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Middle School Students' Experiences of Managing Open Access to Digital Technology in an IB MYP International School Environment: A Cautionary Tale

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ABSTRACT

This study examines middle school students' experiences of managing open access to digital technology within an International Baccalaureate (IB) Middle Years Programme (MYP) context. Conducted in a well-resourced international school where students had unrestricted access to devices outside regular class time, the research was prompted by growing concerns about technology use during break periods. Phase 1 involved surveys and discussions with 98 Grade 6 students to identify emerging wellbeing concerns. Phase 2 engaged six self-identified frequent users in empathy interviews, collaborative dialogue, and co-design processes with teachers. Thematic analysis identified interconnected social–emotional, logistical-environmental, and systemic factors shaping technology behaviours. Students described both benefits (social connection, stress relief) and challenges (dependency, reduced outdoor engagement). Through the MYP Design Cycle, students and teachers co-developed responsive solutions, including balanced access guidelines and environmental redesign. Findings highlight the importance of guided autonomy, intentional environmental design, and participatory dialogue in supporting digital wellbeing. The study underscores the value of student agency in shaping context-sensitive technology practices within international school settings.

1. Introduction

Digital technologies have become a defining feature of contemporary education, shaping how young people learn, communicate, and spend their free time. Within schools, devices such as laptops and tablets offer opportunities for creativity, collaboration, and differentiated instruction (Lei & Zhao, 2008). However, when technology use extends beyond structured learning contexts into unregulated periods such as breaks or lunchtime, these benefits may be accompanied by more complex wellbeing concerns.

Across global settings, educators report an increasing student preference for indoor, screen-based recreation alongside a corresponding decline in outdoor play (Merga, 2015; Schilhab, 2017). At the same time, evidence suggests that moderated digital engagement can enhance

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students' sense of connection and support emotional regulation (Charmaraman et al., 2021; Modecki et al., 2022). This apparent tension underscores a central challenge for contemporary schooling: achieving a sustainable balance between digital opportunity and digital overuse.

The present study examines this tension within an International Baccalaureate (IB) Middle Years Programme (MYP) context. It builds on an earlier inquiry (Kelly, 2022), which identified growing concern among Grade 6 students regarding their ability to self-regulate device use during unstructured time. The follow-up phase reported here explores how a group of students and their teachers interpreted this issue and collaboratively designed contextually responsive solutions aimed at restoring balance between digital and non-digital activities.

Guided by a constructivist–interpretivist orientation and employing a design-based inquiry framework, the study seeks to illuminate the lived experiences of middle school learners navigating open access to digital technology. It contributes to the expanding scholarship on digital wellbeing and adolescent self-regulation while offering practical insights for IB schools seeking to cultivate balanced, reflective, and sustainable technology cultures.

2. Research Context

The study was conducted in an International Baccalaureate (IB) World School offering the Primary Years Programme (PYP), Middle Years Programme (MYP), and Diploma Programme (DP). The school serves a culturally diverse, highly mobile, and affluent community, with students representing more than seventy nationalities. Faculty and staff are similarly international, bringing a wide range of educational backgrounds, languages, and pedagogical perspectives. English functions as the primary language of instruction, while multilingualism and intercultural awareness are actively promoted as part of the school's ethos.

The IB framework provides a particularly rich context for inquiry into student wellbeing and self-regulation, as it explicitly promotes holistic development, global mindedness, and learner agency (IBO, 2017). The MYP, in which this study is situated, emphasizes conceptual understanding, interdisciplinary learning, and reflection through its core components: Global Contexts, Approaches to Learning (ATL) skills, and the Design Cycle. Within this inquiry-based model, digital devices are used extensively across subjects to research, document, and present learning. Consequently, students' engagement with technology is embedded in the daily rhythms of school life.

Although this integration offers clear pedagogical benefits, it also blurs the boundary between purposeful academic use and recreational engagement. Students have ready access to laptops throughout the school day and, in the case of Grade 6, may use them freely during breaks and lunch periods. Over time, this open access appeared to influence patterns of social interaction and physical activity. Teachers observed that many students preferred to remain indoors using devices rather than engaging in outdoor play, even when outdoor spaces were available. These behavioural shifts mirror findings in international research linking increased digital engagement with reduced physical activity and heightened dependence (Michaelson et al., 2020; Twenge et al., 2020). At the same time, teachers were mindful of avoiding overly restrictive policies that might undermine student autonomy or penalize those using devices for legitimate social or creative purposes.

This tension between freedom and regulation provided the impetus for a two-phase study examining how students experience, interpret, and attempt to self-regulate digital technology use during unstructured time. Phase 1, conducted in 2022, mapped the scope of the issue through survey and observational data. Phase 2, reported here, engaged students and teachers in collaborative inquiry and solution design using principles derived from the MYP Design

Cycle (IBO, 2014). Together, these phases offer a holistic account of the interplay between environment, wellbeing, and technology within an international middle school context.

3. Background: Phase 1 Summary

3.1. Study Overview

Phase 1 (Kelly, 2022) employed a mixed-methods exploratory design to map patterns of digital technology use and examine associated wellbeing-related factors. A total of 98 Grade 6 students, aged 11–12, across five classes participated in a brief survey examining daily device habits, preferred break-time activities, and perceived advantages and disadvantages of technology use. The survey was complemented by whole-class discussions to enrich and contextualize the quantitative findings.

3.2. Survey Data

Analysis of the quantitative survey data revealed distinct patterns in technology use and outdoor activity during school breaks. Approximately one quarter of the cohort (24.5%) reported regular laptop use, with all of these students being boys, while the remaining three quarters (75.5%) were not regular users. In contrast, just over half of the sample (54%) indicated that they went outside regularly during breaks, compared to 46% who remained indoors.

Attitudinal responses indicated that a majority of students (68.4%) did not consider current laptop use practices acceptable, while 31.6% expressed approval. Similarly, 62.2% reported preferring changes to existing laptop use policies, compared to 37.8% who were satisfied with the status quo. Taken together, these findings highlight a clear gender divide in laptop use, a majority preference for reducing screen time, and a shared recognition of the importance of outdoor engagement during school breaks. Figure 1 provides a visual overview of these quantitative findings.

