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Understanding Usability Challenges in Educational Games Through the Lens of the Mechanics, Dynamics and Aesthetics Framework

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Abstract: This study investigates the usability challenges in educational games for primary-grade children, using the Mechanics-Dynamics-Aesthetics (MDA) framework as an analytical lens. Cantering on the case of Taleemabad, a Pakistani educational game, the research employs an unmoderated usability study to identify interface and engagement issues that affect player experience and learning outcomes. Through thematic analysis of user feedback organized via affinity diagrams, the study classifies usability concerns into mechanical, dynamic, and aesthetic dimensions. Findings highlight critical barriers such as poor cross-platform compatibility, navigational flaws, and inadequate feedback mechanisms. The research offers targeted design recommendations to enhance usability and player engagement, advocating for a user-cantered approach in serious game development. By bridging game design and user experience evaluation, this study contributes to the discourse on effective educational technology and supports improved digital learning environments.

Keywords: Serious Games, Usability Analysis, User Experience (UX) Design, Game-Based Learning, MDA Framework, Player Engagement, Game Mechanics, Educational Technology, Human-Computer Interaction (HCI)

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Introduction

The integration of digital technology in education has led to the emergence of serious games—interactive digital platforms that merge learning with entertainment. Unlike traditional games, serious games are designed to teach specific skills through immersive experiences (Westera, 2019). Their success hinges on usability, as poor design undermines engagement and learning outcomes, often leading to user attrition (Nwosu et al., 2022).

Serious games are now applied across a range of educational domains—from language acquisition to medical training—due to their capacity to enhance motivation, engagement, and retention (Soyoof et al., 2024). The usability of these games is paramount; when game interfaces are non-intuitive or error-prone, learning is disrupted and user frustration increases (Permata et al., 2024).

In Pakistan, rising digital literacy has encouraged the integration of educational games such as Taleemabad in schools (Baloch & Taddese, 2020). Despite growing adoption, many local games suffer from technical shortcomings, content gaps, and limited accessibility.

This study investigates Taleemabad through usability testing and applies the Mechanics-Dynamics-Aesthetics (MDA) framework (Hunicke et al., 2004) to identify design flaws affecting player engagement. Despite critiques of MDA's relevance to serious games (Carvalho et al., 2015), the framework remains a robust tool for analysing user experience. Findings aim to inform educational technology development and offer design recommendations for improved engagement, particularly in the context of primary-grade learners.

Research Question

- How do usability challenges affect game mechanics, dynamics, and aesthetics in educational games for primary-grade children?

Serious Games in Educational Contexts

games have emerged as effective tools in education, combining interactive storytelling and game mechanics to enhance learner motivation and engagement (Naul & Liu, 2020). They facilitate the development of cognitive skills and problem-solving abilities across various disciplines, including science, mathematics, and language acquisition (Astuti et al., 2021). Contrary to traditional passive learning environments, serious games promote active learning by allowing learners to make decisions and solve problems within the game context (Rissanen et al., 2020).

Usability in Serious Games

Usability is a critical factor in the effectiveness of serious games. It encompasses learnability, efficiency, satisfaction, error tolerance, and accessibility (Antunes et al., 2022). Usability issues such as confusing navigation, unresponsive controls, and lack of adaptive feedback can lead to learner frustration and disengagement (Antunes et al., 2022). Ensuring intuitive and user-friendly interfaces is essential to minimize cognitive strain and maintain learner engagement (Luo, 2024).

