International Journal of Serious Games

ISSN: 2384-8766
https://journal.seriousgamessociety.org/

Article

A System Design Approach of Gamification for disseminating Intangible Oral Expressions of Indigenous Textile Heritage

Susmita Roy[1], Pankaj Pratap Singh[2] and Abhijit Padun[1]

[1]Department of Multimedia Communication & Design, Central Institute of Technology Kokrajhar, Kokrajhar, India;
[2]Department of Computer Science & Engineering, Central Institute of Technology Kokrajhar, Kokrajhar, India;
{s.roy, pankajp.singh, a.padun} @cit.ac.in

Keywords:
Gamified learning environment
Instructional design
System design
Local ICH
Oral narratives
Indigenous handloom & fabrics

Received: January 2023
Accepted: May 2024
Published: June 2024
DOI: 10.17083/ijsg.v11i2.727

Abstract

In recent years, there has been a rising interest in using gamification to promote local intangible cultural heritage. Gamification can make cultural heritage more accessible and relatable by transforming traditional practices into interactive digital experiences. Traditional hand-woven fabrics of tribal communities of Northeast India represent their cultural expression and identity. However, industrialization and globalization have negatively affected the inheritance of the traditional weaving practices. Their traditional fabrics also carry a rich legacy of oral narratives, which are underappreciated and at risk of being lost due to lack of adequate documentation. This paper attempts to investigate the relevance of using gamification for the dissemination of oral narratives embedded within the traditional fabrics of tribal communities of Northeast India. It further proposes a gamified system model to disseminate the oral cultural expressions associated with tribal fabrics and their textile heritage. It also integrates instructional design approach for creating a gamified learning environment for fostering cultural awareness and education among young generation of the tribal communities. This model may also offer a new approach for digitally archiving indigenous intangible cultural heritage.

1. Introduction

Gamification has emerged as a popular approach among researchers in cultural heritage domain for promoting and preserving cultural assets. The role of gamification in the preservation of local intangible cultural heritage is multifaceted and significant. Local intangible heritage refers to the oral expression of rituals, customs, beliefs, knowledge and traditional practices, that are shared among a particular community or region. Gamification can serve as an effective tool for raising awareness about local intangible heritage among young audiences [1]. In addition, it can provide a digital platform for community members to actively contribute to the dissemination of Intangible Cultural Heritage (ICH) [2]. UNESCO defines intangible cultural heritage (ICH) as ancestral traditions and expressions, which includes 'oral traditions, social practices, performing arts, rituals, knowledge, practices festive events related to nature as well as the knowledge and skills needed for the creation of handmade crafts [3].Textile is a long-standing craft in human civilization and serves both practical and symbolic function .The type of fabric one wears reflects expression of social identities, social relation and value [4]. The value of textile heritage can be categorized into basic value, heritage value, and derivative value. The basic value includes craftsmanship, materials, and aesthetics. The heritage value includes historical, cultural, and social significance. The derivative value relates to economic and commercial aspects, contributions to local economies [5].

Indigenous textiles are significant cultural artefact that embody the history, philosophies, and beliefs of a particular group of people. Indigenous hand woven crafts symbolize their cultural history that must be safeguarded to uphold the sentiments of self, community, and belonging. The Northeast (NE) region of India holds an important part in indigenous textile culture of India. Each community expresses its identity through a sense of aesthetics that evolved from a specific aspect of their cultural history. Their traditional fabrics hold oral narratives that reflect their beliefs and customs of their past tribal society. With the advent of modernization and globalization, young generations of tribal communities in NE India are increasingly moving away from their traditional lifestyles leading to a loss of interest in transmitting and continuing the age-old cultural practice [6]. With the passing of older generations it creates risk of losing their inherent knowledge and oral history forever. Oral traditions have been the primary and traditional means of passing down the cultural knowledge and history [7]. However, in an increasingly digital and fast-paced world, engaging younger generations and fostering their interest in intangible heritage through oral tradition can be challenging [8]. Cultural education can play a crucial role in safeguarding ICH, but it remains a scarcely explored area with inherent challenges [9]. However, these challenges can be addressed through holistic and integrated approaches with innovative solutions, incorporating technology and digital platforms for involving local communities towards safeguarding their intangible heritage [10].

This paper is intended to investigate the viable solution by using gamification in transmitting the cultural history associated with the indigenous textile culture of northeast India. It attempts to use gamification for creating an interactive learning experience, to enable young generation to explore the cultural history and significance of their indigenous fabrics. The objective is to propose a gamified system design model in context to disseminating oral narratives associated with “Tsungkutepsu shawl”, a warrior shawl of Ao tribe of Nagaland, India. The proposed model endeavors to use a gamified learning environment with the instructional design approach to transmit and perpetuate oral history and heritage value of the shawl existed during earlier Ao tribe society. The learning environment integrates game elements, storytelling and game-based knowledge acquisition to promote cultural awareness and education in the virtual setting for the young generation aged between 12-18 (Gen Z).

2. Background study

2.1 Relationship of Textile tradition of NE India with Intangible Cultural Heritage:

The textile culture, a living tradition passed down from ancestors to descendants, is endowed with rich value that is specific to a group of people [11]. The textile heritage of Northeast (NE) region of India is recognized as an important aspect of Intangible Cultural Heritage (ICH), contributing to the social, cultural, and economic impact on individuals and societies [12]. This region of India, previously known as the seven sisters (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura), now including Sikkim, has diverse tribal communities. This is the home to various tribes such as Adi, Apatani, Angami, Ao, Rengma, Nyishi, Garo, Khasi, Mizo, Kuki, Bodo, Missing, Dimasa, Riang, Tripuri etc. [13]. Each tribe of this region have a distinctive and prevalent textile culture where myth, legend stories and their depiction are woven on their textiles [14]. The hand-woven fabrics of these tribes have visually communicated various aspects of their culture like gender, social class, and status etc. [15] .Women weavers use traditional techniques to create culturally and artistically valuable textiles [16]. Researcher Varadarajan in 2010 [17], conducted an investigation addressing the textiles of the NE region's belief systems from the pre-Christian era to uncover local identities and their cultural roots. It was found that Northeast region exhibit patterns and motifs that are adapted to fit local customs and hold symbolic significance in terms of social status and ceremonial rituals. Also, several historians have observed that tribal artistic and creative expressions are influenced by their mythology and reflect their worldview. Legends and folklore inspire them, and their crafts incorporate motifs and patterns which carry deep significance [18]. However, globalization has negatively impacted the folk life of these tribes by commercializing their traditional art, crafts, and cultural practices. This has led to exploitation and commodification, diminishing the authenticity and significance of their cultural expressions [13].There is a need for the NE tribes to balance traditional heritage preservation while adapting to the changes brought by globalization. Raising awareness is crucial for promoting the diverse tribal arts and culture heritage in this region of India [7].

Nagaland, one of the sister states of NE India, is the abode of 17 major tribes and various sub-tribes belonging to the Indo-Mangoloid race. Their weaving is mostly done using different colors of warp and weft weaving method in their traditional backstrap or loin loom. This traditional skill is inherit from generation to generation by women [18]. One of the most interesting Naga textiles are the Naga Shawls. Each tribes of the Nagas have different shawls of their own, with unique patterns and motifs. The shawls range from simple to complex designs, with interesting myth associated with it [19]. The Naga weaving tradition has a close connection to the rituals and belief of the Naga people.

