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Enhancing FocusUp: Integrating AR Interaction into Gamified Learning for University Students

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Abstract. The penetration of digital technologies has made sustained attention and deep concentration in independent learning increasingly difficult. To address this, the FocusUp project applies gamification and behavioral reinforcement principles to support study habits. This paper proposes a qualitative investigation into the potential role of Augmented Reality (AR) interactions in the future design of FocusUp. Based on the semi-structured interviews with five students and five teachers experienced in using AR, the study explores AR's perceived affordances for enhancing engagement, interactivity, and intrinsic motivation. Analysis revealed three main themes: AR's embodiment and spatial interaction can promote deeper mental engagement; its social and collaborative potential remains promising for integration; and pragmatic obstacles such as technological accessibility and cognitive overload must be considered. The discussion infers design recommendations for incorporating AR into FocusUp to create a more immersive, adaptive, and socially connected learning experience, ultimately aiming to counteract digital distraction through innovative pedagogical solutions.

Keywords: Gamified Learning, Augmented Reality (AR), Student Engagement, Learning Focus and Attention, Intrinsic Motivation

1. Introduction

The contradiction in the learning environment in the modern university is technological abundance [1]. On the one hand, the digital means have given unprecedented access to information and the ability to collaborate, on the contrary, these resources have produced an unquenchable onslaught of distractions that divide the attention of students and forget about academic performance. Smartphones symbolize the ideologies of this dualism since they are not only a tool that cannot be replaced but due to their possibility to create a window to the educational content illustrate an inevitable source of social media, entertainment, and communicative hazards as well. It is a condition that tests the capability of the students to keep their grip and concentration that are crucial variables to profound study and academic success. To deal with this omnipresent challenge, a strategic intervention in the shape of the FocusUp mobile application was created. According to the rules of gamification and behaviorist psychology, the concept of the program presupposes the possibility to develop a long-term capacity to focus and develop positive habits with the assistance of such characteristics as time management courses (e.g. Pomodoro-inspired timers), self-

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observation applications, and the system of incentives in the form of motivational points, badges, and avatar levels [2]. FocusUp tends to ensure that the concentration behavior becomes more concrete, gratifying and proactive by providing positive reinforcement as soon as the behavior takes place to ensure the habitual behavior becomes the behavior.

FocusUp's most new generation operates mostly within a two- spatial, screen- bound interface, nevertheless. Although powerful, this structure may not fully exploit engaging science's potential to deliver more interesting and relevant learning activities. Augmented reality (AR) technology has a promising future for reimagining learning design thanks to recent and rapid advancements [3]. Embodied and framework- conscious interactions are made feasible by AR, which easily superimposes computer- generated information onto the user's perception of the real world. According to researchers like Azuma, AR fosters a sense of presence and direct manipulation by combining digital content with real- world conditions [4]. A growing body of research in educational research suggests that applying abstract concepts to spatial and sensory experiences can boost motivation, increase interactivity, and increase knowledge retention [5,6]. These skills are in line with constructivist and experiential learning theories, which hold that information is constantly created by the person through contact with their environment [7].

So, this paper aims to bridge FocusUp's existing design with AR's ability as a teaching tool. Its main objective is to find out how to incorporate AR contact paradigms to strengthen FocusUp's learning experience and increase customer commitment. Employing semi- structured interviews with two important client groups who have first encounter with AR- based learning tools, the investigation employs a quantitative approach. Through this exploration, the research looks at perceived benefits, useful difficulties, and broader instructional implications of AR inclusion in a research- habit formation context. The conclusions drawn serve as practical style suggestions for a later FocusUp iteration, with a special emphasis on using AR to strengthen students ' focus, develop autonomy, and improve their sense of accomplishment and connection with the learning process.

2. Method

2.1. Participants

Ten individuals in this quantitative study were randomly selected from three major universities in Canada to ensure that there were different viewpoints in the framework of higher learning. To get both coach and consumer perspectives, the participant cohort was deliberately divided into two distinct groups. Five college undergraduate students between the ages of 19 and 23 made up the second class. All learner participants cited examples of Google Lens for language and information retrieval, language learning apps like Mondly AR, and academic simulations like 3D anatomy explorers as examples of typical use of digital learning tools and self-identifed experiences with AR applications. Five teachers and training aides from different academic fields, including laptop technology, electronic media, infrastructure, and science, made up the second class. These educators who had verified their ability to add AR or additional interactive multimedia technologies into their training materials or study tasks were chosen based on their selection conditions. Following a thorough proposal that included the study's objectives, procedures, and tight security agreements, all participants volunteered for the review in accordance with accepted social research practices.

Semi-organized discussions were used as the main method of data collection, implementing a qualitative research method. This process was chosen because of its natural freedom, which allows for the investigation of sophisticated, personal experiences while maintaining a focus on the key research concerns [8,9]. The recruiter gained wealthy, complex information by examining emerging

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themes and clarifying member responses in a semi- structured style. The next research questions served as the framework for the review:

How do students and instructors view AR connection as a method of improving understanding focus and commitment?