Frameworks for Usability Analysis

Several frameworks and methods have been developed to evaluate the usability of serious games:

- Game Usability Model: This framework focuses on game mechanics, task completion, and player experience to assess usability (Pagulayan et al., 2012).
- Moderated vs. Unmoderated Testing: Moderated testing involves direct observation of users, while unmoderated testing relies on surveys and analytics (Nielsen, 1994).
- Qualitative vs. Quantitative Assessments: Qualitative methods include interviews and think-aloud protocols, whereas quantitative methods involve metrics like task completion time and error rates (Bacca et al., 2014).
- Affinity Diagram Method: This method organizes user feedback to identify recurring usability issues for targeted improvements (Beyer & Holtzblatt, 1998)

Common Usability Challenges

Research has identified several recurring usability challenges in serious games:

- Navigation and Interface Design: Poor menu organization and unclear interface elements can distract learners from educational content (Jrall & Kiran, 2023).
- Technical Performance: System crashes and unresponsive controls disrupt the learning experience (Merkt, 2021).
- Accessibility and Adaptability: Lack of customization options and assistive technologies can hinder the effectiveness of serious games for diverse learners (Salvador-Ullauri et al., 2020)
- Feedback Mechanisms: Insufficient feedback prevents learners from monitoring progress and learning from mistakes (Chou & Zou, 2020)

Taleemabad: A Case Study

Taleemabad is a serious educational game developed in Pakistan to supplement primary education. While it offers quality content and national outreach, challenges such as limited ICT infrastructure and regulatory constraints affect its implementation (Wilson et al., 2022). Evaluating learner engagement with Taleemabad is crucial before its widespread adoption in classrooms.

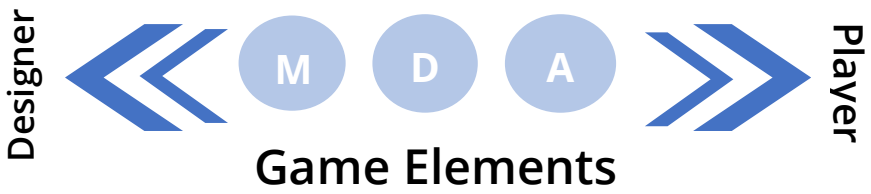
Mechanics-Dynamics-Aesthetics (MDA) Framework

The MDA framework provides a structured approach to game design by analysing mechanics (rules and interactions), dynamics (player behaviour), and aesthetics (emotional responses) (Hunicke et al., 2004). Although initially developed

for entertainment games, MDA has been applied to serious games to assess user experience and guide design improvements (Martinez et al., 2020).

Figure 1

Player and Designer interaction with Mechanics Dynamics Aesthetics Framework



User Experience Evaluation

User experience (UX) evaluation in games encompasses various methods:

- Flow Theory: Csikszentmihalyi's flow theory describes the optimal state of engagement achieved when challenges match the player's skill level (Csikzentmihaly, 1990)
- Presence and Immersion: Studies have explored the sense of presence and immersion as key components of engaging game experiences (Takatalo et al., 2010).
- Physiological Measures: Some researchers have used physiological indicators like heart rate and eye-tracking to assess user engagement, though results are mixed (Bernhaupt, 2008).

In the context of educational games, UX evaluation focuses on gaming experience, learning outcomes, adaptability, and usability (Vieira et al., 2019) .

Integrating MDA and Usability Analysis

Combining the MDA framework with usability analysis offers a comprehensive approach to evaluating serious games. While MDA provides insights into game design elements, usability analysis assesses the effectiveness, efficiency, and satisfaction of the user interface (Lu et al., 2021). Integrating these approaches can enhance the design and evaluation of educational games, leading to improved learner engagement and outcomes (Laine & Lindberg, 2020).

This research uses an unmoderated usability study approach to evaluate user experience and engage the players with Taleemabad through an educational game assessment. The baseline survey findings revealed weak player involvement, so a usability analysis was initiated to evaluate game interaction disruptions and possible causes.

UX research relies on established usability studies for assessing digital system ease of use efficiency and satisfaction (International Organization for Standardization, 2018; Nielsen, 1994). For this research, an unmoderated usability study was used to let participants engage with the game without researcher supervision so they could behave naturally and maintain independence from researcher influence (Lu et al., 2021). 47 Participants who had been part of the engagement survey joined a WhatsApp group and received instructions for the usability study.

Participants provided feedback related to game mechanics interface design and usability issues using structured prompt sheets during data collection. During the two weeks of the intervention, participants received guidance to explore the game and document their experiences on the WhatsApp group.