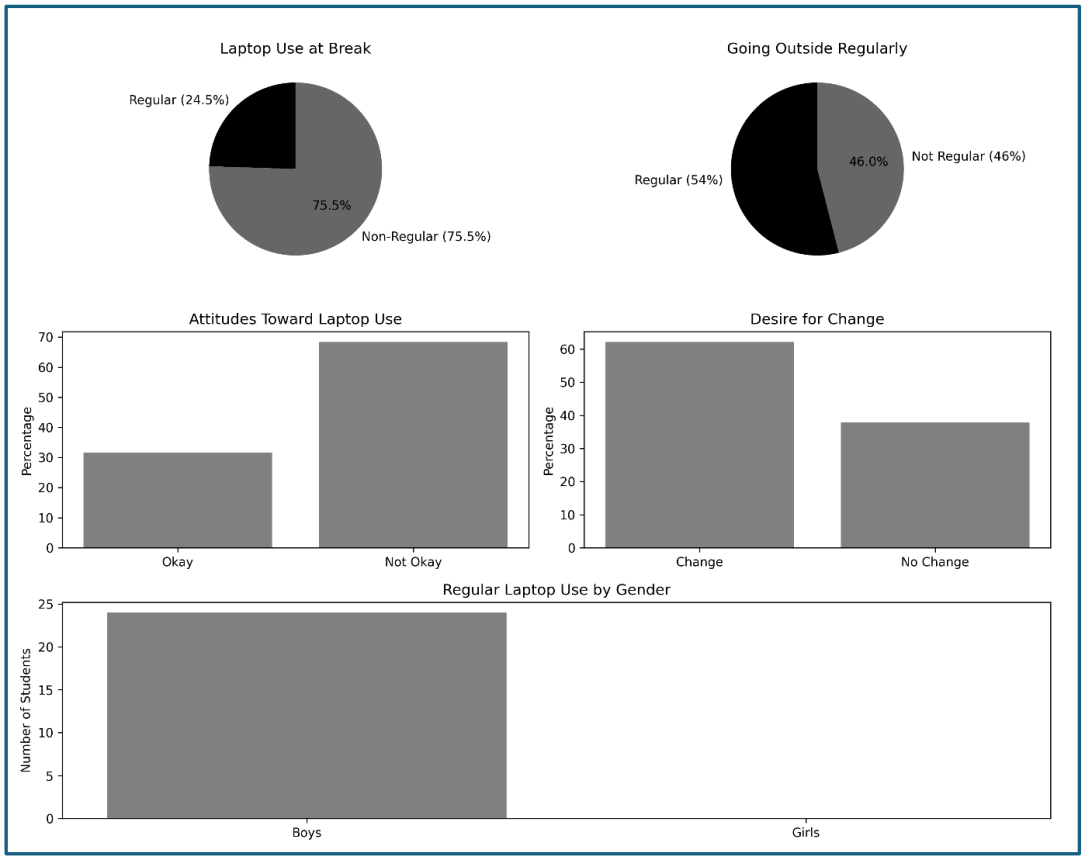

Figure 1. Grade 6 Laptop Use and Outdoor Activity

3.3. Whole-Group Discussions

Analysis of qualitative data from the whole-class discussions revealed several recurring patterns in students' perceptions of laptop use during school breaks. The most frequently cited category was fun and entertainment, accounting for approximately one-third of the points raised (~35%), underscoring the role of digital devices as a source of enjoyment and distraction. Stress reduction and relaxation emerged as the second most common category (~20%), followed by friendship and socializing (~15%), indicating that students often associated laptop use with emotional regulation and peer connection. Learning and skill-building was also mentioned, though less frequently (~7%).

Alongside these positive perceptions, several concern-related categories emerged from student accounts. Students recognized the health implications of remaining indoors rather than engaging in outdoor activity (~12%), citing reduced energy levels, diminished physical activity, and symptoms such as "tiredness," "sore eyes," and "less energy." One student observed, "We need fresh air and Vitamin D from outside to be happy," reflecting awareness of the connection between outdoor activity and physical wellbeing.

Laptops were also described as a form of distraction (~9%), with comments such as "escape from reality and from emotions" and "helps you not to feel sad or upset," suggesting reliance on screens as a coping mechanism. Peer influence emerged as another theme (~6%), with students noting that "nobody is going out," indicating the role of social norms in shaping break-time behaviour.

Additional concerns included apprehension about habit formation and dependence (~6%), with students admitting they felt "hooked on games or videos." Issues of social fragmentation were evident (~4%), as some students felt isolated from peers who preferred outdoor play. Time

constraints were also noted (~3%), particularly in relation to navigating the school building during break times. Figure 2 illustrates the distribution of categories identified across the five classes.

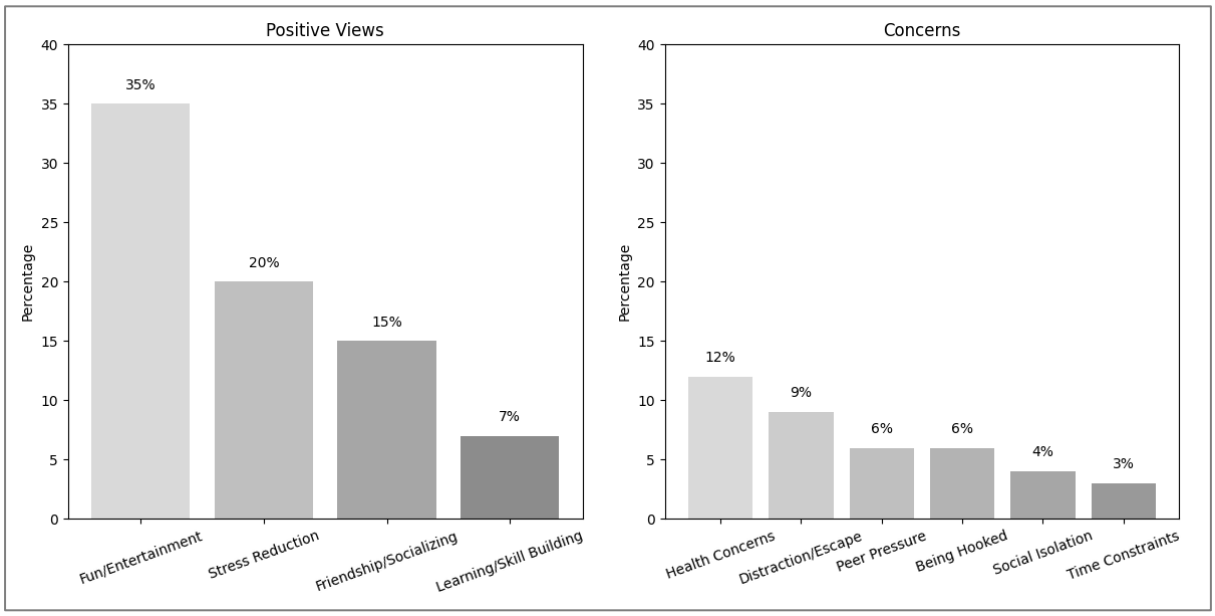

Figure 2. Positive Perspectives and Concerns Relating to Laptop Use

Taken together, these findings suggest that while laptops are valued for entertainment and social connection, students are simultaneously aware of potential drawbacks, including overuse, isolation, and barriers to outdoor engagement. These patterns reflect both psychosocial and physical dimensions of wellbeing.

3.4. Emerging Problem Statement

Drawing on these findings, Kelly (2022) articulated the following problem statement:

> *Grade 6 students appear to be spending a disproportionate amount of their breaks and lunchtime engaged in screen-based activities, which may impact their social connection, physical activity, and overall wellbeing.*

Phase 1 provided an essential descriptive foundation for understanding how technology habits shape student activity and wellbeing. It also highlighted the need to engage students directly in examining both the challenges and potential solutions. These insights informed Phase 2, which adopted a participatory, design-based approach to further explore the issue. The following section reviews relevant literature to situate Phase 2 within broader scholarly discourse.

4. Review of Literature

Over the past two decades, the daily lives of young people have been profoundly reshaped by the proliferation of digital technologies. Smartphones, tablets, and laptops now permeate most aspects of students' learning and leisure, blurring the boundaries between schoolwork, socialization, and recreation. Although these technologies offer opportunities for creativity, collaboration, and individualized learning (Lei & Zhao, 2008), unregulated use - particularly during unstructured time - has prompted concern regarding its implications for student wellbeing, social interaction, and physical activity.

