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Gamifying Cultural Heritage: the digitization journey of Genoa University Museum System (SMA-UniGe)

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Abstract

The vast collection of paper documents and books stored in university archives worldwide represents a significant, yet often inaccessible, cultural heritage. To address this, the University of Genoa, Italy, is digitizing a variety of materials, including books, manuscripts, archival documents, and museum-related items. Making this heritage accessible requires providing alternate descriptions, metadata, and transcriptions, especially for ancient texts where OCR is ineffective. This paper presents the design of a transcription system for the University Museum System (SMA-UniGe), which is currently under development, featuring user-friendly interfaces and engagement techniques. The system leverages gamification to turn transcription into an engaging experience, aligning with the University's mission to promote public engagement and contribute to social, cultural, and economic development through knowledge sharing.

KEYWORDS: Cultural Heritage, Gamification, User Experience.

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1. Introduction

After completing the inventory of cultural assets within the University of Genoa in July 2021, it became clear that this heritage should be accessible without barriers. The University decided to establish the University Museum System (SMA) to digitize and archive its cultural heritage on a single online platform, making it accessible as an interactive exhibition. This collection includes structured museums, archives, botanical gardens, biobanks, and smaller collections.

Digitization and transcription are key to making this heritage discoverable and accessible for education, research, and public sharing, following the FAIR principles (Reiser et al., 2018) and Open Science (Ignat & Ayris, 2021). While OCR and HTR tools have shown promise, they are not accurate enough for the fine handwriting and contextual elements in UniGe manuscripts, despite the progress achieved with the implementation of AI and Machine Learning (Khan et al., 2024; Memon et al., 2020). Therefore, a novel human-based transcription system has been developed, leveraging Citizen Science (Bonney et al., 2016), crowdsourcing (Estellés-Arolas & González-Ladrón-de-Guevara, 2012), and public engagement (Davies, 2020), aligning with the "third mission" of universities to generate knowledge for societal benefit. Maintaining user engagement is crucial, as gamification encourages higher participation and work quality (Lin & Ding, 2023; Morschheuser et al., 2017). This crowdsourced, gamified transcription project also provides educational benefits, enhancing volunteers' understanding of cultural heritage, archival research, and language proficiency (Kim et al., 2015). It fosters critical thinking, attention to detail, and technological literacy, as volunteers learn to use digital tools for transcription and archiving. Collaborative problem-solving and peer-to-peer interaction further enrich the experience, promoting teamwork and community.

Peer review processes encourage accuracy and foster critical evaluation skills. Gamification elements, such as points, levels, and rewards, enhance motivation and engagement, making the transcription process more enjoyable and fostering sustained participation.

Since the transcription portal is still under development, this paper focuses on analyzing the engagement and

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gamification strategies adopted, as well as the design choices that shape its usability and aesthetic identity. In accordance with a user-centered and iterative design approach, comprehensive formative evaluations, including usability testing and pilot studies, will be conducted once the platform is finalized. These evaluations will involve the diverse target groups identified and characterized in this study, allowing for the refinement of both interface design and gamification mechanisms prior to full deployment.

2. Related Works

The web has enabled anyone to have access to a free space for acquiring information on a large scale, leading to new methods of content delivery and tools for accessing it (Schreiber, 2013). In the last two decades, numerous projects for document transcription were developed (Leon, 2014), but to realize this one, two specific realities have been taken as a model. In particular, the study focused on information architecture and engagement dynamics, to create a satisfying environment in terms of user experience and user interface design.

The former is the American Smithsonian Institution, which, with its platform "Smithsonian Digital Volunteers: Transcription Center" has created a space where "digital volunpeers" (Ferriter, 2014) can collaborate and contribute to transcription. The latter is the European Europeana, which has devised a more comprehensive transcription experience with "Transcribathon" (Feliciati, 2022) applying gamification dynamics to motivate users in a collaborative and competitive context, comparing the transcribed characters to miles covered in a marathon.

2.1 Smithsonian Digital Volunteers: Transcription Center

The Smithsonian Institution was founded in 1846 by James Smithson (1765-1829) with the aim of creating a place for culture and the dissemination of knowledge. Currently, it comprises 21 sites including museums, galleries, and a national zoo, making it the largest museum, educational, and research complex in the world. Its main goals are to preserve cultural heritage, foster new discoveries, and share its resources with the world. To pursue its mission, the Smithsonian Institution has been engaged in the process of digitizing its cultural heritage since 2013. It created a portal where "volunpeers" can access documents, browse and transcribe them (Gunther et al., 2016). After completing their transcription, volunteers have the opportunity to review their own work, while also having the option to review the work of others.