Intangible cultural elements associated with traditional Naga weaving culture:

- *Social identity representation:* In past society, Naga tribe had their own social boundaries and these shawls helped to identify those boundaries. Only specific individuals could wear certain shawls, and disobeying this had consequences [14].
- *Symbolic representation of motifs and designs:* Naga textiles are characterized by their distinct geometric and minimalistic designs, which hold cultural significance and reflect the rich tribal heritage of Nagaland [20].
- *Oral tradition of cultural memory:* The Naga oral tradition is preserved through oral narratives, folk tales and songs because there is no written script in the Naga dialect. Various Naga folk tales, songs and dances represent different Naga tribes' important events such as headhunting, victory, festivals, social gatherings, social practices etc. [6] [7].
- *Oral narratives inscribed in the hand woven fabrics :* The Naga shawls and fabrics holds an underappreciated legacy of oral narratives of their past tribal society .Each design

within a Naga textile carries importance and can be studied like a story, representing the cultural narratives and traditions of the Nagas [14].

- *Identifying different Naga tribes:* Each of the Naga tribes, have their own color and motif code representing their distinct identity [6].
- *Women centric practice:* Their textile tradition, spinning and weaving is the exclusive monopoly of women and is an element of women social identity [16].

With the advent of modernization and globalization younger generations in Northeast India are moving away from traditional lifestyles, leading to a loss of interest in cultural practices [4]. As the western missionaries introduced a new religion and script in the 19th century, it caused severe intimidation and inadequacy in oral communities**.** The Naga cultural narratives are preserved through oral tradition, folk tales and songs because there is no written script in the Naga dialect [7]. Various Naga folk tales, songs and dances represent different Naga tribes' important events such as headhunting, victory, festivals, social gatherings social practices etc. These oral forms serve as a means of record keeping, in a Naga society. However, the lack of a written script possess the threat of minimal partial loss of information with every passing generation, which may collectively cause a major loss of information in near future [14].As such cultural education and awareness is needed to ensure the continuation of these practices for future generations [21].

2.2 Gen Z and Gamification

The young generation (GEN Z) [22], born between mid-1990s and early 2010s, are the first to grow up in a digital world. Research confirms their proficiency in using the internet and social media and also confirms that they are visual learners and prefer experiential learning [23]. Gamification can make learning more interesting for Gen Z learner who are born technology natives and prefer interactive and visually focused learning experiences [24]. It is important to design gamified activities that are relevant to the subject matter and promote active learning. Incorporating game elements to create a sense of achievement and motivation and well-defined objectives and clear goals should be provided to steer learners' advancement and sustain their engagement. The use of technology and mobile devices increases the gamified experience and improves accessibility for the Gen Z [25].

3. Literature review

3.1 Theoretical Background of Gamification

The term 'gamification' was first coined in 2008 and has gained relevance since 2010. From its conceptual inception, gamification has succeeded in drawing the attention of academics and practitioners [26]. Researchers often refer to "gamification" as the integration of game elements to a non-gaming context but in real sense the concept of gamification is much more than this infusion. Despite the enthusiasm, researcher [27], argues that gamification is misunderstood and misinterpreted by designers and practitioners as different fields has conceptualized it differently. This has led to the blind inclusion of game elements in non-gaming contexts, and referring it as "gamification" has become a trend for designers and practitioners. To improve gamification, it is necessary to comprehend its differences, its effective application, and development. Often, the concept of gamification is intermixed with serious games but there is a distinct difference [27]. Serious games apply all game elements, while gamification identifies and uses only necessary and required game elements to non-gaming context for motivating and engaging the learners.

There have been various studies proposing various frameworks as the guideline for gamification designers for creating successful gamified solutions [27]. The MDA framework was the first pragmatic approach to analyze game design. The MDA framework was based on the concept of *"Mechanics"*, which represents game rules that define the game system; *"Dynamics"*

is the gameplay, the relation of the interaction between the system and the users and *"Aesthetics"*, which is the perceptions, the emotional response of the users during the session [28]. Inspired by the Mechanics, Dynamics, Aesthetics (MDA) model for the Actions, Gameplay, and Experience (AGE) framework was gradually formulated [29]. Like MDA, the AGE model considers the game into three layers of abstraction: *Actions:* the core actions performed by players; *Gameplay:* the resultant play that players accomplish by performing the accessible "actions. *Experience:* the emotions the players perceive and experience while playing. Octalysis framework proposed in 2015 [30], was regarded as the complete gamification framework. This framework is a Human-Focused Design approach with a keen focus on human motivation resulting in getting the job done by users quickly. It is founded on 8-core drives viz. epic meaning, social influence, scarcity, accomplishment, ownership, empowerment, unpredictability and avoidance.

3.1.1 Motivation and engagement factor in gamification:

Various studies have shown that engagement level of learners increases when game elements are combined with other non-gaming domains. Motivation is another crucial factor which must be considered while designing gamification. The Self-determination theory [31], proposes three categories of intrinsic motivation - relation, competence, and autonomy. Based on this theory there are three primary human needs: "Relatedness"- the tendency to get connected with other players emotionally and socially; "Autonomy"- the need for freedom, the player's will to take action; and "Competence"- the desire to be good at something, player's ability to achieve goals, and master the gamification system. User-centered gamification is a potential alternative to enhance user experience. It is similar to the iterative user-centered design process, which involves understanding users, measuring through prototyping and testing, and iterative design to correct problems and achieve satisfactory results. [32]. Toda et.al. 2019 [33], proposed a user-centered gamification framework for the educational context, considering seven dimensions - personal, functional, psychological, temporal, playful, implementable, and evaluative properties.

- Personal dimension (Who?): Understanding the characteristics and preferences of the users, such as their player types and motivations.
- Functional dimension (What?): Considering the tasks and goals that the users need to accomplish in the system and selecting appropriate game elements to support those tasks.
- Psychological dimension (Why?): Taking into account the emotional and cognitive aspects of the users, aiming to create a positive and engaging experience.
- Temporal dimension (When?): Considering the timing and pacing of the gamified elements, ensuring that they are appropriately integrated into the learning process.
- Playful dimension (How?): Emphasizing the enjoyment and fun aspects of gamification, making the learning experience more engaging and motivating.
- Implementable dimension (Where?): Focusing on the practicality and ease of implementation of the gamified system.
- Evaluative dimension (How much): Measuring the impact of gamification on user interaction, engagement, and satisfaction.

3.1.2 Game elements as the building blocks of gamification:

Game elements are the basic blocks of game structure that create the gaming experience. Different researchers have laid down different opinions on defining a gamification and what type of elements a gamification can have [34]. F.-H. Nah et al. 2014 [35], proposed eight elements of game design that are preferred in the context of education and learning.

i. Points: Point is considered as a unit for measuring achievement or success and can be seen as rewards for progress towards goals.

ii. Levels/Stages: The level system provides a sense of progression for the given players in the game.

iii. Badges: Badges are regarded as tokens of appreciation during the course of goal achievement.
iv. Leader boards: leader board creates a sense of eagerness in learners towards tracking and displaying overall game progression and accomplishment.
v. Prizes and Rewards: Prizes and rewards effectively motivate learners when distributed throughout the learning process at scheduled intervals.
vi. Progress bars: Progress bars encourage learners as they approach educational goals and sub-goals.
vii. Storyline: The storyline engages learners throughout the learning process, creating interest.
viii. Feedback: Frequent and instant feedback enhances learner's performance and engagement.