The researchers analysed data through the affinity diagram method which groups recurring themes from user-reported issues according to (Goldman et al., 2022). The study data was sorted into different categories following the MDA framework to evaluate how different issues with gameplay, control or user interface interrupt the gaming experience. This approach created an organized mechanism for usability evaluation which allowed researchers to determine fundamental issues in design and the classification using MDA framework streamlined the rectification process alongside specific potential solutions for Taleemabad.

Analysis

Three rounds of usability study were conducted to gather primary data on player attitude and experience with the game. As per recommended standards, each round included 11,12 and 10 participants respectively. The participants were members of the earlier survey who volunteered to participate in the usability study. Each participant was given a prompt sheet which laid out the instructions as well as provided the prompts which users were expected to record their observations against. The responses were then organized in the form of affinity diagrams to organize them according to the priority level of addressing the issue. The six prompts and the responses of each are listed in the form of affinity diagrams.

Prompt 1: Install and Register the User on the Game

A total of 50 observations were recorded by the 33 respondents. The respondents of the study followed the instructions and downloaded the game from the Play Store. The registration process is a compulsory step for any user of Taleemabad. Users were asked to register and record any observations about the process. Most of the users were able to eventually register but some major observations were seen recurring in user responses, including the observation that the screen hangs and the submit button malfunctions a lot. Others expressed frustration over being asked to share phone numbers to register on the app. While many others found the process time-consuming with delayed response from the app. The most frequent observation recorded was reservation in sharing phone numbers for registering on the app as respondents were concerned about spam and privacy.

Prompt 2: Overview of Game Features

The participants were asked to explore different interfaces and dig out the features of the app. User response to this prompt was excessive as 192 observations were recorded. Users shared their experiences regarding the orientation of the app, it was seen as an obstacle by a majority of 22 respondents. Another recurring observation was that the grading interface was seen as hard to locate by 20 users. Other widely recurring observations were about sound buttons, offline unavailability, issues with typing in landscape mode, malfunctioning of contact and feedback buttons, and missing information and buttons on nearly all interfaces.

Prompt 3: Game Controls and Settings Available

The prompt asking about game controls and in-game settings provided to the player also received a lot of observations. A total of 180 responses were received. The most recurring observation, 21 responses, was on the back button which malfunctions or is absent from most of the screens. 19 users shared that the diamond button on the test screen doesn't work. Another 15 said that the exit button is hard to find. Other recurring observations included users recording concerns about missing video controls, concerns regarding the IOS version, absence of feedback and contact mechanisms, absence of any language control, lack of user settings, and user profile-making features. Absence of mute button and notification sound for in-app messages. About 8 users objected that the background music does not stop when they are playing videos.

Prompt 4: Select a Grade and Complete One Lesson

The next prompt was the most important one as it dealt with the essence of the game. Successful completion of the learning process by selecting a grade and attempting the learning activities about one lesson. 237 observations were recorded. A wide majority of 23 users said the video speed cannot be controlled. Another 21 expressed that they wished they could pause and resume the videos. 13 demanded that the videos should have subtitles with them. 19 users conveyed that the diamond button on the test screen does not work and another 19 said the tests should have scoreboards at the end. Another 11 wrote that the progress of a student during the tests should be recorded. 13 users found the test to be unchallenging and boring for the students. 06 said vocabulary bank should be included. Other observations were about educational minigames, pop-up ads showing up, some malfunctioning video links were reported and users revealed that the Android app has an incomplete curriculum for Grade 5 while the IOS version only has grade one.

Prompt 5: Malfunctions and Bugs

This prompt was included for users to write about any malfunction that they are unable to report under any other head. Since most areas were generally covered already, observations recorded are relatively less. A total of 47 observations were recorded, mostly concentrating on loading issues and screen-freeze problems that the game is encountering. The most reported bug was that when the user clicks on a mega-phone icon on the home screen, assuming it is the volume button, it turns out to be a 'share with friends' button. 18 out of 33 respondents found this annoying and off-putting. Other observations included users mentioning that the app is not calibrated for Android tablets and the interface is disturbed if we open it on a tablet.