What are the possible advantages and major drawbacks of combining AR features, especially those that specific habit formation, into university- level learning applications?

How does the FocusUp user's experiential inspiring characteristics remain supported, extended, or modified by the distinctive AR affordances?

2.2. Procedure and interview guide

Four important philosophical principles were used to make an appointment link based on the research on AR, gamification, and studying relationship:

Focus and Engagement: In response to the question, "How does interacting with online information in your physical space influence your perception of focus or inspiration during a learning task compared to using a regular screen"?

Collaboration and Social Dynamics: This area of inquiry looked at the cultural potential of AR, for as "Do you get AR- based activities more powerful or responsible when they offer opportunities for collaboration or interaction with peers"? "May you clarify why or why not?"

Usesability and Cognitive Load: Queries addressed both theoretical and empirical obstacles, for as "Have you encountered any difficulties, concerns, or expected distractions while applying AR tools for learning"? "What caused the experience to be as easy or difficult psychologically?"

Design implications and potential vision: Participants were asked to imagine best applications, like as "Based on your experience, what particular types of AR features or scenarios do you think may improve the effectiveness or enjoyment of a study- focused application like FocusUp"?

Each discussion lasted between 30 and 40 days. Sessions were held either encounter- to-experience in a peaceful campus setting or using the Zoom videoconferencing platform to support participant convenience and physical restrictions. All members had informed consent before the start of the process. Each meeting was recorded sound- recorded to maintain accuracy and therefore exactly transcribed for in- depth analysis with their consent.

2.3. Analyze the data

The six- phase thematic analysis technique described by Braun and Clarke, which provides a systematic yet flexible method for identifying, analyzing, and monitoring patterns in qualitative data, was used as the data analysis process [10]. Through repeated observations of the meeting transcripts, the scientist became involved in the information. Analytically, original rules were created, capturing essential features of the data that were important to the research questions. NVivo, a qualitative data analysis program, was used to organize and manage these rules. Possible designs were identified through an iterative process of identifying shared meaning designs that captured important aspects of the information in terms of research objectives. The prospect designs were finally evaluated for consistency and individuality against the entire database and the coded components before being defined and named. Three powerful, overarching themes that encapsulate the participants ' social views regarding the integration of AR into teaching programs like FocusUp were the result of this comprehensive analysis.

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3. Results

3.1. Embodied engagement and spatial presence as precursors for deeper involvement, theme 1

The skill of AR to develop a unique form of embodied engagement and presence was a steady and significant theme in both student and instructor interviews. As opposed to traditional display- based learning, participants regularly claimed that AR experiences are more interactive and actually engaging. Students claimed that quiet usage turned into effective exploration as a result of the necessity to proceed, gesture, or manipulate digital objects in their daily lives. When a student uses an AR apps for studying, such as placing a protein in her area and walking around it, she is not just reading about its construction, according to a student. To see unique perspectives, she had actually move. It feels more like finding or researching something that is really that than it does learning. This attitude emphasizes the change between experienced discovery and observing learning.

Introducing constructivism and experiential learning as educational glasses, teachers strongly reaffirmed this point of view. They put attention on AR's unique ability to create abstract concepts. According to a scholar trainer," AR acts as a gate between the abstract and the visible". Students may see a sophisticated geological formation level- modeled on their desk, walk around it, and yet" cut" through layers instead of trying to figure out a complex formation from a textbook diagram. Powerful for comprehension is this geographical- situational link. This embodied conversation was naturally linked to improved attention by a number of members, both instructors and students. They suggested that the combined bodily- digital task normally reduces opportunities for mind-wandering because the user's cognitive and sensory resources are more completely utilized by the embodied demands of AR—the need to actually engage with the content.

3.2. Social and collaborative motivation: turning a solo study into a community experience, thème 2

The major inspiring possibility of social and creative AR features was highlighted by the second key concept. By utilizing AR's potential for shared experience, participants saw a substantial opportunity to reduce the loneliness that is often associated with independent research. Learners expressed a strong need for features that may help peers to view their research and development in a novel, geographical format. The ability to "work together with a study group to access a book description" or" see a sister's virtual study clock or development tree glowing in the corner of the library" was a plus. This meets with essential principles of Self- Resolve Theory, especially the psychological need for similarity, which argues that feeling connected to another is a key factor in the development of fundamental motivation [11].

According to experts, AR could successfully change gamified learning from a strictly personal pursuit into a social, goal- oriented activity. According to one trainer, "apps often have game- like elements where you can overcome your own rating". Joint "games" where the work is shared and the team's success depends on each other are feasible thanks to AR. This creates transparency and a sense of shared goal, which can be very challenging. Participants also made a critical point, though, that cultural and dynamic elements may be deliberately avoided as opposed to stressful. Alternatively of recommending style guidelines that focused on joint challenges, group-based accomplishments, and features that celebrate social progress, they issued a warning against leaderboards that does increase anxiety and promoted a friendly and encouraging study environment.