3.1.3 System design approach of gamification

Without systems, discussing gamification design is challenging. In simpler terms, a system is more than the sum of its parts because of interactions between the components, such as emergency, synergy, and coordination [36]. A gamified system is a system that incorporates game methodologies to generate data by utilizing inputs and outputs related to a non-game context [37]. A game is by itself a system that provides for the mechanics and dynamics of play. This definition prioritizes the non-game data involved. In successful gamified systems, data is collected, measured, and analyzed to reward players, engage them, and improve goals. A game is by itself a system that provides for the mechanics and dynamics of play. This definition prioritizes the non-game data that is going into and coming out of the structure. In successful gamified systems, this data is collected, measured and analyzed, and the information is used to reward players, create engagement and refine goals. Overall, a gamified system should achieve two interrelated purposes – (i) facilitate an enjoyable and engaging experience and (ii) achieve and measure goals external to the system [37].

3.2 Gamification for Learning

Gamification uses game mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems [38]. Gamification is categorized into two types - structural and content. Structural gamification is the application of game elements with no changes or alteration to the learning content. The gamification structure is built around the content and involves using game elements to progress through the content. [39]. This is done by incorporating clear goals, rewards, progression, challenge, and feedback and achievements, into an educational setting [40]. Content gamification transforms content into a game-like experience. This gamification transforms content into a game-like experience by adding elements such as storylines, mysteries and characters into the content to actively involve and engage the learner [39]. It adds game context or activities to instructional content through elements like story, challenge, characters, interactivity, and allowing freedom to fail.

3.2.1 Gamification from instructional design perspective

Researcher found that the alignment of learning outcomes achieved through computer games depends on matching game objectives with curriculum objectives [41]. Matching game objectives with curriculum objectives prevents disjunctions. Instructional support is necessary to help learners understand how to use the game and focus on its content [42]. Instructional Design is a systematic procedure for developing educational and training programs. In a meta-analysis of 65 game studies, Sitzmann 2011 [44], found that entertainment is not a prerequisite for learning, and the choice of a game should be based on the learner's engagement with the content. Technology can provide immediate feedback and allow for personalized learning. Well-designed gamification encourages learners to see failure as an opportunity for growth and promotes experimentation

without fear [45]. The main goal of games is to provide pleasure or tension, but in gamification, the goal is to transfer knowledge or influence user behaviour. Therefore, instructional design theory should be applied to the development of learning environments. The Decision Oriented Instructional Design Model (DO-ID) [46] is a suitable framework for designing gamification applications. The DO-ID model helps organize and justify the process of planning and developing a multimedia learning environment. When conceptualizing, it is important to establish a specific objective and analyze the framework requirements. The DO-ID model, [46] is a framework used in instructional design to guide the development of educational materials and learning experiences. The model consists of four phases: Design, Operation, Integration, and Design (DO-ID). Each phase serves a distinct purpose in the instructional design, with specific goals and activities associated with it.

Design Phase (D): The Design phase entails the initial planning and conceptualization of the learning experience.

Operation Phase (O): The Operation phase involves executing the design plan established in the previous phase.

Integration Phase (I): In the Integration phase, the focus shifts to incorporating the developed materials and activities into the broader educational context.

Design Phase (D): The final Design phase is characterized by evaluation and refinement. Feedback and assessment data are used to iteratively improve the learning experience.

3.3 Gamification for Intangible Cultural Heritage (ICH):

Gamification has been recognized as a potential technique for engaging learners and facilitating the dissemination of both tangible and intangible cultural heritage [47]. Wu et.al 2023 [48], discussed gamification as a viable strategy for cultural preservation and local sustainable development in peripheral regions. A case study was conducted on the boat-based Tanka culture in southern China. They used gamification to promote the preservation and sustainable development of this culture. A game was developed and tested with unfamiliar participants, who learned about Tanka customs and traditions through gameplay. Feedback from a focus group interview was used to suggest adjustments for more effectiveness.

Hua'er, a significant oral performance of China, is being studied for its protection, using digital documentation technology. However, traditional methods to promote and educate about Hua'er was found insufficient. Liu et.al 2022 [49], suggested an interactive virtual reality system called "Hua'er and the Youth" (HY) that enhances audience engagement and knowledge. HY uses virtual avatars, participatory performance, and game-based learning. A user study showed that HY improved interactive experience, knowledge, and awareness about cultural heritage protection. Cesaria et al. 2020 [50], explored the use of gamification in cultural heritage education. They proposed a tangible user interface game that combines manual procedures and visual information. The study describes the system in detail and its potential impact. The paper suggests that gamification and digital tools can enhance user engagement and experiential value. It also presents a framework for creating similar games in other fields. Studies have shown that gamification and serious games can improve learning achievements and enhance learners' interest in cultural heritage [51]. Gamification can also be used to create effective connections and emotional engagement with cultural heritage, leading to the new forms of audience development [52] [53].

4. Methodology

The methodology introduces a novel approach by conceptualizing a gamified system model to transmit and perpetuate the oral narratives of tribal textile heritage and fabrics of NE India. The

system model employs the instructional design approach for creating the learning environment. Designing instructions for the cultural content is a multifaceted challenge. Integration of gamification with design thinking framework was considered as a strategic choice. Each step of the methodology is inspired by the stages of design thinking viz. Understand & empathize, define & design, prototype & test, and implement & evaluate. The proposed methodology is described in the seven steps which are shown in the Figure 2 below.

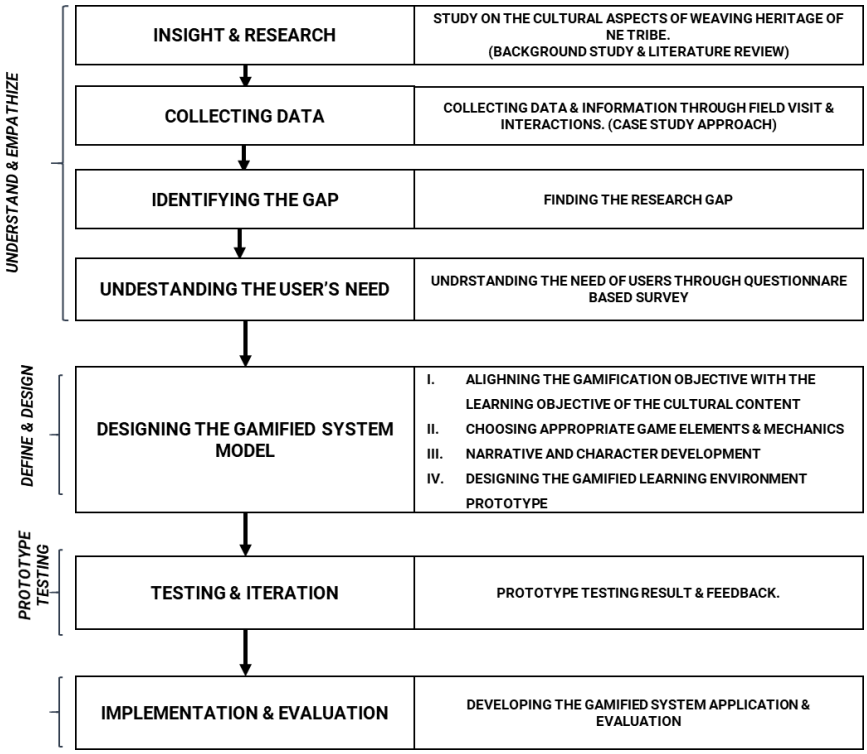

Figure 1. Flowchart representation of the methodology for designing the gamified system model.