Prompt 6: Look and Feel of the Game

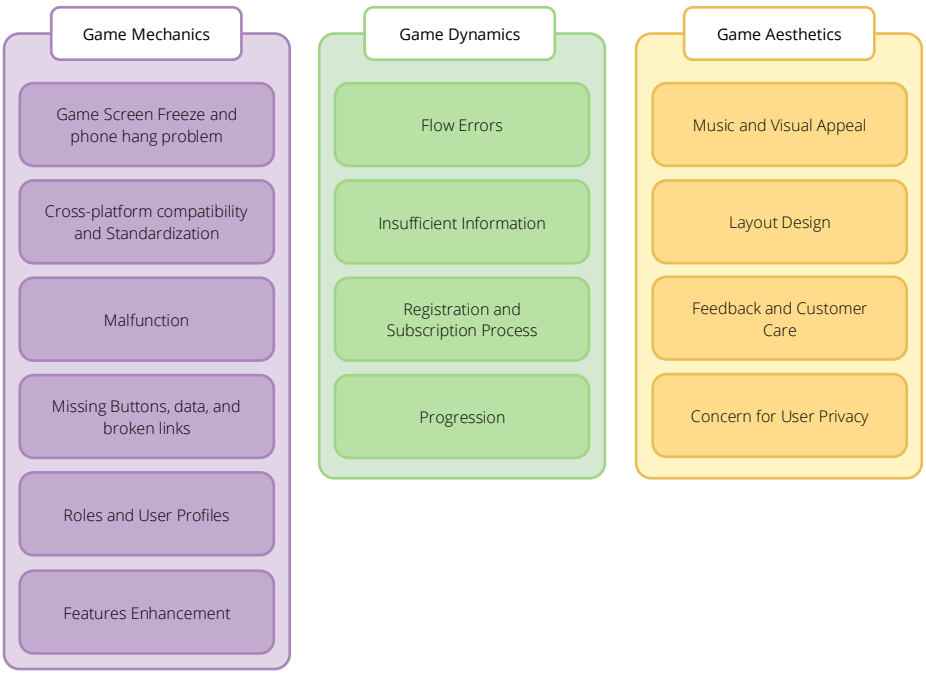
A wide majority of 21 out of a total of 33 respondents found the music to be loud, pinching, and distracting. Respondents gave 70 responses to this prompt, mostly concentrating on the visual aspects of the game. 19 reported that the colors are distracting, another 07 found the colors to be "eye piercing" while 09 said that the background visuals are causing distraction. Other less reported observations included that MCQ visuals are not clickable, which confuses, the icons are not aligned on some of the interfaces, and some expressed that video browsing should not be done by swiping as the finger touch causes the video to play, while others simply didn't like the icons.

Affinity Diagram

Usability study assembles user observations on one platform where it is organized using affinity diagrams and a designer can see the themes that are emerging from user data. Figure shows how insights or themes derived from user data may be divided into Mechanics, Dynamics, and Aesthetics to facilitate a designer.

Figure 2

Insights Derived from Usability Study of Taleemabad



Discussion

Mechanics Dynamics and Aesthetics Framework by Hunicke et al. (2004) attempts to address all issues relating to game design and user experience from the player's perspective as well as from the designer's perspective. This research is a case study of an educational game that has been analysed for poor user experience to draw user insights from user data that are of use to a designer attempting to improve the game. To further streamline the game enhancement process, the user insights can be classified into game Mechanics, game Dynamics, and game Aesthetics.

Game Mechanics

a) Game Screen Freeze and Phone-Hang Problems

The users expressed that they encountered screen freeze or game hang problems at multiple interfaces throughout the experience. Screen freeze, also called UI latency, refers to the time a mobile app takes between user input and response generation, and usually occurs when the system resources at the backend are not able to cope with the user input. Although it is hard to locate this type of bug, there are tools available online in open source that help in detecting UI latency and have been proven effective in combating UI design defects causing UI latency (Kang et al., 2016). Another such tool is DiagDroid which has been used to test 33 Android mobile apps, 14 of which were detected to have 27 performance issues.