2.2 How to transcribe

The "Smithsonian Digital Volunteers: Transcription Center" portal lacks a responsive design, complicating navigation on devices other than desktops or laptops. The homepage features a mixed layout: a non-fixed header with the Smithsonian logo linking back to the homepage on the left, a navigation menu on the right, and links for "signup" and "login". Below this, a slideshow displays news, new projects, and invitations to collaborate on transcriptions. Upon scrolling, the page is divided into three columns:

1. Instructions for volunteering or following Smithsonian on social media;
2. A central section with a drop-down menu for browsing projects;
3. Updates on transcription activity, including revisions and completed pages with links to the relevant documents.

The footer contains links to the Smithsonian homepage, collections page, terms of use, privacy policy, and an Adobe Reader download. Document searches can be performed via a "search" button in the header, allowing keyword searches across all projects or specific ones from a drop-down menu. The search results appear in a table displaying pages with matching terms, including project and collection details. Projects can also be viewed by selecting the "projects" option in the header, showing clickable boxes with status markers: red for ongoing transcription, yellow for review, and green for completed pages. The transcription page is split into two resizable columns: on the left, a viewer shows the document image, and on the right, volunteers can input transcriptions and notes. Buttons for layout modification, document navigation, PDF download, and social media sharing are located around the transcription area.

2.3 The community engagement

The organization of a community is not foreseen within the Smithsonian transcription portal, as can be seen from the official document "Tracking Volunteer Work in the Transcription Center" which highlights that it is not necessary to register to transcribe. However, the account becomes essential at the time of review and if you want to keep track of your work, even if a note reads: "The Transcription Center does not record the number of hours a volunteer contributes, but the "My Work" report does include dates and times that a volunteer participated on a project page"; this means that in the "My Work" section it is possible to view the date and time in which your contribution was made to that specific project, but not the total amount of time spent carrying out the transcriptions themselves. In reference to a personal aspect of the target of the experience, according to the community management policies, registration on the portal is intended exclusively for over 14s while users under 14 can only consult the material. However, there is no real age control, but it is entirely up to the user to declare whether or not, by clicking on a button, they are more or less than 14 years old.

2.4 Europeana Transcribathon

Europeana is a digital library that brings together the cultural heritage of European archives, libraries, and museums, making their collections available for anyone who wishes to browse their documents out of curiosity, educational purposes, and research. Directly quoting the official website, its mission is to "empower the cultural heritage sector in its digital transformation" and "develop expertise, tools, and policies to embrace digital change and encourage partnerships that foster innovation" (Europeana, 2022). Europeana's vision is to provide cultural heritage for professional, educational, or leisure purposes, promoting its development on the web through the integration and enrichment of metadata for the digital content made available (Di Giorgio, 2014; Macrì and Cristofaro, 2021). Through the hamburger menu located at the top left of the homepage screen, users can access the "collections", which are macro-categories containing individual objects in different forms. However, the content of these media is not easily discoverable through a simple search on providers, and it is not possible to extract citations for theses or research if needed. For these reasons, they create "Transcribathon", a portal cofinanced by the European Union where anyone, upon registration, can engage in the transcription, geolocation, and dating of digitally acquired documents.

2.5 How to transcribe

The registration process requires users to provide a username, first name, last name, email, country, language, and password. All users begin at the "Trainee" level and can progress through higher profiles by accumulating miles and unlocking new features as they complete transcriptions. Documents for transcription can be found through the archive, an interactive map, the search bar, or by joining themed "runs".

Search results are displayed as a grid or list, with document status indicated by color: gray for "not started," yellow for "in progress," orange for "awaiting review," and green for "completed". Filters are available on the left side to refine search results. Clicking on a document opens its "cover" page, which includes general information, metadata, and progress percentages. On the transcription page, users can transcribe text and add tags such as dates, locations, people, document type, keywords, and external resources. All edits and additions require confirmation through a review process.