4.1 Insight & research

This research is exploratory and uses a case study approach to understand the intangible cultural elements of textile heritage and oral narratives associated with Tsungkutepsu shawl of Ao tribe of Nagaland. The Ao warrior shawl "Tsungkutepsu" was meant exclusively for head hunters or those who have performed a feast of merit (who sacrificed Mithun, a kind of buffalo).The Ao tribe, is one of the major Naga tribes in Nagaland, India, known for their oral tradition. Instead of documenting their folk narratives, they relied on signs, symbolism, songs, and folklore. Among their textiles, their shawls are exceptional, varying from simple to complex designs with associated myths. The intangible components associated with the act of "Head Hunting" associated with the Ao tribe warrior shawl carry aesthetic and creative value in conceptualizing the Ao tribe identity. Though the ferocious act of head hunting was banned long back and no longer practiced, but its oral significance in Naga society's cultural activities both in tangible and intangible aspect, cannot be denied. The case study revealed that the hand-woven warrior shawl and their traditional textiles are a reminder of their rich cultural legacy and preserving its oral history is crucial for future generations.

4.2 Data Collection

This design research utilizes a case study approach on intangible elements of Ao textile heritage and warrior shawl of the Ao tribe and collects primary as well secondary data. – *i) Primary data :* The study is initiated with a field visit to Handloom & Handicraft sector situated in Dimapur district of Nagaland, India. This was followed by a field observation and interaction session with

local weavers and master craftsmen. The study also gathers primary data like collecting Ao Naga shawl samples, recording the traditional weaving technique and understanding the current status of the shawls (see Fig.2 & 3).

ii) Secondary data: Additionally, secondary data was gathered from published sources such as articles and books to acquire information on the cultural history and symbolism of Naga shawls (see Fig. 4).

Figure 2. Field visit to Nagaland Handloom and Handicraft sector situated in Dimapur, Nagaland, India.

Figure 3. Interaction session with local weavers practicing traditional loin weaving, along with interaction session with master craftsman.

The primary data gathered gave an insight about the use of the backstrap loin loom as well as gave an insight into the step by step process from gathering raw materials, ginning, winding, dyeing, warp and weft technique of the Ao traditional weaving practice. The secondary data was used for authenticating the narratives to be developed for the cultural content.

4.3 Identifying the gap

4.3.1 Disappearance of traditional lifestyles

Westernization has replaced traditional clothes and accessories, except for cultural functions, tribal gatherings, and festivals. The Naga culture should be acknowledged and safeguarded as a heritage. The earlier traditional dormitory recognized and appreciated the weaving skills of young girls. Modern education and the absence of traditional dormitory systems led to the decline in women's weaving practice.

4.3.2 Underappreciated legacy of oral history

Oral tradition is often overlooked due to Western bias towards written word as the true history. The written word is seen as modern and progressive, while the oral is seen as primitive and traditional. The term 'oral' in oral tradition and the verbal arts refers to spoken words and communication through word of mouth. It is commonly used in technical terminology such as 'oral tradition', ‘oral literature’, oral narratives, oral testimony and so on. This is often contrasted with written forms. Prior to the arrival of the British in 1832, the Nagas in Northeast India did not have a written language and were a pre-literate society. Writing was unknown to them and hence did not possess script of their own.

4.3.3 Lack of awareness of traditional identity of fabrics

Earlier Naga society had their own social boundaries to wear traditional fabrics and shawls [19]. As the era of battlefield and clan fights and strict rules of earlier society no longer exist, the code for wearing particular shawls and its motifs are no longer a strict obligations for Naga tribes. Further due to the commercialization of their textile tradition the Naga Shawls are in great

demand, but unfortunately so far the hidden narratives of motifs and designs have not been retained as their exclusive possession. Hence there is a need to document, preserve and transmit the oral legacy and reveal the untold stories of traditional textile and motifs, making the hidden treasure reachable to young generation.

4.3.4 Limited access to the oral history for a broader outreach

In earlier Naga society traditional institution, "Morung" was the place where traditional skills and practices were performed and transmitted from generation to generation. Due to modernization the traditional dormitory were replaced with modern education system, as such there is no particular place where the traditional knowledge could be shared or practiced. Encouraging the appreciation and involvement of young generation in traditional Naga practices is necessary to prevent the loss of these skills. The focus should be on intangible elements, tangible objects, ideas, and philosophy that represent Naga culture. Cultural education is necessary to ensure that the new generation understands the importance of continuing the legacy of their textile heritage.

4.4 Understanding the user's need

The study used a user-centric approach to understand the opinions and preferences of the target user (Gen Z) aged between 12-18 years through a questionnaire based survey. Participants were also encouraged to provide comments and suggestions. The questionnaire based survey used five statements response options. The survey focused on five key factors: 1) Cultural Identity through textile heritage and weaving practice. 2) Need of digital archival of unsung oral narratives.3) Interpreting oral narratives through visual storytelling. 4) Choice of medium for dissemination. 5) Increasing reach to a wider audience as shown in Table 1.

Table 1. Responses of young generation (target user) recorded through questionnaire survey (77 participants):

Factors considered	Question asked	Options	Responses
1. Cultural heritage representation through textile heritage.	Do you believe that traditional textiles play a significant role in representing the cultural heritage of a community?	Strongly agree	77
		Agree	0
		Neutral	0
		Disagree	0
		Strongly disagree	0
2. Value of oral history in today's digital world.	How valuable do you think it is to preserve and pass on tribal oral histories associated with textile heritage to future generations?	Options	Responses
		Extremely valuable	53
		Valuable	20
		Neutral	04
		Not valuable	0
		Not valuable at all	0
3. Accessibility to oral resources	Have you encountered challenges in accessing cultural narrative resources, in museums or historical sites?	Options	Responses
		Never	0
		Rarely	04
		Occasionally	25
		Frequently	30
		Very Frequently	18
4. Preference of medium for Cultural Exploration	Which medium would you prefer for learning about cultural heritage and traditions: traditional oral methods (e.g., storytelling, verbal transmission) or digital mediums (e.g., videos, and interactive apps)?	Options	Responses
		Traditional oral methods	10
		Digital mediums	27
		Both equally	34
		Neither	00
		Not sure	06
5. Digital	Would you be more likely to	Options	Responses

Platform for Cultural Learning	explore cultural heritage if it were presented in visual format (videos, animations) Interactive experiences (games, simulations) Other (please specify)	Videos	07
		Animation	20
		Interactive experiences	22
		Gamified format	26
		I am not sure	04

4.4.1 Statistical analysis and outcome of user survey

With reference to the graph, and the factors presented for evaluation (see Fig. 4), the majority (77%) of respondents strongly agree that traditional textiles are important for cultural heritage representation. Recognition of textile heritage's importance is observed among the young generation. Over half of (53%) respondents consider oral history to be valuable, indicating some awareness among them of its significance. Many respondents face challenges in accessing cultural narrative resources, (frequently 38.9%) and (very frequently 23.4%) emphasizing the need for improved accessibility. A significant portion respondent i.e. 44.2%, prefer both traditional oral methods and digital mediums for cultural exploration and 35% for digital mediums, showing a desire for diverse learning experiences. The preference for engaging digital content for cultural learning is evident, with a focus on gamified formats and interactive experiences. The survey underscores the enduring significance of cultural heritage, highlighting challenges in accessing cultural resources and varying preferences for learning mediums. Efforts are required to promote cultural preservation and heritage education in interactive and engaging ways.