The two most frequent click paths where users faced the problem were while registering and while playing videos. More efficient algorithms can be written for the registration process and size optimization of videos may help in overcoming the problem.

When users using a PC for certain games and applications, switch to a smartphone, an expectation gap is created which poses a challenge for applications and game designers for smartphones. Prompt and responsive user interface can boost user patience resulting in better user retention which is at the heart of User Experience Research and Industry (Kang et al., 2016).

The screen freeze and phone hang issue may also be caused due to the specification of the user device so developers may take that into account either by designing for optimal performance or by including a disclaimer for system requirements that will prepare the user for a bumpy experience if their device is not as per requirements.

b) Cross-Platform Compatibility and Standardization

User observations for this category generally cantered around the orientation of the game, interface optimization for different screen sizes, and disparities in the application versions available for Android and IOS.

The game has a landscape orientation by default, and it provides no option to the user but to bear with it. Nearly all respondents had reservations about this feature as users are used to auto-rotating applications and game interfaces for maximum user satisfaction. Layout transitions between versions are complex but many platforms like PrefChecker provide automated layout transition features using basic layouts and some standalone components in static layout files like “XML” while implementing dynamic features with Java code.

Furthermore, users observed that the game interface gets disturbed when they open it on a device sized differently from the standard smartphone, like a tablet. This can be handled by an algorithm which will make the game multi-platform compatible. Hence it is a core game mechanic and should be dealt with as a priority.

All successful games are multi-platform compatible and provide offline versions. Meaning they can be installed on a variety of screen sizes, devices, and operating systems and can be played without the Internet. Nearly all famous games have separate versions for each platform, but they remain consistent in terms of design unity. Essentially the same logo is used, uniformity is maintained in controls interface placement of icons is followed as standard and only those components or controls are redesigned, which is inevitable.

Taleemabad is lacking in the area of platform compatibility so much that even the logo of the game is different for Android and IOS. Furthermore, the content in the IOS version is only available till grade 1 whereas we know through the Android version that most of the content for other grades is also ready. So, both versions must be brought at par to restore user confidence in the game and an offline version may also be made available for smooth working and bigger outreach of the game.

c) Malfunctions

The first indication of poor game mechanics is bugs and malfunction. Taleemabad has been reported to have about over 10 to 15 major malfunctions which were reported by over a hundred observations given by the respondents. Most frequently pointed out were problems with interfaces, buttons not working on first click, music playing behind a video, videos being locked without any sequence, video download function not working and videos not opening.

Performance bugs are lethal for the popularity of any mobile application as the Android framework allows any application to respond to a user within 5 seconds, Google has the standard set at response generation within 200ms, beyond which users may perceive slowness of the application. Although it is very tricky to write a source code that eliminates all bugs, there are many open-source automated layout testing tools and platforms available that may be used to refine a source code for layout errors.

A usability study is another way to evaluate user expectations and track down logical and interface errors or bugs. Anne Kaikkonen et al. established through research that both moderated and un-moderated usability study methods are effective measures of diagnosing an application interface for errors and omission on the part of the designer.

d) Missing Buttons, data, and broken links

The usability study helped identify many interfaces where certain basic buttons were expected by users and were found missing. The biggest is the absence of an exit mechanism from the game. There is no exit button on any screen and even when the smartphone interface back button is used, it needs to be pressed twice before it asks for user confirmation to leave the game. This creates frustration in users as they feel captive and bound, like "trapped in the game" as one of the users expressed it. Taking control away from the user is another thing user experience designers advise against. Likewise, the 'back' button is missing or malfunctioning on nearly all screens. Once again, the user gets frustrated and feels like he/she is in an escape room when playing the game. The third most missed control was the setting to control music. Firstly, it's hard to find, secondly, it is available only within a certain menu which is on the home page, which is once again depriving users of switching music on and off, at will. This results in heightened user dissatisfaction.