2.6 The community engagement

Undoubtedly, among the two analysed portals, "Europeana Transcribe: Transcribathon" has the most comprehensive and interactive experience, considering the playful context in which the transcription action is placed, metaphorically likened to the world of a marathon where miles become transcribed characters, and users can assume the roles of "Trainee", "Runner", "Sprinter", and "Champion", as well as create their own running team (Morschheuser et al., 2019). For Transcribathon, an engagement system was designed based on the world of marathons, matching written characters to miles traveled and some categories and themed events to "runs", i.e., monothematic races. As anticipated in the introduction to this portal, the volunteer transcriber climbs four levels, which are also linked, in their naming, to the environment of the marathon. Each level has its own "skills", rewards for continuity in transcription and for user loyalty.

3. The case study of University Museum System at UniGe (SMA-UniGe)

3.1 Methodology & Goals

The SMA-UniGe project arises from the need to consolidate the extensive cultural heritage of UniGe into a single repository and make it readily accessible online through a user-friendly interface and an engagement system specifically designed for this purpose. The primary goal was to capture, using high-performance 2D and 3D scanners, images of each individual page of ancient tomes, manuscripts, postcards, labels, cartography, and even exam papers, ensuring their high-definition presentation to all individuals interested in participating in their digitization process or those who simply wish to remotely browse through them. The census of these documents was completed in July 2021, resulting in a significant number of documents that need to be digitized and categorised to prevent them from being lost or scattered. The mission of the project is evident: to make the cultural heritage of Genoa University discoverable, understandable, and accessible to individuals worldwide. By doing so, researchers, students, professors, and enthusiasts will have the entire archive of UniGe's cultural heritage at their fingertips with a simple click, regardless of their location.

The transcription of scanned documents will be carried out by the so-called "digital volunteers". A digital volunteer can be anyone, from a university professor to a student, from an enthusiast to a curious individual. They will be the driving force behind the transcription process and are the ones who, out of experience, passion, or simply for fun, dedicate their time to deciphering each individual character that composes the works in the archive. Digital volunteers resemble the role of paid solvers of CAPTCHAs (Completely Automated Public Turing test to tell Computers and Humans Apart) (Woods, 2021). CAPTCHAs are sequences of distorted letters and numbers often displayed in a confusing background and are typically encountered at the end of online registrations or used as a Turing test to confirm one's human nature and keep malicious bots at bay.

Similarly, digital volunteers use their free time to decipher the often complex and challenging documents presented on the platform. However, their motivations are different from simply seeking monetary gain. In fact, in the SMA-UniGe, there is no monetary reward. However, engagement is fueled by a gamification system that includes an immersive setting, various gameplay modes, as well as interaction with other volunteers. This system also allows volunteers to earn experience points and receive rewards from affiliated organizations.

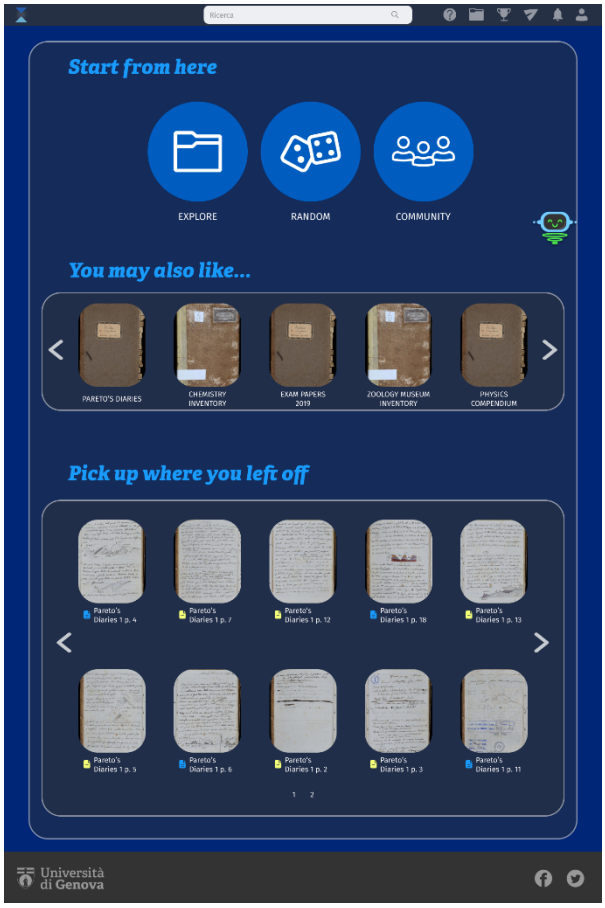

Figure 1 - Homepage after login.