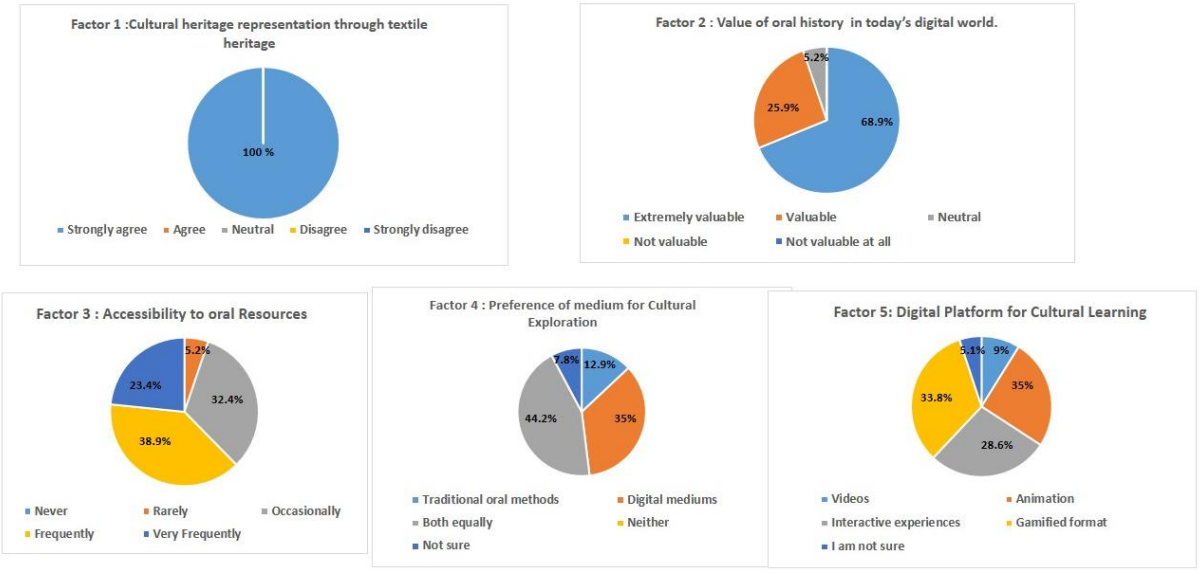

Figure 4. Statistical representation of percentage of positive responses of target user recorded on the Questionnaire based survey

4.5 Designing the Gamified System Model

A gamified system is a system that incorporates game methodologies to generate data by utilizing inputs and outputs related to a non-game context.

4.5.1 Aligning the Gamification objective with the Learning Objective of the cultural content

The gamification objective must align with the learning objective of cultural content. Cultural content in relation to media and communication refers to symbolic meaning, artistic aspect, and cultural values that emerge from or convey cultural identities. The gamified system has short term and long term goals for achieving the learning objective of the cultural content.

4.5.2 Choosing appropriate Game elements and Mechanics for the Gamified System

The choice of game elements and mechanics for the gamified system was considered based on the following criteria (see Table 2).

- Consideration of preferred game elements and mechanics based on learning objectives.
- Inclusion of game elements from the perspective of intrinsic and extrinsic motivation of target users.

Table 2. The game elements and mechanics included for the gamified system model are mentioned in the table below:

Point system	Learner gains points for completing an exercise, allowing them to advance to a next level.
Exploration & Discovery	Allowing learner to explore the game environment to find hidden accessories, weaving tools and gifts.
Levels & Progression	Levels to allow for various learning paths, repeated experimentation, with inclusion of problems and tasks. Game based acquisition of knowledge at the end of every level for measuring the learning progress.
Quest & Objectives	The quest is to retrieve and collect the oral memories hidden in the traditional fabric. The short term goal is to earn badges, souvenir, points, bonuses etc. Long term goal is achieving the title, "The Ultimate Retriever".
Time Constraints	The task assigned by the Non Player Characters (NPC) are time bound and the quest for knowledge must be completed within the specified time limit.
Puzzles & Challenges	Activating the NPCs, Quest, solving puzzles, riddles, crossword cards, unlock levels, time pressure.
Choices & Consequences	Branching of narratives into chapters and allowing decision-making points where choices made by learner affect the game's progression and outcome.
Rewards & Achievements	Rank in leaderboard, badges, title, souvenir, gifts.
Collectibles	Virtual goods like souvenir, weaving accessories and tools, gifts, archive of cultural memories. The virtual space named as "Retrieve memories" for storing the collections.
Narrative & Fantasy	Storyline: Two guardian angels (NPC), the "Mythical Storyteller" and "Magical Weaver," guide the learner through a mythical woven world of fabrics. The storyteller shares stories while the weaver explains the traditional weaving technique. Challenges are presented and tasks are assigned to complete the journey.
Visuals & Sensation	Graphics, immersive visuals, and responsive controls to create an engaging and visually pleasing experience.
Audio & Emotion	Soundtracks, immersive sound effects, and emotional cues enhance the overall mood and emotional engagement.

4.5.3 Narrative and Character Development Approach:

The narrative and character development in the gamified learning environment are based on a structured framework that integrates historical and cultural authenticity with educational objectives.

- Historical research: To ensure accuracy and authenticity in depicting cultural heritage and traditions primary and secondary sources (including oral histories, published articles, and archival materials) are referred for the narrative development process. Books like "Naga textile" by Marion Wettstein, "Naga - A Forgotten Mountain Region Rediscovered" by K. Richard and J. Vibha, "The Ao Naga Oral tradition" by Temsola Ao and several other books were referred for the narrative.

- Community involvement for Cultural Accuracy: To ensure cultural accuracy, collaborative work was done with local community members and elders. Their firsthand knowledge of the heritage being depicted, enriched the narrative and ensured that the cultural content is aligned with the standards and values of their cultural heritage.

Figure 5. Involvement of community during the narrative development process

- Authentic Representation: Characters and story is developed with keen attention to the nuances of facial and body features of the tribe, their traditional attire, behavior, and social customs to ensure the cultural authenticity and respectful representation.

Figure 6. Character Development :(i) Ao man and women,(ii) Ao Naga man wearing Tsungkutepsu shawl (iii) & (iv) a lady character demonstrating the step by step process of weaving in loin loom

- Educational Objectives: The narrative is designed to fulfill specific educational objectives, such as promoting cultural awareness, fostering appreciation for heritage, and facilitating learning outcomes related to cultural history, art and cultural studies.

4.5.4 Designing the Gamified Learning Environment (GLE)

The instructional design model that is followed for considering the design decisions is inspired by the DO-ID model [46]. The design process of the environment includes five steps as shown in Figure 7.