4.1. Screen Time, Physical Activity, and Wellbeing

Several large-scale studies demonstrate that increased screen exposure is associated with reduced physical activity and outdoor engagement among children and adolescents (Michaelson et al., 2020; Twenge et al., 2018). Such displacement effects are concerning, as outdoor activity and exposure to natural environments are consistently linked to cognitive, emotional, and physiological benefits, including improved attention, stress recovery, and mood regulation (Mason et al., 2022). In contrast, sedentary screen-based activities may exacerbate fatigue, limit opportunities for social play, and contribute to poorer physical fitness outcomes (Rosen et al., 2011).

Beyond physical activity, longitudinal analyses have linked increased screen use with higher levels of school loneliness and a diminished sense of belonging. Twenge et al. (2021), analysing data from the Programme for International Student Assessment (PISA) between 2000 and 2018, found that reports of school loneliness rose substantially between 2012 and 2018 across most participating countries, coinciding with increased smartphone and internet use. Country-level research echoes these findings, indicating that heavy device users often report weaker peer connections and lower school attachment (Michaelson et al., 2020).

These effects are not uniform, however. Gender, device purpose, and social context moderate how technology use influences wellbeing. For example, boys' heavier involvement in online gaming has sometimes been associated with weaker peer integration, whereas socially oriented technology use may buffer against isolation (Rosen et al., 2011). This variability reinforces the importance of examining not only how much time young people spend online, but also how and why they engage.

4.2. Cognitive, Emotional, and Physiological Impacts

Research examining the cognitive and physiological effects of screen exposure has identified several pathways through which excessive use may influence wellbeing. Greater device use - particularly before bedtime - has been associated with impaired attention, increased stress, and disrupted sleep patterns (Hale & Guan, 2015). Poor sleep, in turn, contributes to reduced concentration and diminished affective regulation during school hours. Moreover, studies suggest that prolonged information and communication technology (ICT) use may affect stress physiology among adolescents (Wallenius et al., 2007).

These findings align with concerns reported in school settings, where teachers observe that students who spend extensive time online often appear fatigued and less socially responsive. Nevertheless, causality remains difficult to establish. While technology use may contribute to stress and distraction, it may also function as a coping mechanism for pre-existing anxiety or social withdrawal (Kim et al., 2009). This bidirectional relationship complicates simplistic interpretations of screen time effects.

4.3. Positive Dimensions of Technology Use

Not all evidence regarding digital engagement is negative. Moderate and purposeful use of technology can enhance wellbeing, particularly when it complements offline relationships or supports self-regulated learning (Dienlin & Johannes, 2020). Digital platforms can enable students - especially those who are introverted or socially anxious - to maintain friendships, practise communication skills, and engage in creative self-expression (George & Odgers, 2015). In some contexts, online activities have been shown to reduce stress and promote emotional regulation (Modecki et al., 2020).

Similarly, social media and gaming environments can offer meaningful social outlets when interactions are positive, reciprocal, and embedded within broader offline networks (Charmaraman et al., 2021; Wu et al., 2015). Collectively, these findings suggest that the quality, context, and purpose of engagement are more consequential than screen time alone.

4.4. Methodological Considerations

Inconsistent findings in the literature often stem from methodological limitations. Early studies frequently relied on small convenience samples and inconsistent definitions of "screen time." More recent analyses employing specification-curve and robustness methods suggest that average correlations between general screen use and adolescent wellbeing are small (Orben & Przybylski, 2019). Rather than supporting claims of universal harm, the evidence points toward heterogeneity: outcomes depend on what young people do online, when they engage, and the motivations underlying their use.

This complexity supports the argument that digital wellbeing should not be framed dichotomously as "good" or "bad," but rather conceptualized along a continuum shaped by context, content, and self-regulatory capacity. For educators, this implies that fostering reflective awareness and balanced digital habits may be more effective than imposing blanket restrictions.

4.5. Intervention and Policy Directions

Recent intervention research has begun to explore strategies for cultivating digital balance within school contexts. A cluster-randomized trial in Italian middle schools demonstrated that media education programs can reduce problematic smartphone use while improving attention and peer engagement (Gui et al., 2023). Quasi-experimental evidence from U.S. school districts suggests that structured mobile phone policies can yield modest academic gains, although wellbeing outcomes depend significantly on how restrictions are implemented (Figlio & Özek, 2025).

Furthermore, meta-analytic research examining digital tools designed to enhance self-regulated learning indicates that technology can support metacognitive growth when used intentionally to scaffold goal setting, monitoring, and reflection (Zhao et al., 2025). These findings align with the IB's emphasis on developing student autonomy and reflective capacity within inquiry-based frameworks.

4.6. Summary

Taken together, the literature supports a nuanced understanding of young people's digital engagement. Unstructured or excessive use - particularly when it displaces physical or social activity - tends to correlate with lower wellbeing and attentional difficulties. Conversely, moderate and guided use within structured educational or relational contexts can enhance learning, social connection, and emotional regulation.

The implication for schools is clear: digital literacy, self-regulation, and environmental design must operate in concert to cultivate balanced technology cultures. The present study builds on this body of research by examining how middle school students understand and navigate digital balance, and by exploring how collaborative, design-based approaches can generate sustainable, student-informed solutions.

5. Methodology

5.1. Research Paradigm and Methodological Orientation

Methodology establishes the philosophical and strategic foundation shaping how research questions are conceptualized and explored (Guba & Lincoln, 1989). This study is situated within a constructivist–interpretivist paradigm, which posits that knowledge is socially constructed and understood through the meanings that individuals attribute to their lived experiences. From this perspective, reality is viewed as dynamic and collaboratively shaped through dialogue and interaction (Creswell, 2013).

Accordingly, the research sought to illuminate students' lived experiences of navigating digital technology use during unstructured school time and the meanings they ascribed to those experiences. The inquiry was participatory and reflexive, emphasizing collaboration and the co-construction of understanding between researcher and participants. This qualitative orientation aligns with the study's aim of generating nuanced, contextually grounded insights into students' digital habits rather than testing predetermined hypotheses.

5.2. Research Design

The study employed a design-based qualitative approach situated within an action research framework. Design-based inquiry (DBI) integrates iterative cycles of exploration, design, and reflection to address complex educational challenges (Anderson & Shattuck, 2012). This approach aligns closely with the IB Middle Years Programme (MYP) Design Cycle (IBO, 2014), which encourages students to engage in iterative stages of inquiring and analysing, developing ideas, creating solutions, and evaluating outcomes.

Within this framework, DBI was used to investigate how middle school students experienced the challenge of regulating digital device use during break times and to facilitate their active participation in developing balanced solutions. The research unfolded in two interconnected phases:

1. **Exploration and empathy** - Students articulated personal experiences and emotional responses to digital technology through empathy interviews and group dialogue.
2. **Co-design and reflection** - Students collaborated with peers and teachers to identify underlying causes, explore alternatives, and prototype solutions using the MYP Design Cycle.

This iterative structure enabled participants to move between reflection, analysis, and creative problem-solving while maintaining a focus on student voice and agency.