Gamification is the process of transforming a non-game activity by incorporating game elements and game design techniques to make it more captivating, thereby stimulating cognitive processes associated with satisfaction and providing an additional positive impetus for accomplishing that activity (Werbach and Hunter, 2012). The ultimate aim of gamification is not to create an immensely complex triple-A title, but rather to devise effective methods that enhance individual motivation in both work and personal daily objectives (Coccoli et al., 2015). Gamification prompts individuals to improve their online and offline behaviours through the utilization of game mechanics that ensure a constant state of engagement. By actively engaging the user, the experience becomes closely linked to the message being conveyed, resulting in enhanced comprehension. Gamification enhances communication, collaboration, and creativity, while boosting learning, motivation, and interest in a flexible, mistake-tolerant, and digitally adaptive environment (Lee, 2023; Zeybek and Saygı, 2024).

The design of our gamified platform is based on the MDA framework created by Hunicke et al. (2004). The MDA framework consists of three components: Mechanics, Dynamics, and Aesthetics. Mechanics refers to the game's specific components and algorithms. Dynamics describes how these mechanics interact and behave in real-time. Aesthetics focuses on eliciting desired emotional responses from players when they engage with the game. The framework emphasizes that games are designed artifacts, with behaviour and interaction being more important than the media presented to the player. This perspective supports clear design choices and analysis throughout the development process. The platform's design aimed to take into account both the selected objectives for the platform itself and the intrinsic motivations of the users. It sought to choose the most suitable mechanics based on the needs and motivations of the end-users, offering a flexible structure for the experience, allowing users to personalize their journey according to their specific requirements (Seaborn & Fels, 2015).

In order to study the different personas that could potentially interact with our gamified platform and predict how they would engage with it, we analysed various player types. According to Richard Bartle (Bartle, 1996), players can be categorized into four distinct profiles.

(i) *Achiever*: This player embarks on gaming experiences with the goal of obtaining all possible badges and achievements, which they proudly showcase on their dashboard.

(ii) *Explorer*: The explorer is drawn to the world presented to them and enjoys the thrill of uncovering secrets and Easter eggs, finding fulfilment in the discovery of new experiences.

(iii) *Socializer*: The socializer prioritizes collaboration and socialization, dedicating less attention to competition. Their primary objective is to connect and engage with others.

(iv) *Killer*: Similar to achievers, killers find gratification in acquiring badges and achievements. However, what sets them apart is their intense competitiveness and the subsequent satisfaction derived from seeing others lose.

The conducted analysis served the purpose of selecting the most effective mechanics and internal rules within the platform to make engaging the potentially tedious experience of transcription. By understanding the different player types, we aimed to incorporate game elements that would cater to each user's motivational needs. The objective is to prevent premature abandonment of the platform by ensuring that users find mechanics that align with their individual preferences, thereby making the offered content more appealing.

However, the assistance of all digital volunteers is crucial to maximize the addition of as many documents as possible. Therefore, it is important for each individual to feel active and satisfied in their contribution, so that the cultural heritage of UniGe can be continuously enriched with new and valuable content day by day.

3.2 The target

The target audience for which the experience is intended is very broad and, in particular, includes curious people, experts in a specific field of work, study or research and secondary schools students undertaking transversal skills and orientation path ("PCTO", "Percorsi per le Competenze Trasversali e l'Orientamento", in Italian). For this reason, it was decided to create three user profiles. The first two can be selected during the sign-in process while the last can be obtained after interacting for a certain time within the platform:

(i) *"Curious" user*: the curious user has the possibility to browse, transcribe, review, earn experience points and badges and manage his dashboard independently via favorite topics selected during registration or elaborated based on his search preferences.

(ii) *"PCTO" user*: the profile is reserved for students who have undertaken the Transversal Skills and Orientation Path and it is linked directly to the young user's school email address. This type of profile has a personalized user experience to allow the student to complete the tasks required by the PCTO activity. In fact, the student must complete some tasks shown in his dashboard previously selected by the tutor professor who will see the work done once it is finished. Depending on the amount of time expected from the PCTO activity, the state of progress -and therefore the time spent active on the platform- will be considered based on the level reached within the game system. Once the PCTO period has ended, the student will be able to request, via a specific button in the account settings, to change it to a "Curious" user.

(iii) *"Expert" user*: as soon as the user reaches level 20, the account is upgraded to "Expert" status. The "Expert" user has gained the trust of the community and, therefore, can review a transcript and mark it as "complete" without the intervention of a moderator.