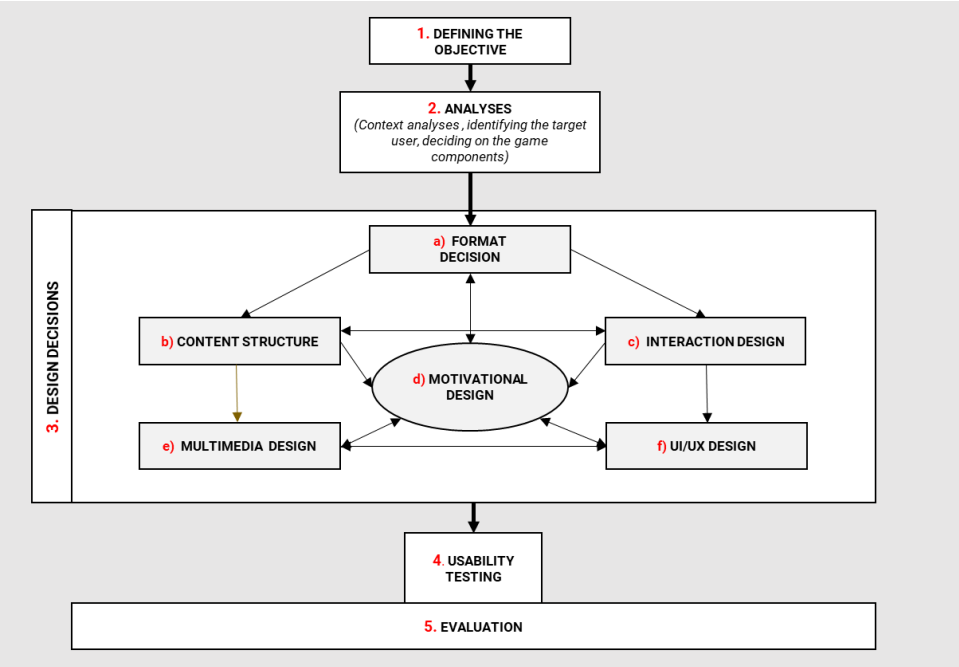

Figure 7. The design process of the gamified learning environment based on the DO-ID model by Niegemann et al., 2008.

1. Defining the Objective: The learning objective of this gamified learning environment is to educate learners about the cultural significance of traditional tribal textile and fabrics. The main goal is to create awareness among young minds about the cultural significance of their tribal textile heritage.
2. Analyses:

   Context analyses: Various forms of new media such as animation, interaction, and games can engage young people in learning about intangible cultural heritage. The interactive gamified environment can bridge the gap between culture and individuals, enabling users to explore intangible cultural heritage from a fresh perspective.

   User characteristics: The target audience is the "Gen Z", the young individuals of tribal societies. These individuals have been impacted by technology, which has moulded their identities and behaviours. They possess proficiency in technology and to some extend depend on digital platforms for education.

   Task analyses: A variety of game-based activities including interactive content, quizzes, puzzles, obstacles and challenges, were provided to cater to different learning preferences of learners.
3. Design Decisions:

   Format decision: To reach the defined goal a combination of structured and content based gamification is preferred for creating the gamified leaning environment. The cultural content is divided into two sections- i) structure based gamification is used for unravelling the oral narratives associated with the traditional fabric using interactive storytelling approach. ii) Content based gamification is used for demonstrating the traditional weaving technique which includes dye, yarn, weaving process, embroidery etc. Game-based acquisition of knowledge is used for this section.

   Content structure: Dividing the content into sections of three units was considered appropriate for the gamified learning environment. Hence, the acquisition of cultural content was adapted to gamification as levels. Content of units 1 & 2 are designed based on structure based gamification and design of unit 3 employs the content based gamification type.

- *Unit 1:* This unit unravels the cultural significance and oral memories of the fabric based on the cultural values of past tribal society and gives a brief overview of the tribe it belongs. The unit further explains about the size, dimension and usage of the fabric.
- *Unit 2:* This unit explains about the inherited skill and knowledge of craftsmanship of the tribe and the process of weaving the fabric which includes dye, yarn, and the loin weaving process.
- *Unit 3:* This unit covers the traditional embroidery skill and techniques of the tribe and unravels the myth & symbolism related to the motifs and patterns of the fabric.

Motivational design: Game mechanics utilized for this gamified learning environment for disseminating the oral cultural content includes game elements which can affect both extrinsic and intrinsic motivation of the Gen Z learners (see Table 2).

Multimedia Design: The learning environment utilizes multimedia elements such as audio, fictional characters (NPC or Non Player Characters), animated storytelling (for visualization of cultural content), and subtitles for better understanding (see Fig. 8). It includes soundtracks, digital environments, game elements, interactivity and game based acquisition of cultural knowledge. A multimedia exhibition of traditional fabrics will also be included in future. The NPC characters are imaginary and only exist in the gamified environment setting. They do not represent or resemble the Ao tribe community.

Figure 8. The fictional characters (NPCs) of the digital learning environment.

Interaction design: As users navigate through the gamified system, the virtual environments unravel and depict the beliefs and customs of past tribal society associated with these fabrics. The flowchart representation of the navigational architecture is given in the Figure 9.

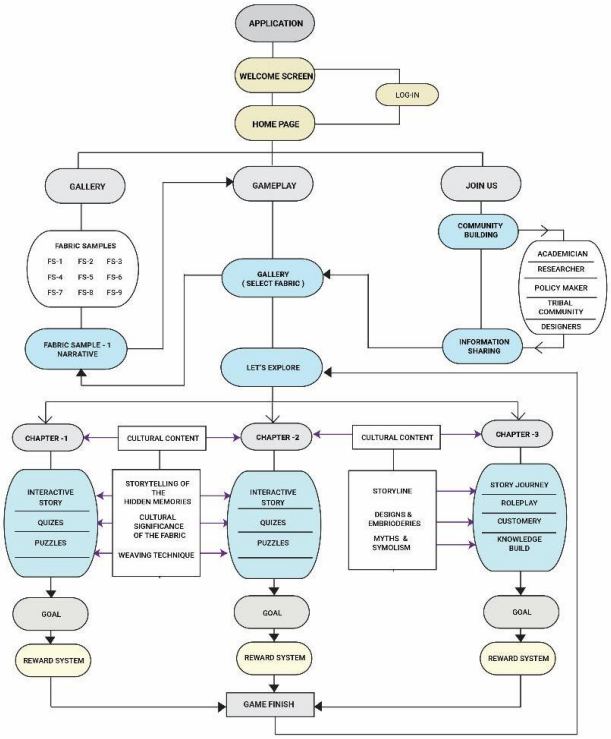

Figure 9. The navigational architecture of the gamified learning application “Woven Memoir.