5.3. Participants and Sampling Strategy

A purposive sampling strategy (Lincoln & Guba, 1985) was employed to ensure inclusion of participants most directly affected by the issue under investigation. An open invitation was extended to all Grade 6 students, specifically encouraging those who frequently used laptops during break times to participate in empathy interviews and the design phase.

Six Grade 6 students (coded S1–S6) volunteered. While the group comprised boys from diverse cultural backgrounds, the sample was small and gender-skewed, as no female students identified as frequent device users. This limits the generalizability of the findings and raises questions about whether the perspectives captured reflect broader patterns within the Grade 6 cohort. Although culturally diverse, the sample does not fully represent the wider student population, and cultural diversity alone does not ensure inclusivity or balance.

Five Grade 6 teachers subsequently participated in a follow-up group discussion to provide complementary contextual perspectives. While their contributions strengthened triangulation and contextual interpretation, the inclusion of adult voices may have influenced or reframed student narratives. These limitations should be considered when interpreting the findings and assessing their transferability beyond this context.

5.4. Data Collection Procedures

Data were collected over a six-week period using three complementary methods.

5.4.1. Empathy Interviews

Individual empathy interviews were conducted to explore students' feelings, motivations, and lived experiences related to technology use. Drawn from design thinking methodology (Lochmiller, 2022), empathy interviews aim to uncover underlying needs and emotions rather than elicit direct evaluative responses. Each interview lasted approximately 20–30 minutes and took place in a quiet meeting space during school hours.

5.4.2. Group Conversation

Following the interviews, students participated in guided lunchtime group discussions. This setting facilitated collective reflection and meaning-making, allowing students to compare experiences, identify shared challenges, and begin envisioning potential improvements.

5.4.3. Teacher Focus Group

A semi-structured focus group was conducted with five Grade 6 teachers after completion of the student sessions. Teachers were invited to respond to emerging themes, including supervision, logistical constraints, and student wellbeing, and to consider how the school environment might better support healthy technology practices. Table 1 provides an overview of data sources and analytic processes.

Table 1. Overview of Data Sources and Participants

Data Source	Participants	Data Collection Method	Purpose	Output / Analysis
Student empathy interviews	6 Grade 6 students (S1–S6)	Individual semi-structured empathy interviews	Explore personal experiences and emotional responses to device use	Audio transcripts coded inductively for recurring categories and themes
Student group conversation	Same 6 students	Guided lunchtime discussions	Surface shared experiences, and emergent collective insights	Group transcript analysed thematically
Teacher focus group	5 Grade 6 teachers	Semi-structured focus group	Capture teacher perspectives on student technology use and supervision	Summarised into key ideas shared with students for solution development

5.5. Researcher's Role and Reflexivity

As the researcher was also a member of the school's teaching faculty, reflexivity was integral to the inquiry. A reflexive journal was maintained throughout the study to document

assumptions, emotional responses, and interpretive decisions (Eisenhart, 1998). Reflexivity was approached across personal, relational, and methodological dimensions (Walsh, 2003).

The dual teacher–researcher role presented both advantages and challenges. Familiarity with the context facilitated trust and open dialogue; however, careful attention was required to mitigate potential bias and maintain confidentiality. To mitigate potential power dynamics associated with the dual teacher–researcher role, participation was framed explicitly as voluntary, unrelated to academic evaluation, and open to withdrawal at any time. Interviews were conducted outside formal assessment contexts, and care was taken to emphasize that students' responses would not influence classroom relationships or grading.

5.6. Data Analysis

Data were analysed using thematic analysis following Braun and Clarke's (2006, 2013) six-phase framework:

1. Familiarization with the data through repeated reading of transcripts.
2. Systematic generation of initial codes capturing salient ideas.
3. Collation of codes into broader categories and provisional themes.
4. Review and refinement of themes in relation to the overall dataset.
5. Definition and naming of final themes.
6. Production of a narrative synthesis aligned with the research aims.

Coding was conducted inductively, allowing patterns to emerge from participants' language rather than being imposed a priori by the researcher. Initial semantic codes were generated line-by-line and subsequently grouped into higher-order categories reflecting psychological, social, and environmental dimensions of device use. Through iterative comparison across interviews and group discussions, categories were refined into overarching themes. Table 2 provides an illustrative extract from the coding framework, demonstrating the progression from raw data to thematic interpretation.

Table 2. Illustrative Coding Framework: From Initial Codes to Final Themes

Initial Code	Description	Example Quote	Category	Final Theme
Perceived loss of control	Difficulty disengaging from device use	"I just can't stop." (S4)	Habit formation	Difficulties with self-regulation and dependency
Peer norm cascade	Social reinforcement of remaining indoors	"Domino effect - one person stops going out…" (S6)	Social pressure	Psychological barriers to going outside
Behavioural displacement of break routines	Loss of alternative break-time habits	"We've forgotten how to have a break."	Habit formation	Difficulties with self-regulation and dependency
Time-access constraint	Structural barriers limiting outdoor access	"There is limited time to get around." (S3)	Logistical friction	Logistical barriers to going outside
Gaming as competence-building	Gaming as a source of competence and identity	"Games give you confidence." (S1)	Self-esteem and belonging	Psychological benefits of devices
Perceived absence of adult structure	Lack of visible guidance or supervision	"Nobody tells us what to do." (S4)	Supervisory ambiguity	Logistical barriers to going outside

While initial coding began with in-vivo phrasing drawn directly from student language, these were subsequently refined into analytic codes to support conceptual clarity and thematic abstraction. Themes were collaboratively reviewed with participants during a follow-up group session to enhance interpretive accuracy and authenticity, consistent with participatory and design-based research principles (Stringer, 2014). Students were invited to confirm whether the identified themes resonated with their experiences and to suggest refinements to theme wording. Minor adjustments were made to ensure thematic labels aligned closely with student language. Although the sample was small and gender-skewed, thematic saturation was approached by the sixth interview, at which point no substantively new categories were emerging. This suggests that the central concerns relevant to this participant group were adequately captured within the dataset.

5.7. Ensuring Trustworthiness and Rigor

Trustworthiness was established through strategies aligned with Lincoln and Guba's (1985) criteria for qualitative rigor. Credibility was enhanced through triangulation across data sources, iterative engagement with participants, and member validation of emerging themes. Transferability was supported by providing rich contextual description to enable readers to assess relevance to other settings. Dependability was maintained through systematic documentation of analytic procedures and decision-making processes. Confirmability was strengthened through reflexive journaling and the maintenance of an audit trail to distinguish participant perspectives from researcher interpretation.

5.8. Ethical Considerations

Institutional approval was obtained for both phases of the study. Participation was voluntary, and informed consent was secured from students and their guardians. Pseudonyms (S1–S6) were used in all documentation to protect anonymity. Data were stored securely and used exclusively for research purposes. Care was taken to ensure that participation did not disrupt students' academic learning or social routines.

5.9. Summary

The methodology was designed to balance rigor with responsiveness, integrating principles of action research and design-based inquiry. By foregrounding student voice and collaborative reflection, the study sought to move beyond descriptive analysis toward actionable insight, enabling the co-creation of solutions that address the emotional, social, and logistical dimensions of technology use in middle school contexts.