3.3 The environment

To immerse the digital volunteer in a hi-tech environment and with the aim of maintaining the visual identity of the University of Genoa, a color palette has been chosen, and it includes two of the primary colors of University's corporate identity: "Blu Unige" (HEX: 002677) and light blue (HEX: 199BFC). To these two main colors, a gray for written texts (HEX: 333333), a contrasting blue (HEX: 005DBF), and a neon green (HEX: 48E55A) for links and hover state activation for some clickable elements on the screen have been added (Figure 2).

Figure 2 - S.M.A. transcription system color palette.

The homepage after logging in (Figure 1) is structured to allow the user to reach all the pages of interest for the transcription and the features inserted to appreciate the experience. The page is designed with a central layout and is divided into three main sections:

1. The two transcription modes and the community button.
2. Suggestions.
3. Documents to which a contribution has already been made that are still pending completion.

Additionally, it features a navbar that provides access to the search bar, instructions, archive, rankings, messages, notifications, and the user's profile (Figure 3).

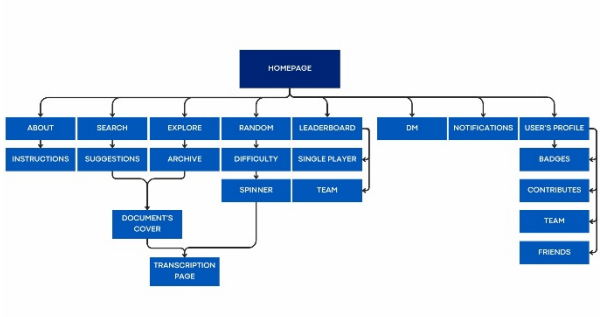

Figure 3 - Sitemap.

4. Proposed Gamification Strategies

Once logged into the platform, the player will have the option to choose a document to transcribe in three different modes through the "Classic Mode". The first mode is through a search bar located on the homepage, where suggested documents based on user-entered keywords will be displayed. The second mode is accessed via a dedicated button positioned in the centre of the homepage, which leads to the catalogue page equipped with a search bar and filters. The content can be filtered by "category", "difficulty", and "document conditions". Lastly, there will be a section dedicated to recommended documents within the homepage. However, to cater to the needs of Explorers, a "Random Mode" has been devised, allowing the player to engage in transcribing a random document (Figure 4). The player will need to select a difficulty level from "Easy", "Medium", or "Hard" to initiate a "Wheel of Fortune Game" (Woodward and Woodward, 1994) containing all the categorized document categories. When the wheel stops, it will randomly and automatically open a document for transcription from scratch or one that has been started by another user but remains unfinished, encouraging the player to try their luck with a

psychological mechanism of information-seeking similar to the famous Google's "I'm Feeling Lucky" button (Kalbach, 2006).

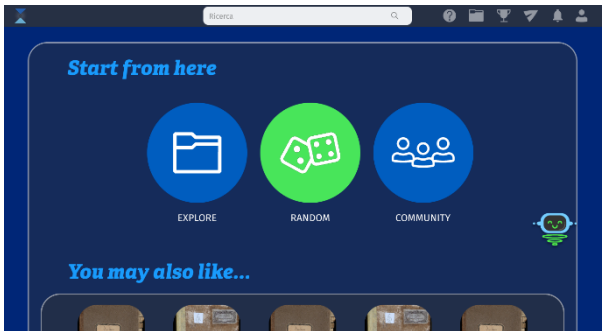

Figure 4 - Random Mode, Step 1.

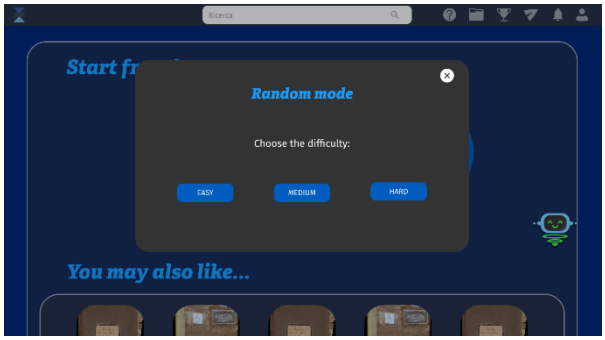

Figure 5 - Random Mode, Step 2.

Figure 6 - Random Mode, Step 3 .