Certain puzzles and learning games have been added which are essential to raise the engagement of users with the game. However, they lack the essential details like titles, captions, and guiding instructions. Once again, the user is repelled by this. Some of the videos are not opening while others are not available at all.

e) Roles and User Profiles

Education, when approached as a process, involves different stakeholders like the teachers, the parents, and the child. Many educational apps have different features available for all stakeholders. Like when you log in to the app, it asks you if you wish to join as a teacher, student, or parent. These roles help streamline and organize relevant app features for each role. The majority of users expressed that the app should have a teacher interface.

Currently, the app has little to offer to the teacher, although they do have a parental portal link for the parents to get updates from. The parental portal is also inefficient because of multiple broken links, insufficient information, and lack of provision to choose between children if a parent has more than one. There is no feature for the teachers, even though the same company does have a separate app for teacher training.

User profiles enable an application or game to store user data record its progress through the game and provide customized experience. The majority of learning games or applications allow user profiles so that more than one child can use the same app but still receive an exclusive experience. The majority of the 33 UX study respondents demanded that Taleemabad should enable user profiles. The profiles can help keep track of user progress for both the parent and teacher and may also help encourage students to perform better.

f) Feature Enhancements

Today's mobile users are well accustomed to game and mobile application interfaces. Most successful apps use standard buttons and button placements which make the game easy to use for users. This enables and educates the users about what to expect from a good user experience. Based on this observational learning, most mobile app and game users feel comfortable expressing how they want or expect an interface to behave.

The user in this study also recommended many new features that can help improve the game experience and ensure that the game objective is achieved. Since Taleemabad is a learning game, most features recommended are related to improvements in the learning process. As the game used video lessons, most of the users expressed that

they wished more video control settings were available, like playback speed control, pause and play control, and subtitles.

Another most demanded and requested enhancement was the addition of a vocabulary bank, which would list the difficult words used in the video lessons. Most users expressed that they were expecting a list of contents for each subject which was not shared. Once more, this is about giving control to the user to tailor their learning experience which will make them feel more responsible and result in better engagement. Users also recommended sharing more puzzles and learning games to give variety to the user experience.

Game Dynamics

g) Flow Errors

Flow errors and caused by navigational errors or omissions. If the app experience is not optimized in terms of efficiency or user expectation, and there is a wrong linking of buttons, etc., which results in a disruption in the user experience, the app is said to have flow errors.

The usability study revealed many such flow errors in Taleemabad, first and foremost, the main menu and exit buttons were expected to be present on all screens but they were not. There is absolutely no exit button while the main menu which has many important controls, can only be accessed from the home screen. Next, the sound and Grades buttons are hard to find as they are also on the main menu. Upon registering, the first user impulse is to select the students' grade but instead, they see a list of subjects. Next, some of the users are not comfortable with the music, they cannot control it until they have to locate the sound button.

Another logical error is caused by a button that resembles a megaphone. Users mistook it for the most-wanted sound button, only to find out that the button was used for sharing the game with friends. Recurring observations were received about video controls, including the option to pause and resume videos or to jump to the next video by skipping a video.

Certain respondents also objected that the game has pop-up ads which are distracting. Two more observations on the video selection and test screens were regarding the hotspot which will be touched to play the next video and the same is also used to slide to the next video. The hotspot on test screens is misleading as the visuals are not clickable only the text is.

h) Insufficient Information

Proper communication is the key to any interaction. Games and mobile apps are no different. This app is found to be giving insufficient information at many crucial interfaces as many such spots were pointed out by the users. The parental portal is one of the most important interfaces, and yet it doesn't ask the user for enough input, only the age and name of the child are asked, we can see no mechanism for connecting a child with a particular parent. Similarly, the portal mentions progress in different subjects but does not mention the grade. How can a parent understand which child's progress is being discussed? The same is the case with subject interfaces, they all look the same, and grades are not mentioned on any of the interfaces. The interfaces can be color-coded grade-wise, or grades may be listed, and they can be color-coded subject-wise, but some categorization is required.