6. Findings for Phase 2 of the Study

6.1. Overview

Phase 2 extended the preliminary findings of Kelly (2022) by exploring deeper social, emotional, and environmental factors influencing Grade 6 students' digital device use during school breaks. The analysis generated five overarching themes:

1. Psychological benefits of devices
2. Difficulties with self-regulation and dependency
3. Psychological barriers to going outside
4. Logistical barriers to going outside
5. Moving towards collective solutions

6.2. Psychological Benefits of Devices

Consistent with Phase 1, students acknowledged several positive psychological aspects associated with screen-based activities, particularly social connection and group cohesion. Gaming and online interaction fostered a shared sense of purpose and belonging. Students linked digital gaming to self-esteem and identity formation, describing gaming proficiency as an alternative source of confidence and social status in an environment where athletic ability often confers popularity. As S1 explained: "We are not so good at sports. Games give you confidence. You feel you are good at something and have more control." These comments illustrate how technology-mediated spaces can serve as arenas for competence and belonging in early adolescence. Students also described technology as a coping mechanism for academic stress. S4 reflected, "I have much more patience when I use tech," while S2 noted that "tech is a good stress reliever, even if it is not the best choice." Others emphasized its role in alleviating boredom, with S1 explaining, "I use it when I want time to go faster. I don't want to be bored."

6.3. Difficulties with Self-Regulation and Dependency

Alongside these benefits, students expressed discomfort about their reliance on digital devices. Participants described feelings of compulsion and dependency, noting that device use had become habitual and difficult to control. As S4 stated, "I just can't stop." Several students reported continuing to use laptops during breaks even when they wanted to go outside, as the digital routine had become their default behaviour. Students were acutely aware of this tension and questioned why adults (teachers and parents) did not intervene or provide clearer guidance. Their reflections suggested that the absence of adult structure contributed to difficulties moderating technology use independently. One student remarked that they had "forgotten how to have a break," implying that digital engagement had displaced more active or restorative forms of recreation. This theme highlights a central paradox: while students valued the autonomy afforded by open access to technology, they also recognized that unrestricted freedom could feel overwhelming without supportive boundaries.

6.4. Psychological Barriers to Going Outside

A notable finding from group conversations was the emergence of what students termed a "fear of the outside." Although several students expressed a desire to spend more time outdoors, they felt constrained by social pressures and uncertainty about how to re-engage with outdoor activities. The following exchange illustrates this dynamic:

- **S2:** "In Grade 6 I want to go out but nobody does. There is pressure not to go outside."
- **S6:** "Domino effect - one person stops going out and then another stops."
- **S3:** "I can't lead ten people to go outside. I don't have that much power."

Students described a self-reinforcing cycle of avoidance: as more peers stayed indoors, those who wished to go outside felt socially isolated or conspicuous. Over time, remaining inside became not only an individual choice but also a social norm. Some students reported feeling "scared of going out," despite recognizing that doing so would be healthier and more balanced. One student commented, "I don't think we should play games inside every time." For students who did not dislike outdoor spaces, there appeared to be a lack of readily available alternatives to digital activities that felt equally engaging.

6.5. Logistical Barriers to Going Outside

Students' technology use was also shaped by environmental and organisational conditions. The transition from lower school to middle school involved changes in access to play areas,

materials, and supervision. Several students expressed frustration that spaces and equipment previously available to them were now restricted or reassigned to younger students. S1 recalled: "Last year we were on the scooters and playing tag and football, even with the girls, and this year we are not allowed on the Astro turf." Another student added, "We are still children, and we need to play." These comments suggest a developmental mismatch between students' continuing need for play and institutional expectations associated with increased independence.

Students also cited structural constraints such as long distances to outdoor areas and short break periods. As S3 explained, "There is limited time to get around," while S2 noted, "It is easier to grab a laptop and go sit in the library than to go out." These logistical factors made outdoor activity feel inefficient compared to the immediate accessibility of indoor digital engagement. Students also reported uncertainty regarding supervision and expectations during break times. The absence of visible adult presence appeared to create ambiguity about boundaries and routines. As S4 stated, "Nobody tells us what to do," capturing both the autonomy and anxiety associated with a lack of structure.

6.6. Moving Towards Solutions

Following analysis of student interviews and group discussions, the student focus group applied the MYP Design Cycle to conceptualize potential solutions. Students were familiar with the cycle's stages - inquiring and analysing, developing ideas, creating solutions, and evaluating - and used it as a scaffold for design thinking around their shared concern. Using the Design Cycle, students brainstormed visually and in writing, participated in school walk-throughs, mapped school spaces, gathered logistical data, and spoke with peers before generating potential solutions.

6.6.1. Student-Led Proposals

Ultimately, the students proposed a range of practical interventions. Central among these was introducing structured boundaries around device access. Suggestions included alternating device-free and device-permitted breaks, as well as short-term "tech-free weeks" intended to disrupt habitual usage patterns. S5 proposed: "We could use the laptops first break and split the second break. Then we would have time to go outside as well."

Students also called for greater access to play materials and recreational zones, particularly for Grade 6 students who felt displaced by younger cohorts. Proposals included adding small pitches near the main building, reinstating game equipment, and extending break times to accommodate movement across campus. Students further recommended increased adult presence during breaks - especially early in the school year - to help establish routines and model balanced technology use.

6.6.2. Teachers' Perspectives

When student findings and draft proposals were shared with five Grade 6 teachers, a constructive dialogue followed. Teachers expressed surprise at the depth of student reflection and acknowledged that they had underestimated the complexity of the issue. They suggested that students' reluctance to go outside was partly rooted in systemic factors, including restricted access, unclear supervision expectations, and inconsistent routines across grade levels.

Teachers recommended reframing the issue from "technology management" to "reconnection with outdoor space." They proposed accompanying students outdoors during class time to re-establish familiarity and a sense of ownership of outdoor areas, as well as developing collaborative guidelines through structured student–teacher dialogue. Teachers also suggested

embedding wellbeing-oriented discussions within pastoral and advisory programs and revisiting induction processes for students transitioning from primary into middle school.

The following table summarizes areas of convergence and divergence across student and teacher perspectives derived from Phase 1 and Phase 2.

Table 3. Convergence and Divergence of Student and Teacher Perspectives Across Thematic Domains

Theme/Domain	Student Perspectives	Teacher Perspectives	Convergent/Divergence
Psychological Benefits of Devices	Social cohesion; stress relief; escape from academic pressure; friendship-building; creative engagement	Recognized devices as useful for downtime and creativity; acknowledged that technology supports decompression for some students	Broad agreement that devices serve social and coping functions; teachers reported less awareness of the range of student tech-based activities
Perceived Drawbacks to Devices	Physical inactivity; reduced outdoor play; discomfort in outdoor spaces; dependency; peer influence	Concern about reduced face-to-face communication, eye strain, sedentary habits, and difficulty re-engaging students after breaks	Similar concerns, framed differently - students emphasize internal struggle; teachers emphasize behavioural and learning impacts
Environmental Factors	Limited outdoor appeal; distance to play areas and cafeteria; lack of equipment; limited supervision	Acknowledged structural constraints (supervision, equipment, layout) and time pressures; identified systemic barriers to change	Shared recognition that device use is shaped by institutional design rather than personal choice alone
Agency and Co-design	Proposed compromise models (structured tech access, improved outdoor resources, student involvement in decision-making)	Open to co-developing guidelines; sought consistent policy and improved stakeholder communication	Emerging consensus around a hybrid approach balancing autonomy with guidance through participatory design

7. Practical Outcomes

7.1. Interventions

Following completion of the inquiry, several practical interventions were implemented. First, a set of co-constructed guidelines - referred to by students as “techspectations” - was introduced to support balanced device use during break times. These guidelines were developed collaboratively and framed as shared commitments rather than top-down rules. Second, pastoral care programmes were revised to incorporate sessions on digital literacy and reflective discussion of break-time habits. Opportunities for outdoor engagement were intentionally embedded within non-academic periods. Third, logistical negotiations with the primary school resulted in staggered access to astro-turf pitches and shared play areas. Break-time and cafeteria schedules were adjusted to reduce congestion and travel barriers. On rainy days, the library team introduced alternative non-digital activities, including large-format board games and collaborative puzzles. Additionally, supervisory practices were clarified: teachers on outdoor duty began signalling transition times more explicitly, and supervision coverage was increased during Grade 6 breaks to provide structure and support.