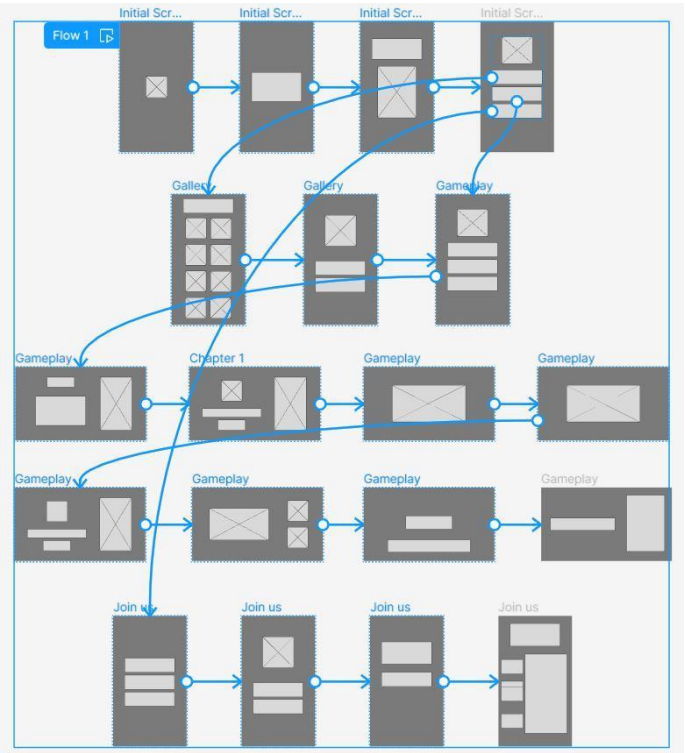

Figure 10. Low-fidelity layout of the interface of the gamified learning application “Woven Memoir”

UI/UX design: Low fidelity design: The low fidelity of the interface of the application was designed in to get an insight of the content and layouts for the navigation screens (see Fig. 10). The main menu of comprises of “Gallery”, “Gameplay” and “Joins us”.

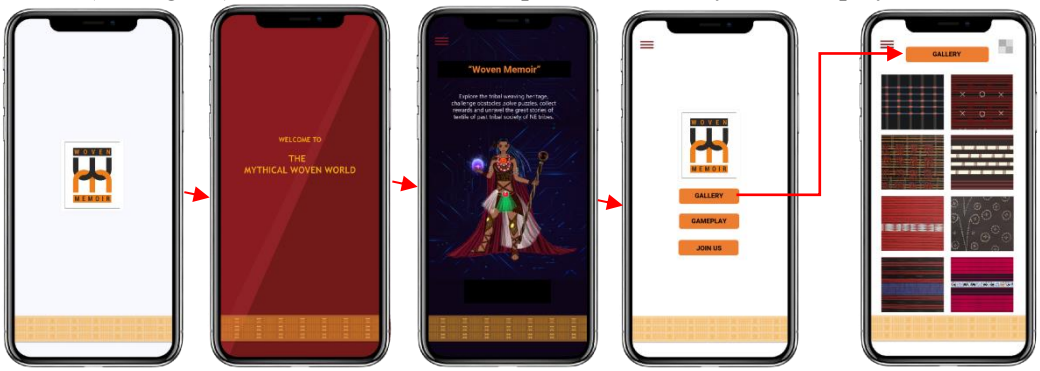

Figure 11. An overview of the initial screens and gallery menu of the interface of the gamified learning application “Woven Memoir”

High fidelity design: A brief description of the main menu is given below (see Fig. 11 & Fig. 12):

- Gallery: To explore a curated collection of traditional fabrics with a multimedia exhibition showcasing its unsung oral cultural narratives associated with it.
- Gameplay: To engage in interactive storytelling, games and challenges designed to educate and create awareness, offering insights into various cultural aspects of Indigenous textile and fabrics.
- Join Us: To build a community of researchers, academicians, tribal community members, policymakers, and designers to connect, engage in discussions, events, and collaborative projects. The shared goal is to educate, unravel, and promote the oral cultural narratives of indigenous traditional textiles and fabrics.

Figure 12. An overview of a few screens of Level 1 of unit-1 of the Gameplay: A structured gamification approach using interactive digital storytelling to share the oral narratives of the chosen fabric.

The prototype version of the gamified system model was created using Adobe Animate to carry out testing and obtain result and feedback from users. In addition, interactivity was incorporated into the learning environment to assess the flow of navigation and the usability of the gamified system model. Also the design of the levels for unit 1 & 2 of the prototype was successfully accomplished. The evaluation and feedback to be received will serve as the basis for the

development of a fully functional mobile application using the unity engine. The developed application will be solely for academic research purpose with no intention of commercial implementation.

4. Usability testing: For the user survey, a user-centric approach to usability testing was adopted, tailoring the survey questions to address key usability factors identified in the prototype design process [32] [33].
   - Survey Design: The survey questionnaire comprised of structured questions and Likert scale responses (providing quantitative data for analysis), allowing participants (target user), to rate their agreement with statements related to the usability factors under investigation. The keen focus was on five key factors: 1) Concept & idea; 2) Dissemination of the cultural content; 3) Interest & engagement factor; 4) Ease of Navigational & 5) Aesthetic appeal. For the purpose of conducting usability testing on the prototype expedition, a grand total of 80 individuals actively engaged and took part in the endeavor.

5. Evaluation:

   - *Rating calculation:* The user survey has been divided into four sections of research results to compile and verify the survey data as already mentioned in the previous section. A total of five (5) key factors have been measured to calculate a grading based survey. The grading is measured in points where a user had to mark each factor by giving points from a minimum of 1 to a maximum of 5, on their experience after using the prototype. After that, the average rating point for each factor has been calculated to standardize the rating. The formula for the calculation of average rating points is as follows. The following formula have been adopted to derive the rating point:

$$\frac{\sum f_i x_i}{n}$$

Where f_i are the frequencies of the respective ratings x_i,
f_i= number of respondents giving particular rating and x_i = rating ranging from 1, 2… 5
N = number of total respondents

Table 3. Survey data of Gamified Learning Application conducted based on the 5 Key factors:

Factors	Question asked	Responses of participants					Ratings	Comments & Suggestions
		1	2	3	4	5	$\frac{\sum f_i x_i}{n}$	
Concept & Idea	On a scale of 1 to 5, How effectively does the concept of the gamified learning environment resonate with your understanding of cultural heritage? (1 = Not at all effective, 5 = Very much effective)	0	0	20	24	36	3.9	Innovative concept. Very Interesting. Amazing idea.
Dissemination of the cultural content	On a scale of 1 to 5, How effective the prototype adds value to your understanding and appreciation of Ao tribe textile heritage? (1 = Not at all effective, 5 = Very much effective)	2	8	10	26	34	4.02	Well executed but can be improvised.

Interest and engagement factor	On a scale of 1 to 5, how interesting and engaging do you find the prototype? (1 = Not at all Enjoyable , 5 = Very Enjoyable)	0	6	20	28	26	3.9	Appreciable. Interesting storyline. Effective & engaging.
Ease of navigation	On a scale of 1 to 5 rate the ease of navigation and interaction through different sections and features of the gamified learning environment. (1 = Very difficult, 5 = Very easy)	1	7	15	25	32	4.0	Effective
Aesthetic appeal	Does the aesthetic and visual elements of the gamified learning environment contribute to its cultural immersion and authenticity? (1 = Poor, 5 = Excellent)	4	4	17	27	28	3.8	Requires a little more in-depth environment

4.6 Test and iterations (Result & Analyses):

Participants in the survey assessed the prototype gamified learning environment focusing on the cultural narratives of the Ao tribe fabric through textile heritage. The survey aimed to evaluate the following five factors -

- Concept & Idea: Participants highly rated the concept for resonating with cultural heritage understanding, with many giving top ratings and praising its innovativeness.
- Dissemination of Cultural Content: The prototype was deemed effective in enhancing understanding of Ao tribe textile heritage, though some areas for improvement were highlighted by the participants.
- Interest and engagement factor: The majority of participants found the prototype interesting and engaging, particularly praising the storyline and engagement strategies.
- Ease of navigation: Navigation through the gamified environment was rated as easy and effective, indicating a user-friendly interface.
- Aesthetic appeal: Participants appreciated the aesthetic elements contributing to cultural immersion, but some suggested a need for more in-depth elements to enhance the overall appeal.