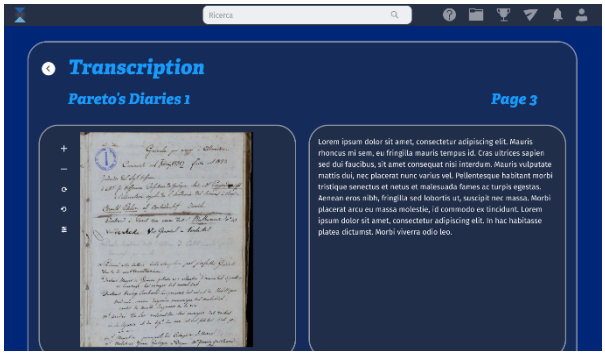

Figure 7 - Random Mode, Step 4.

The Achievers will derive their satisfaction within the experience by collecting and acquiring rewards such as badges, experience points, and items, while the Killers strive to achieve higher rankings compared to other users. Therefore, various collectible items have been selected, based on the actions undertaken by the players. Players can earn badges within the platform, which will be displayed on their profiles. Badges are unlocked upon the completion of specific tasks indicated by the platform through special missions or upon reaching a certain level or ranking. The requirements for obtaining each badge are clearly stated, enhancing the player's sense of autonomy and satisfaction by increasing positive feelings (Bandura, 1993). Additionally, obtaining all available badges to showcase to other players serves as an extra incentive that can influence player behavior, particularly among achievers who are motivated to earn them all (Hamari, 2017). The inclusion of challenges within gamification, for instance, those that must be completed to earn badges, along with a user-centered design, enhances user performance (Legaki et al., 2020).

The primary form of rewards is experience points, and a level advancement system has been devised for them, following the Fibonacci sequence in the hundreds. Each number in the Fibonacci sequence is generated by adding the two preceding numbers. By assigning appropriate values to the first two numbers, the entire sequence can be defined. This recursive formula ensures that each term in the sequence relies on or "recurs" the values of the previous terms, specifically the last two numbers. The Fibonacci sequence is often denoted by the symbol F(n), where n represents any natural number, and F(n) represents the corresponding number in the Fibonacci sequence (Coppola, 2014).

$$F(n) = F(n-1) + F(n-2)$$

This means that reaching level 1 will require earning 100 experience points, progressing from level 1 to level 2 will require an additional 100 experience points, and advancing from level 2 to level 3 will require 200 points, and so on, as outlined in Table 1. The presence of a significantly high maximum level, which entails a substantial increase in experience points, serves as a strong incentive for achievers and killers to persist in their transcription efforts (Mekler et al., 2013). It caters to their ambitions of collecting badges, attaining higher levels, and competing with fellow users. Moreover, this gradual levelling system enables long-term engagement with the platform, fostering an increasingly immersive experience. Experience points within the platform can be earned through three actions:

1. Document transcription: each character, including spaces, is equivalent to 2 experience points, which are immediately credited upon saving. However, the content may undergo verification by other users capable of reviewing it for adherence to the original text.
2. Revision: each reviewed character of a transcribed document is worth 0.5 experience points during the revision process, which are earned upon validation of the review.

3. Daily logins: by accessing the platform for five consecutive days, experience points are awarded according to the guidelines outlined in Table 2. The consecutive day count resets after the five-day period.

The acquisition of experience points can be expedited through the presence of the 2x Boost. The 2x Boost is a condition that, when triggered, doubles the recently acquired or yet to be acquired experience points. Specifically, this enhancement occurs in two circumstances. The first circumstance occurs when a document transcription is completed and saved as "Ready for Review." This triggers a 2x Boost, effectively doubling the experience points just obtained, making longer documents significantly more rewarding. The second circumstance arises when reaching two thousand typed characters within a single session. This situation activates a 2x Boost that doubles the value of all characters from the two-thousand-and-first character onward, even if they are typed in another document. It's important to note that the boost is only applicable during the current session and will be nullified upon logging out.

Table 1 - Fibonacci sequence for Levels and Experience Points needed to progress.

Level	Experience Points
1	100
2	100
3	200
4	300
5	500
6	800
7	1300
8	2100
…	…

Table 2 - Experience Points earned for daily login.