7.2. Observed Changes

While the study did not employ formal pre- and post-intervention quantitative measures, several observable shifts were noted over the course of the following school term:

- A visible decrease in device clustering during break times
- Increased use of outdoor play areas and sports pitches
- Greater student presence in the cafeteria during breaks
- Increased engagement with non-digital games in the library and gym on rainy days
- More frequent outdoor learning experiences during regular class time
- Strengthened supervision routines and clearer expectations for Grade 6
- Revisions to the Grade 6 transition programme to include digital balance orientation

These changes suggest that coordinated adjustments across personal, social, and environmental domains may meaningfully influence break-time behaviour. However, as the study did not employ experimental controls or systematic pre- and post-measures, these observations cannot be causally attributed to the interventions implemented. Rather, they reflect practitioner observations occurring alongside coordinated adjustments to routines and environmental conditions. Future research would benefit from incorporating systematic observational counts, brief student wellbeing surveys, or longitudinal tracking to examine the durability and scope of behavioural shifts more rigorously. Importantly, students retained access to devices under the shared understanding that technology use should be thoughtful and aligned with the co-constructed techspectations.

7.3. Ecological Model

The ecological model presented in Figure 3 reflects the study's holistic approach to understanding device-related behaviour. The model conceptualizes break-time technology use as shaped by interacting layers of influence rather than individual preference alone. Students' experiences reflected individual motivations (e.g., competence, stress relief, habit formation), peer norms and social dynamics, and institutional factors such as supervision routines, spatial layout, and scheduling structures. This layered representation is conceptually aligned with Bronfenbrenner's (1979) ecological systems theory, which positions behaviour as emerging from dynamic interactions across individual, relational, and institutional contexts. While inductively derived from participant data, the model is offered as a heuristic framework for understanding digital wellbeing within this specific school setting rather than as a formal theoretical extension.

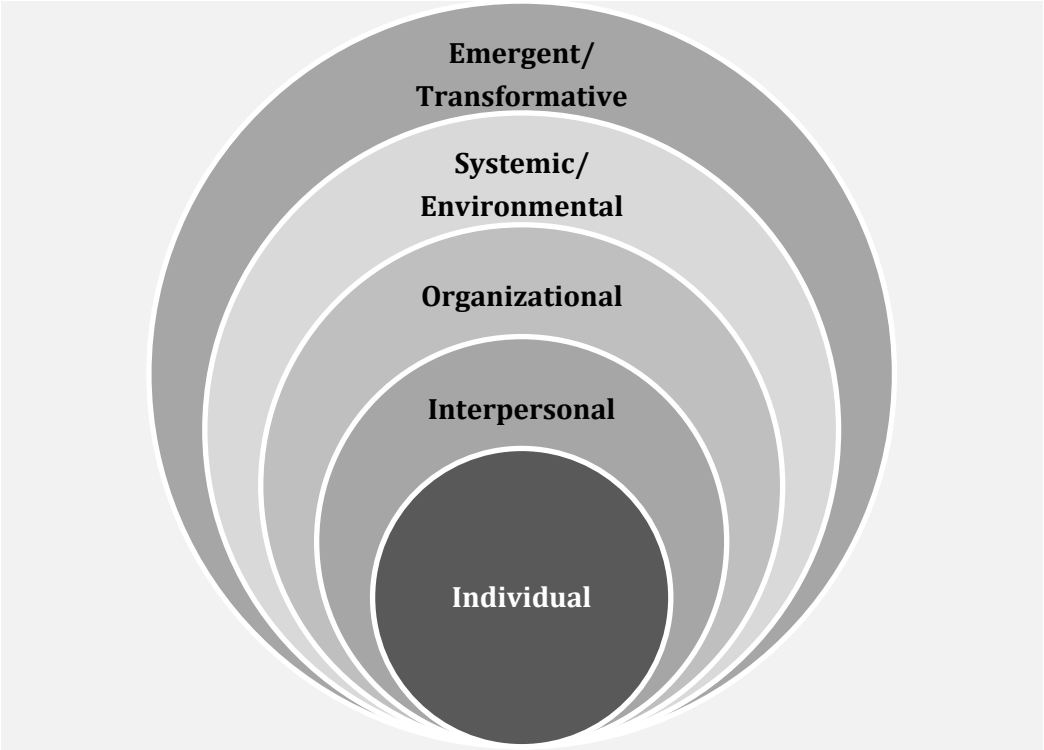

Figure 3. Ecological Model representing the factors influencing technology use during breaks

8. Discussion

The findings offer insight into how middle school students experience and interpret open access to digital technology within an International Baccalaureate (IB) Middle Years Programme (MYP) context. While digital devices are integral to contemporary teaching and learning (Lei & Zhao, 2008), Phase 2 suggests that habitual use during unstructured break periods can carry complex implications for student wellbeing. This aligns with research suggesting that, although digital media can foster connection and creativity, unstructured or excessive use may be associated with reduced physical activity, social fragmentation, and challenges related to self-regulation (Michaelson et al., 2020; Twenge et al., 2018). Importantly, the participatory design-based approach used here - combining empathy interviewing, group meaning-making, and collaborative solution design - enabled students to articulate not only what they do during break times but also why these patterns persist, and what conditions might support change.

It is important to note that this study is presented as a contextually grounded case inquiry rather than a generalizable model of digital wellbeing. It offers an illustrative account of how one cohort within a specific IB setting interpreted and responded to open device access during unstructured school time. Within this paper, digital wellbeing refers to the balanced, reflective, and contextually appropriate use of technology that supports, rather than undermines, students' social, emotional, and physical development. The findings should therefore be understood as exploratory and situated within this particular educational context rather than universally representative.

8.1. The Dual Nature of Technology Use

Consistent with previous studies, findings across both phases suggest that break-time technology use cannot be characterized as wholly positive or negative. Its influence depends on context, purpose, and balance (Dienlin & Johannes, 2020). For some students - particularly

those less drawn to physical activity - digital devices supported social bonding, confidence-building, and relaxation. Students' descriptions of gaming as a source of competence and belonging echo evidence that online interaction can support connection and emotional regulation when used moderately and intentionally (George & Odgers, 2015; Modecki et al., 2022).

