social conventions [25]. More broadly, play can be understood in relation to creative processes [83–85], as many of the cognitive and emotional functions linked to creativity are also evident during play [86].

Importantly, children also expressed a desire for their final product to be share-worthy (4.4), indicating an expectation that their experience would yield a creative product representing their musical experience and tastes (4.1). We suggest that what sets casual CSTs apart from other educational technologies are the creation of "intermediate products." The term "intermediate" can be understood as creative products that move users from what Beghetto and Kaufman suggest are "*intrapersonal creativity that is part of the learning process*" [61], to products recognized by others as creative. This concept of creativity is increasingly integrated into the evaluation of CSTs [62]. Furthermore, our findings underscore the importance of ensuring that casual CSTs for children focus on helping users create intermediate creative outcomes that remain coherent and aesthetically pleasing to support users' creative self-efficacy [28].

5.2 The Purposeful Play Design Toolbox

In this section, we introduce four design principles, deemed "tools," to foster the elements that lead to purposeful play, suggesting specific design features for each.

5.2.1 Controlled Serendipity

Previous work in creative MIR has shown that serendipity is a crucial aspect for supporting meaningful interactions with music information during the creative process [32]. This was an important element in supporting non-musicians in musical creativity [56]. When surprised by an app, children in our study felt excited and inspired, like Emma's excitement with *Incredibox* (4.3). However, they also wanted their creations to feel genuinely theirs, i.e., their individual exploration mattered (4.4). Therefore, casual music tools should offer structured control while guiding users towards aesthetically pleasing results that reflect their goals. Novices often do not have the domain knowledge to identify how to execute specific creative goals or whether those goals are domain relevant [87, 88]. Therefore, a system taking on the role of the guiding professional by supplying options that support a pleasing final product, may help children to feel excited about their creative outputs. For example, both *Incredibox* and *Sketch-a-Song* only supplied notes that corresponded to a specific chord progression, and as a result, any "seemingly" random combination of sound layers or feature options also sounded good to the children. Similarly, *TextAlive* and *TextAlive Flow* supplied templates or color combinations that looked aesthetically pleasing and matched the music. The carefully and intentionally constrained environment was able to provide the sense of serendipity but at the same time produce outcomes that children felt good about and wanted to show off.

Design Features. Implementing structured guidelines alongside controlled randomness provides a framework for fostering creativity. Feedback mechanisms that allow transparency serve to facilitate children in revisiting and elaborating upon moments of unexpected discovery.

5.2.2 Visual Scaffolds

The term scaffold can be understood as the use of a temporary framework for supporting learners as they aim to gain new skills [89]. During our analysis, children expressed consideration of the role of an application's visuals when creating (4.2). In a sense, musical experiences were "scaffolded" by the visual aesthetics of the application, since the intention of the musical technology is to encourage children to develop an aesthetic perspective [90] through clear and direct visual communication of the application's possibilities for creation. When visuals do not align with the sounds, or at least align in a way that a child expected, such as when the animations in *Incredibox* did not align with the music, it can be distracting and take away from understanding of the music, even if the UI design in clear. Yet, as Emma noted (4.3), some ambiguity in the visual scaffolding can also spark creative experiences as well. Specifically, our results emphasize that *color* and *characters* are two visual scaffolds that are effective for children. Furthermore, our findings suggest that children perceive casual creation as encompassing multiple mediums, often utilizing sound and video, aligning with the conception of children's musical experiences being multimodal [52]. Prior research advocates for multimedia authoring activities that enable collaborative reflection among children [91, 92], promoting self-expression [93] at both individual and social levels.

Design Features. Visual elements like real-time visualizations, character-based imagery, customizable aesthetics, and visual ambiguity, when integrated into features designed to evoke serendipitous moments, along with multimodal outputs like videos, can act as scaffolds to support children's musical interest.

5.2.3 Direct Manipulation

Children in our study preferred the ability to directly interact with the interface, which can be understood as a form of direct manipulation [94]. Shneiderman, who suggested the term, notes four features of user interfaces that utilize this concept: continuous representation of the object of interest, physical actions, immediate feedback, and the ability of novices to gain knowledge of the system quickly. Moreover, helping kids manipulate things effectively means showing clear connections within the subject area, which helps them link new skills with what they already know [95]. Furthermore, computer scientist Alan Kay [96] suggests that visuals play an important role in digital spaces–they offer representational systems that through manipulation lead to chains of abstract reasoning that creates *symbols*; in the semiotic terms, these symbols allow a user to externalize through the manipulation of representations [97]. This suggests a connection between the visual scaffolds and potential direct interactions that lead to moments of play in digital creative systems.

Design Features. Interactive elements such as drag-and-drop functionalities, objects responding to user actions, and tactile interactions, will enhance children's engagement and maintain their interest over time.

5.2.4 Shareable Intermediate Outputs

The children in our study wanted the ability to share the creative outputs they were proud of during their exploration of different tools (4.4). Allowing children to share their creative outputs can help build creative self-efficacy [28], which is essential to fostering their view of themselves as creators. Allowing children to share these objects encourages creativity at not only an individual level, but also a social level, which is particularly important as social-environmental factors have been shown to influence creativity of individuals [98]. This is particularly important for children as creativity is largely social for them [53, 55].

Design Features. Sharing options (email, file downloads, replay), galleries of user-generated content, ability to remix or elaborate on others outputs will help support self-efficacy of children as developing creators.

6. LIMITATIONS AND FUTURE WORK

While our research follows established precedents, it has limitations. The small sample size of 10 children, while comparable to similar co-design studies [68, 69], may limit the generalizability of the result. Participants were mainly from a single geographic area, with privileged backgrounds, and familiar with technology and co-design, which may not represent diverse socio-economic perspectives. Future studies should include more diverse demographics, explore evaluation methods for supporting design principles, and investigate features tailored to different MIR tasks in support of purposeful play.

7. CONCLUSION

Our study explored the creative preferences of one user group, children, in casual music creation applications. Through two Participatory Design sessions, we observed children's perceptions of casual musical creation as a personally-oriented process, where visuals and direct interactions allowed children to generate creative works they wished to share with others. We highlighted the importance of purpose in play duirng casual music creation, suggesting that casual creation applications should facilitate the process of exploration of music with the intention of expression. Additionally, we discussed the potential impact of this playful approach on creative MIR by presenting four design tools to support purposeful play and suggesting a set of design features that support these principles. We further believe that these insights transcend children, offering design implications for individuals of various musical skills and recreational adults who wish to explore musical experiences in a variety of ways.

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