When choosing to take a test, the test interface opens where students can attempt an MCQ type of quiz which is well-designed and age appropriate. After attempting more than ten questions, the app simply returns to the main subject screen, without me even informing that the test is complete. Most users expressed they expected a scoreboard or at least marks achieved. One user was so annoyed he said, "I won't take any test again". It's the human psyche to know how we perform when put to a test.

i) Registration and Subscription Process

The app starts with a one-time password (OTP) verification process, which is used to register a user to the app. The app demands for user's phone number to send the OTP, which is a big hurdle. A large number of respondents showed

reservations about sharing their phone numbers out of concern for privacy and spamming. Furthermore, most students do not have personal phones and parents found it "unsafe" to share their numbers.

Furthermore, the app does not take any details of the child at this step, except for the name of the child. Next, as soon as the number is verified, the app asks for permission to know the device location and to access photos and media, this makes the already speculative user more concerned. Other users expressed that the registration and phone verification take longer than expected and the phone gets stuck. Although this part has been covered in the mechanics section, fixing this will certainly enhance user experience.

The first screen after registration invites users to buy a payment plan. They are given three options to subscribe and all three have errors and do not work. The first plan is for 3 months, which talks about the app video access, while the 6 month and one-year plans are talking about cash on delivery of books and worksheets. The contact details shared here do not work and Play Store reviews revealed that many users did not get the services they paid for.

j) Progression

Progression dynamics serve as the backbone of any game by structuring user progress throughout the game in a way that the user remains confident and is assured that he is doing well. The usability study revealed that users had some concerns about their progress during the experience of learning with Taleemabad. Almost all respondents complained about a lack of feedback and progress after and during a lesson. All lessons are followed by a test, but no score is displayed at the end of any test which is demotivating, and users show resentment over it. Ideally, learning games must incorporate a feedback mechanism that shows user progress throughout the experience and has built-in encouragement messages to engage and compliment the learners on their achievement. Scoreboards are another form of progression dynamic which are missing in Taleemabad. Competition can be raised by including scoreboards which will make the tests more engaging as the users will be intrigued to compete with other players. Parental portal can be used as an effective progression dynamic tool, but it is also not fully responsive. A user complained that the parental portal lacks information and is inaccurate.

Game Aesthetics

k) Music and Visual Appeal

A loud and attractive background music starts to play as soon as the game is launched. Where it engages the kid instantaneously, some users expressed that they wanted to turn it down or mute it but could not find the button. Sound control is something that should be accessible from all interfaces rather than being available only on the home page, there also hidden inside a submenu. Literature supports the use of loud music to attract attention as children are the target audience (Mrázová, 2010), but no evidence has been found of music helping with enhancing learning and when it cannot be stopped and plays in the background of video lessons, it certainly becomes distracting.

Many users showed reservations about the use of colours, referring to them as "pinching", "loud", "distracting" or "too bright". This is a debate whether to use bright colours for a children's app or not. All children's games have bright colours and kids adore them. It may be considered if the user feedback in this category is reflective of their overall frustration with the experience of the app or if there is a problem with the colours. It may be recommended that colour change be dealt with at the very end after the app is rid of the other mechanics and dynamics-related problems. Maybe the users feel differently towards these colours if the overall app performance is improved.

Concern was also recorded about the animations that play in the background. Users found them to be loud and distracting. Light and subtle backgrounds create emphasis on the foreground. "Loud" and "pinchy", as the users commented, distract the child from the learning process.

l) Layout Design

Layout is the arrangement of buttons and screen elements on any app or game. For most interfaces, Taleemabad has linear layouts with a few drop-down menus, and the rest of the elements are arranged in a grid view. During the usability study, many observations came about the icons. Users said they were confused about what an icon does,

they simply said "I don't like the icons, they are confusing". The main reason for the confusion is again the mismatch with user expectations moreover the icons do not have descriptions under them. Some users noticed that icons are not aligned in some of the interfaces. Another major observation about the layout was regarding the landscape orientation which seemed to be a problem for the users as users are accustomed to auto-rotating screens with layouts optimized for both layouts. Users found it hard to type with a keyboard in landscape orientation as it covers the whole screen.