Day	Experience Points
1	5
2	10
3	15
4	50
5	100

The documents on the platform will be categorized into different completion statuses that users can easily understand through a color-coded system. Specifically, the documents can have the following states (Figure 8):

1. Not Started: A document present in the archive that has not yet been transcribed. The document icon will be displayed in grey.
2. In Progress: When a digital volunteer starts transcribing a document but does not complete it, saving only the work done up to that point, the icon on the main page will appear in yellow.
3. Pending Review: Once the transcription is completed, the digital volunteer can confirm their work by clicking the "Ready for Review" button. In this case, the icon will change to blue, indicating that another volunteer is needed to perform the review.
4. Reviewed: Anyone has the opportunity to review a document, but the contributors' names are not shown during the review process. Once the review is completed, the icon will turn green.

Figure 8 - Documents' status (Grey=Not Started; Yellow=In Progress; Blue=Pending Review; Green=Reviewed).

Social interaction plays a crucial role in fostering engagement within the platform, especially in a voluntary activity (Lee et al., 2016). As a result, we decided to create an environment where digital volunteers can connect, send friend requests, exchange messages in private chats, leave comments in a dedicated section on the document pages, and even form work teams to compete against one another and compare their experience points on a team leaderboard. Players will have the ability to create work groups consisting of their friends, each with a unique team identification code. The group leader will choose a name for the team, which will be displayed as an abbreviation on each member's profile along with an image uploaded by the creator. Having a team can greatly enhance users' motivation by fostering a sense of involvement and collaboration through teamwork (Cohen & Levesque, 1991).

Leaderboards are a crucial tool for engaging and motivating users, fostering competitiveness, and inspiring them to strive for higher rankings (Landers et al., 2017). The leaderboards will be based on the results achieved in single player, displaying the names of individual users alongside their respective counts of badges and transcribed characters, and team mode, showcasing the names of teams along with the cumulative count of badges and transcribed characters achieved by all team members.

To accompany the digital volunteer on this journey, they will have a companion named Christopher (Figure 9), a

virtual entity who guides the player into the realm of transcription and remains with them throughout the entire experience. Christopher will keep the player informed about updates, and can help in navigating the platform, if needed. The interaction with the buddy helps the user become acquainted with the environment and develop an emotional connection (Vercelli et al., 2021). Christopher's demeanour will vary based on the player's actions in the game. If the player experiences more defeats, the buddy will become sadder, motivating the player to strive for improvement and avoid disappointing their friend.

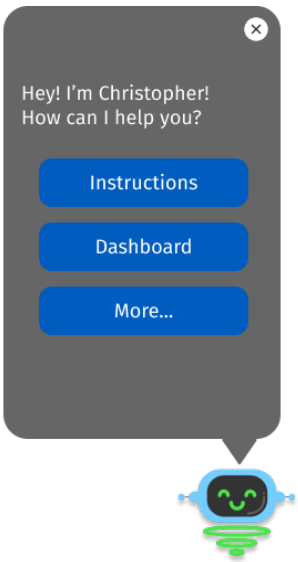

Figure 9 - Christopher, the buddy.

5. Discussion and Conclusions

This paper analyzes portals that utilize gamification to engage users in transcription tasks, showing how this approach can enhance the transcription experience for both casual users and experts. By following FAIR, Citizen Science, and Open Science principles, users are guided by clear instructions to ensure tasks are completed correctly, maintaining community harmony.

The launch of version 1.0 of the platform will be closely monitored to identify which features users appreciate most, allowing for improvements that better meet their needs. Gamification has been shown to boost motivation and performance across disciplines and institutions, as well as enhance analytical and problem-solving skills (Rodríguez et al., 2020; Vargas-Murillo et al., 2023). However, it is important to evaluate whether the selected mechanics foster meaningful engagement or lead to superficial content acquisition (Featherstone and Habgood, 2019). A key area for further study is whether the gamified structure effectively meets students' needs and motivations. The project aims to engage users in transcriptions with non-monetary rewards, such as ranking positions or badges. It will be necessary to adapt the structure to meet the personal needs and motivations of users (Rowicka & Postek, 2023).

Additional incentives for high achievers could include University of Genoa merchandise, Genova University Press books, cultural heritage reproductions, and museum discounts, awarded after completing specific tasks. Another potential improvement involves partnerships with museums and departments, allowing digital volunteers to visit archives and learn about cultural preservation efforts firsthand. This would offer volunteers a shared experience of enhancing university cultural heritage. Gamification plays a key role in fostering good community practices through engaging activities (Thomas et al., 2023). Future projects could further immerse users in transcription tasks through storytelling, creating a narrative that transforms their contributions into part of an exciting adventure, thereby enhancing motivation and involvement.

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