At the same time, students reported feelings of dependency, reduced motivation to go outdoors, and social anxiety linked to outdoor play norms. The student-generated phrase "fear of the outside" captured a strong sense of social inertia and avoidance. Related patterns have been identified in international research linking high-frequency digital engagement with social withdrawal and loneliness (Twenge et al., 2021). In this study, students' accounts suggest that autonomy alone was not sufficient for healthy regulation: the perceived loss of control ("I just can't stop") indicates that unstructured access may amplify habitual use when alternative routines and supportive boundaries are absent.

8.2. The Role of Environment, Logistics, and Supervision

Environmental and organisational factors emerged as significant determinants of student behaviour. Restricted access to play areas, distance to outdoor spaces, and short break periods contributed to the predominance of indoor device use. This supports research indicating that access to engaging physical spaces strongly influences students' willingness to participate in active play (Hazar & Hazar, 2018). In this context, device use appeared not only as a preference but also as a pragmatic response to environmental constraints.

Notably, students' accounts emphasized friction - the relative ease of going to the library and opening a laptop compared with the time and effort required to reach outdoor zones. This reinforces a key implication: break-time behaviour reflects "choice architecture" within the school environment as much as individual self-control. Teachers' acknowledgement of logistical barriers during follow-up dialogue further supported the interpretation that the issue was not solely a matter of motivation. These findings strengthen the case for whole-school approaches to digital wellbeing that address both self-regulation and environmental conditions through consistent supervision routines, equitable access to play resources, and intentional design of break-time spaces.

8.3. Social and Emotional Complexity, and the Value of Student Validation

Students' ambivalence underscores the complexity of digital wellbeing in early adolescence. Participants valued technology for enjoyment and self-expression while also recognizing its capacity to dominate attention and reduce real-world engagement. This reflects arguments that digital platforms can function as both sources of connection and catalysts for avoidance behaviours (Charmaraman et al., 2021).

A key methodological strength informing this interpretation was the iterative review of themes with participants, which helped ensure that theme labels and claims aligned with students' lived experience rather than adult assumptions. For example, the retention of "fear of the outside" as a student-originated descriptor adds credibility to the interpretation that social norms - not simply preference-driven indoor clustering, were shaping behaviour. This strengthens analytic trustworthiness by grounding claims in language participants recognized as accurate.

8.4. Teacher–Student Collaboration Through the Design Cycle

A significant outcome of this study was the co-construction of solutions through the MYP Design Cycle. Design-based inquiry positioned students not merely as research participants but as partners in problem-solving. This participatory process enabled students to translate concerns into actionable proposals, including structured "tech-free" breaks, improved access to play materials, and increased supervision.

Teachers' involvement in later stages deepened collaboration and supported shared understanding. This is consistent with participatory design research suggesting that co-design processes can strengthen agency, empathy, and engagement (Anderson & Shattuck, 2012; Stringer, 2014). The teacher recommendation to reframe the issue from "technology management" to "reconnection with outdoor space" is particularly important, as it shifts the focus from control to wellbeing-supportive conditions and aligns with an educational (rather than punitive) approach to behaviour change.

8.5. Reframing Regulation: From Restriction to Structured Balance

Evidence across both phases supports the view that digital wellbeing is less likely to be achieved through blanket restriction than through structured balance. Students expressed a desire to retain some device access during breaks while also advocating boundaries to disrupt habitual patterns and encourage renewed engagement with outdoor activity. This aligns with findings that guided, balanced digital use can support self-regulation and wellbeing outcomes (Gui et al., 2023; Zhao et al., 2025).

Framed in this way, regulation becomes an educational process rather than a disciplinary one. Schools can support students' self-awareness, time management, and digital literacy through explicit instruction, reflective dialogue, and consistent routines. Such approaches align with IB emphases on agency and inquiry, positioning digital wellbeing as a shared responsibility across the learning community (IBO, 2017).

8.6. Linking Findings to Practical Outcomes

The practical changes described in this study (e.g., co-constructed "techspectations," revised supervision practices, adjustments to outdoor access, and provision of alternative play materials) are consistent with the multi-layered influences identified in the ecological model.

Observed shifts - such as reduced device clustering during breaks and increased use of outdoor and non-screen activities - suggest that coordinated changes to norms, routines, and environmental affordances may influence break-time behaviour.

However, these outcomes should be interpreted cautiously. Future research could strengthen outcome claims through routine observational tallies (e.g., number of students on devices indoors per break), brief student self-regulation check-ins, and follow-up tracking across multiple terms. Even modest indicators would help quantify the extent and durability of behavioural change while remaining feasible within a school-based inquiry design.

8.7. Inclusivity, Non-Frequent Users, and Transferability

Interpretation of findings should account for the gender-skewed sample in Phase 2 and the purposive focus on self-identified frequent users. While this sampling strategy was appropriate for understanding intensive use patterns, it likely underrepresents perspectives of students who self-regulate effectively or who prefer outdoor activity as a default. Including non-frequent users in future work could illuminate protective factors, alternative routines, and peer norms that support balanced break-time engagement. Future research could also adopt more inclusive recruitment strategies (e.g., stratified sampling by gender and usage frequency) to better

capture variation in device practices and ensure representation. Doing so would be particularly valuable in IB settings where inclusivity and multiple perspectives are central to the educational ethos.

8.8. Summary

Overall, these findings contribute to discourse on digital wellbeing by foregrounding student perspectives in technology-rich school environments and by demonstrating the value of participatory, design-based approaches for addressing complex wellbeing challenges. They suggest that adolescents can articulate nuanced understandings of their digital habits and contribute meaningfully to change when supported by structured opportunities for reflection and co-design. For international and IB schools, the implications are clear: rather than relying solely on externally imposed restrictions, fostering balance, guided autonomy, and intentional environmental design may cultivate healthier and more sustainable relationships with technology.

9. Implications

The following implications are drawn from the thematic analysis and the literature review, offering considerations for educational practice, school design, and policy development within technology-rich learning environments.

9.1. Promoting Balanced Access

Schools should promote a deliberate balance between technology access and opportunities for outdoor or social play during break times. Structured, partial boundaries - such as designated “tech-free” or “outdoor-first” breaks - may support habit recalibration without undermining student autonomy. Research suggests that moderation rather than elimination is more likely to foster adaptive, self-regulated behaviours that extend beyond school contexts (Dienlin & Johannes, 2020; Gui et al., 2023). In line with the study’s findings, balance appears more sustainable when co-developed with students rather than externally imposed.

9.2. Recognizing the Positive Dimensions of Technology

Not all technology use is detrimental. Students emphasized the value of digital devices for stress relief, creativity, and peer connection - particularly for those less drawn to athletic or outdoor activities. Educators should therefore distinguish between passive consumption and active, purposeful engagement. Recognizing constructive uses of technology aligns with the IB’s holistic conception of learner wellbeing and supports inclusive approaches to digital regulation (IBO, 2017; Modecki et al., 2022). Policies that acknowledge both risks and benefits are more likely to be perceived as legitimate by students.

9.3. Designing Inclusive and Engaging Spaces

Environmental design emerged as a critical influence on break-time behaviour. Providing accessible outdoor areas and indoor play materials can reduce default reliance on screens. Transitional year groups, such as Grade 6, may be particularly sensitive to logistical constraints including distance, time pressure, and crowding. Schools undergoing expansion or restructuring should prioritize equitable access to green spaces and play areas (Hazar & Hazar, 2018). Relatively simple interventions - such as shaded seating, equipment stations, or near-building play zones - may lower the “activation energy” required for outdoor participation.