Another observation regarding the messages option was pointed out that the messages have no notifications. This is disturbing as users end up missing out on their notifications.

m) Feedback and Customer Care

Connectivity and availability of the responsible body through feedback or contact us buttons is of utmost importance for the user to determine the quality of experience. If these connections are not established, the user feels that he is "left unattended" and that creates a trust deficit between the user and the game or application. The usability study revealed that none of the feedback mechanisms in the game work properly. The WhatsApp number listed doesn't have a WhatsApp account, the number is not responding, and the email is not replied to readily enough.

The next feedback mechanism is the parental portal through which the game tries to give us an update but again users see this as an inefficient response. The feedback is not comprehensive, there is missing information, and the parent is once more left "unattended" as the Contact Us button doesn't work. If users try to purchase any services, they are faced with the same broken contact link again.

Play store reviews of the game complement the findings of this usability study as people giving one-star ratings were mostly seen complaining about no feedback mechanisms or no response from the team after the user paid the price. One good thing about Play Store feedback is that the Orenda team responds to every query of the users. Mostly only sharing a new phone number each time, telling them to contact the number for further assistance.

n) Concern for User Privacy

Talking about the contact and connection with a game, a learning app acquiring parents' phone numbers to start with, then taking permission to access the location of the device, and then demanding access to photos and media, are too many red flags for any conscious educated parent to ignore. The users were mostly speculative and demanded that the game should give the option of email instead of number, which makes perfect sense. Moreover, the Taleemabad development team needs to think if they have all the accesses they are demanding. The game also lacks an offline version which means that you need to be online to play the game. All these factors raise users.

Conclusion

This study employed the Mechanics-Dynamics-Aesthetics (MDA) framework to investigate the usability challenges of Taleemabad, a serious game designed for primary education in Pakistan. Through empirical user testing and structured feedback analysis, the research identified critical usability shortcomings that impact learner engagement, interface efficiency, and educational value.

Findings revealed performance and compatibility issues, inadequate feedback mechanisms, non-intuitive navigation, and inaccessible aesthetic elements. These issues hinder the development of flow experiences and increase cognitive load—barriers that undermine both user satisfaction and pedagogical outcomes.
In response, a set of targeted enhancements is proposed to improve usability across the MDA dimensions:

Mechanics: Optimizing layout, reducing UI latency, enabling portrait mode, and standardizing cross-platform design can significantly enhance technical performance and ensure consistent interaction across devices. Incorporating user profiles and enriching learning content with features like vocabulary banks and interactive puzzles personalizes the experience and boosts cognitive engagement.

Dynamics: Eliminating flow disruptions, clarifying interface structure, and overhauling the subscription process enhance user trust and interaction fluidity—key factors for maintaining motivation and supporting long-term learning goals.

Aesthetics: Customization options for music, visuals, and interface layouts offer users greater control, while consistent iconography and responsive feedback channels build emotional resonance and system credibility. Reducing intrusive data requests and offering alternative registration options also address privacy concerns that deter user adoption.

Collectively, these interventions represent a roadmap toward a more inclusive, engaging, and pedagogically aligned game experience. By addressing both surface-level usability issues and deeper experiential barriers, this study underscores the necessity of aligning game design with educational psychology principles—specifically, reducing extraneous cognitive load and fostering flow states.

The application of the MDA framework in this context not only validated its utility beyond entertainment design but also highlighted its capacity to integrate with empirical usability evaluation. This synthesis offers actionable insights for educational game developers, UX designers, and policy stakeholders aiming to scale effective digital learning tools.

Future work should explore how AI-powered personalization and real-time adaptive systems can further enhance usability and learning outcomes in serious games, especially in under-resourced educational ecosystems.

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