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3.3. Themes 3 and 4: traversing the three primary accessibility, functionality, and cognitive load problems

3.3.1. Discussion: a simultaneous proposal for adding AR into focusUp's learning framework

This quantitative study's findings provide a powerful, functional framework for rethinking the FocusUp program. By immediately addressing the issues of embodied engagement and social desire, the inclusion of AR contact principles has a substantial potential for extending the app's educational effect. Energy Points, success badges, and game modification were all effective ways to deliver behaviorist reinforcement for analyze sessions in the initial FocusUp style. These inspiring rings may be made more convincing, engaging, and socially appropriate applying AR.

FocusUp may employ an AR development modeling system to further the concept of embodied engagement. A student may change on AR mode to see a virtual tree that had been planted on their natural office rather than just a 2D development bar or online avatar. The tree grows and flourishes in their actual- world surroundings as they complete their targeted study sessions, giving them a steady, geographical representation of their continued effort and commitment. This idea takes inspiration from previously- existing gamified apps like Forest, a nicely- known focus app based on the Pomodoro Technique, adding a layer of embodied presence, making the reward an important component of the learner's environment and strengthening the psychological and mental connection to their success.

Also, FocusUp could produce AR- based cooperative study strategies to address the powerful need for interpersonal motivation. These features might include" AR Study Hubs" in conjunction with research on social presence in technology- mediated learning. People who commit to a continuous study session was project each other's images or progress indicators (such as smooth, glowing lights or shared virtual whiteboards) into their own physical study space in this envisioned state. They could collaborate to create a knowledge image, send online assistance, or contribute to the success of a popular AR objective. This directs the motivational strength of similarity while maintaining the primary focus on productivity, turning the act of studying from a single struggle to a attached, social endeavor.

3.3.2. Design principles for responsible integration: solving identified problems

Themes 3's availability and cognitive load issues are important style constraints that may guide the creation process, not simply obstacles. AR capabilities in FocusUp should been implemented as extra, downloadable components rather than as required parts to address these issues. Based on their position, system presence, and personal taste, users should be able to easily switch between a conventional 2D interface and AR modes. The use of clear, engaging tutorials and dynamic problems settings is necessary to combat functionality friction and mental overload. A primary- time AR user might begin with clear, credible visualizations, increasing in complexity as they become more secure and efficient.

Most notably, its components must be intrinsically in line with metacognitive learning goals to avoid AR from becoming a disturbing innovation. The technology may allow improved self- rules. By projecting a heatmap or timeframe showing periods of intense focus and numerous distractions onto a person's walls calendar, an AR module was comprehended their weekly focus patterns. Significant mastery activities like projection and organizing are promoted by this by transforming abstract self- tracking data into an embodied, geographical feedback system without burdening the user with unwanted effects. Every AR connection may have a obvious, good purpose, such as

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improving target, understanding habits, or encouraging creative understanding, according to the design philosophy.

3.3.3. Pedagogical and theoretical implications

A consolidation of some learning beliefs led to the proposed production of AR and gamification within FocusUp, creating a potentially dangerous hybrid learning ecosystem. It combines the constructivist and experiential foundations of AR (knowledge construction through active, context-rich interaction) with the behaviorist reinforcement of gamification (immediate rewards for desired behavior). The app's analytics and social features support abstract conceptualization and active experimentation, which is in line with Kolb's experiential learning cycle [7].

Also, AR's features enable situated learning, which emphasizes that understanding is most efficient when it is embedded in the setting where it will be used. Use AR to include context- certain inspiring cues or content to context- distinct study spaces like libraries, dorm rooms, and cafes, to encourage users to initiate focused sessions in AR- increased FocusUp. This strengthens the integration between the routine of focused work and the natural environment, creating a model of ubiquitous learning design that easily incorporates friendly digital tools into the learner's daily life.

4. Conclusion

This research extends the developmental scope of the FocusUp project by qualitatively investigating the transformative potential of Augmented Reality interaction for enhancing gamified learning aimed at university students. Through in-depth interviews with key stakeholders, the study identified three core insights: AR can promote a more embodied and cognitively engaging form of learning; it offers substantial untapped potential for fostering social motivation and collaborative study practices; and its successful integration is contingent upon thoughtfully addressing practical challenges related to usability, accessibility, and cognitive load. Translating these insights into design principles for FocusUp suggests a future trajectory that moves beyond screen-based gamification towards creating immersive, contextually aware, and socially connected learning environments.

The proposed model for an AR-enhanced FocusUp envisions a learning tool that engages students not just cognitively but also physically and socially, thereby addressing the multifaceted nature of distraction and motivation. Future work should involve the iterative prototyping of specific AR modules informed by these findings, followed by quantitative and qualitative user testing to empirically measure impacts on engagement, focus duration, and habit formation. Further exploration could also examine the role of AI-driven personalization to tailor AR challenges and feedback to individual learning rhythms and preferences. By strategically combining the motivational architecture of gamification, the principled feedback of behaviorist design, and the immersive, spatial affordances of AR, FocusUp has the potential to evolve into a next-generation tool that effectively empowers university students to cultivate focus, self-regulation, and resilient learning habits in an increasingly complex and distracting digital world.

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