9.4. Teacher Facilitation and Modelling

Teachers play a central role in shaping digital culture, not only through rule enforcement but also through modelling balanced engagement. Structured dialogue - such as reflective discussions about digital habits, advisory sessions on wellbeing, or routine check-ins - can normalize critical awareness of device use (Ryan & Deci, 2017). When teachers model moderate and purposeful technology use, they reinforce a culture of mindfulness rather than surveillance. This relational approach supports autonomy while maintaining shared expectations.

9.5. Early Digital Guidance and Transition Support

The transition to middle school often coincides with increased independence and expanded digital access. Orientation programmes should explicitly address digital self-regulation, emotional awareness, and decision-making in online environments. Providing early guidance may prevent unhelpful habits from becoming entrenched. Embedding these conversations within pastoral structures or MYP reflection processes can strengthen students' capacity for autonomous and accountable digital engagement (IBO, 2020).

9.6. Environmental and Logistical Planning

Break length, building layout, and supervision schedules significantly shape students' technology use patterns. The study's findings highlight how short breaks and distant play areas made device use the path of least resistance. Reviewing these structural factors may enable modest but meaningful reforms, such as staggered lunch schedules, expanded supervision zones, or clearer transition routines. These systemic adjustments complement individual self-regulation efforts and align with the ecological model presented in Figure 3.

9.7. Collaborative Problem-Solving and Student Voice

A central contribution of this study is the demonstration that students can analyse complex wellbeing challenges and generate feasible solutions when supported through inquiry-based frameworks such as the MYP Design Cycle. Encouraging students to co-develop technology guidelines, conduct peer surveys, or prototype wellbeing initiatives strengthens agency and ownership. This participatory approach reflects IB principles and aligns with established practices in participatory action research (Anderson & Shattuck, 2012; Stringer, 2014).

9.8. Policy-Level Integration and Whole-School Strategy

The findings underscore the importance of coherent, school-wide frameworks integrating digital literacy education, wellbeing initiatives, and device-use policies. Effective policies should move beyond restriction toward skill-building, reflection, and consistent expectations across contexts. Schools may draw on international guidance, such as UNESCO's *Global Education Monitoring Report 2023: Technology in Education*, which advocates empowering, evidence-informed approaches to digital citizenship rather than punitive control. Aligning school policy with such frameworks supports systemic coherence and sustainability.

10. Conclusion

This study explored how middle school students in an international IB MYP environment experience and navigate open access to digital technology during break times. Across both phases of the inquiry, findings suggest that the impact of technology use on wellbeing is not

inherently positive or negative; rather, it is shaped by balance, purpose, and context. For some students - particularly those transitioning into middle school - unstructured and habitual device use appeared to coincide with reduced outdoor participation, social inertia, and patterns of emerging dependency. At the same time, participants demonstrated notable self-awareness and motivation to recalibrate their habits when provided structured opportunities for reflection and collaboration.

Through the participatory, design-based process employed in this research, students identified emotional, social, and environmental factors contributing to screen reliance. Engagement with the MYP Design Cycle provided a scaffold for collective problem-solving, enabling students to propose contextually responsive solutions that sought to balance digital engagement with physical and social activity. Teachers' involvement added complementary insight into institutional and logistical influences - such as supervision routines, scheduling constraints, and access to outdoor space - that shape student behaviour. The collaboration between students and teachers illustrates the potential of inquiry-driven, action-oriented research to support meaningful school-based change.

The inquiry informed tangible adjustments within the school, including revised break-time logistics, negotiated access to shared play areas, expanded supervision practices, and the introduction of co-constructed "techspectations." While these shifts were observed anecdotally rather than measured through formal pre- and post-intervention instruments, they suggest that coordinated changes across personal, social, and environmental domains can influence student behaviour in constructive ways. Future research incorporating systematic observational counts, student self-report measures, or longitudinal follow-up would strengthen understanding of the durability and transferability of such interventions.

Methodologically, the study contributes to the field of participatory school-based research by demonstrating how student voice and design thinking can be leveraged to examine complex wellbeing issues. It affirms that adolescents are capable co-researchers who can articulate nuanced understandings of their digital habits and generate viable, context-sensitive solutions. At the same time, interpretation of the findings should consider the study's contextual boundaries: it was conducted within a single, affluent international school and involved a small, gender-skewed sample of frequent device users. Including broader gender representation and varying usage profiles would deepen understanding of how digital practices intersect with peer norms and break-time culture. Broader and more diverse samples would enhance transferability and deepen insight into variation across student populations.

Ultimately, this study indicates both the challenges associated with habitual or unstructured access to technology during break periods and the promise of collaborative, balanced approaches. The findings point toward an integrative, contextually grounded model of digital wellbeing - one that combines structured environmental design, guided autonomy, reflective dialogue, and shared responsibility. By fostering environments in which digital engagement is purposeful, moderated, and socially connected, schools can support students in developing the awareness and self-regulation necessary for healthy participation in technology-rich learning communities.

11. Limitations

Several limitations should be considered when interpreting the findings of this study.

First, the sample was small and gender-skewed, comprising six self-identified frequent device users, all of whom were boys. While purposive sampling was appropriate for examining

intensive patterns of break-time technology use, it necessarily excluded the perspectives of non-frequent users and female students who may experience digital engagement differently. As a result, the findings reflect the experiences of a specific subgroup rather than the broader diversity of the Grade 6 cohort. Future research would benefit from stratified or mixed sampling approaches that intentionally include students across varying levels of device use and gender identities in order to illuminate both risk and protective patterns associated with digital balance.

The absence of female participants among the self-identified frequent users may itself point to gendered patterns of gaming culture, peer norms, or break-time social organization within this cohort. However, the present design does not allow firm conclusions regarding gender differences. Future research should explicitly investigate how digital practices intersect with gendered expectations surrounding play, gaming, and social affiliation in middle school environments.

Second, the study was conducted within a single, affluent international IB World School. The availability of digital infrastructure, outdoor facilities, staffing resources, and a strong culture of inquiry may not reflect conditions present in less-resourced or culturally distinct settings. Although the findings offer conceptual insight into the relational and environmental dimensions of digital wellbeing, their transferability to other contexts should therefore be approached cautiously.

Third, although behavioural shifts were observed following implementation of the interventions, the study did not include standardized pre- and post-intervention measures of device use, wellbeing, or outdoor participation. Consequently, interpretations regarding impact rely on qualitative analysis and practitioner observation rather than systematic longitudinal data. Future research incorporating structured observational counts, validated self-report instruments, or multi-term follow-up would strengthen evidence regarding the durability and scope of behavioural change.

Finally, the dual role of the researcher as a member of the teaching faculty may have shaped data collection and interpretation, despite the use of reflexive journaling, transparency in analytic decisions, and collaborative theme validation. Although this insider position facilitated trust and contextual depth, it also necessitates ongoing attention to potential bias and power dynamics.

Taken together, these limitations underscore that the findings are contextually grounded rather than broadly generalizable. Nonetheless, the study contributes insight into the dynamic interplay between autonomy, environment, and wellbeing in technology-rich middle school settings and provides a foundation for further inquiry across more diverse educational contexts.

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