Hence, from the outcome it is evident that most of the young generation, responded positively to the given criteria for judgment (Table 3). The positive reaction shown in Figure 14 which confirms that the system model of gamified learning environment is designed effectively and has the potential to disseminate and perpetuate the oral cultural narratives of tribal fabrics.

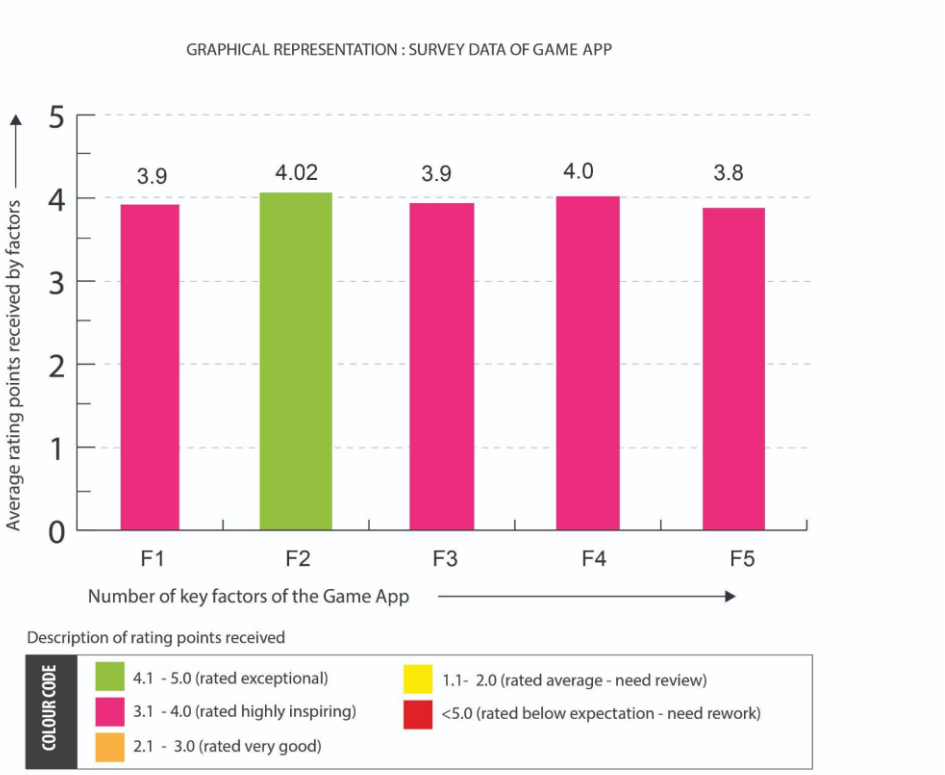

Figure 13. Graphical representation: survey data of Gamified learning application

4.7 Implementation & validation

The positive response and acceptance of the prototype model suggests that combining gamification with indigenous textile heritage can create a platform that celebrates and educates about intangible cultural values. This allows for the prospect of further development of a fully functional gamified learning application in unity engine. The whole gamified system is to be developed as an android based mobile application with name *"Woven Memoir",* with tagline as *"The echoes of cultural threads".* The application will be an outcome of the gamified system model. Rectification will be made based on the recorded comments and suggestions of usability testing report. The gamified system model is in its prototype stage and is undergoing iterations for better performance and execution. Only after the final playable version is ready, its implementation and validation can be carried out in real world environment like museums and educational institutions.

5. Discussion

The survey findings indicate positive responses for the prototype gamified application utilized for Intangible Cultural Heritage (ICH) learning. The concept resonated well with participants with appreciation for its innovative nature and engaging content. Suggestions for improvement were provided, specifically focusing on enhancing the aesthetic appeal and refining of immersiveness. The prototype exhibited significant potential in efficiently communicating the rich oral narratives associated with the "Tsungkutepsu shawl" of the Ao tribe through gamified learning experience. Further refinements based on participant feedback can contribute to the development of a more immersive and impactful learning environment for cultural heritage exploration. Based on the positive response, it can be assumed that the proposed system model of gamification has achieved its foremost goal to create awareness about the unsung oral narratives of indigenous textile heritage to young learners. The appreciation and acceptance of the concept model has opened a

new dimension of integration of gamification with instructional design approach, as a learning tool for dissemination oral expressions of textile & fabric. Furthermore, the gamified system model can be utilized to establish an avenue through which indigenous communities can actively engage and disseminate their respective cultural narratives. This platform can welcome them to assume the roles of custodians and conveyors of their unique heritage. Additionally, the gamified system can serve as an inclusive platform that can encourages collaboration among researchers, policymakers, and designers, fostering efforts to elevate the cultural importance of traditional indigenous textiles and fabrics. The proposed system model may not be confined only to oral narratives of tribal fabrics but can also be employed on any other form of oral expressions related to local Intangible Cultural Heritage of other indigenous textile.

6. Conclusions

Gamification has the potential to serve as a powerful tool to motivate young minds to embrace their rich legacy of traditional textile. With the integration of game elements with instructional design approach, the proposed gamified system model succeeded to transport users into the world of indigenous textile heritage in the virtual setting. The incorporation of educational content within the learning environment, raises awareness about the impact of modernization on traditional lifestyles and emphasizes the importance of safeguarding indigenous weaving culture as a heritage. Through interactive storytelling it provides educational modules within the environment that discuss the cultural significance of traditional fabrics during the past tribal society. The digital representation and visual storytelling of the oral narratives makes it accessible to young audience, to ensure that the heritage value of textile artifacts of indigenous tribes are not overlooked or forgotten. The gallery within the gamified environment showcases shawls, and other textile artifacts along with their historical and cultural contexts for raising awareness about the traditional identity of the fabrics. By incorporating elements of gamification, such as quizzes, challenges, and interactive narratives, the environment engages users in exploring and understanding the intangible cultural heritage embedded in their traditional fabrics. By providing access to oral history and insight into the traditional weaving practice, the gamified learning environment facilitates cultural education among younger generations. Through gamification techniques, like offering incentives, rewards, progression systems, and interactivity, the environment encourages active participation of users to ensure continued relevance and appreciation of indigenous textile heritage. Overall, the potential of the gamified system model for disseminating oral narratives of indigenous textile is relevant. However, it requires specific cultural content for each community. Also the storytelling experiences must be tailored to specific indigenous communities' oral narratives of textile heritage and traditional fabrics. Future iterations of the gamified learning environment is to involve community co-creation and participatory design processes, where other indigenous communities can also actively get involved in shaping and customizing the platform to reflect their cultural values, preferences, and needs.

References

[1] C-H. Wu, Y-L. Chao, J-T. Xiong, and D-B. Luh, "Gamification of Culture: A Strategy for Cultural Preservation and Local Sustainable Development," *Sustainability* vol. 15, no. 1: 650. 2023. doi.org/10.3390/su15010650.

[2] Y. Weng, T. Shen, S. Chen, and B. Xiao, "Gamification in Local Intangible Cultural Heritage Museums for Children: A Case Design," in *8th International Conference, DUXU 2019, Part of the 21st HCI International Conference, HCII 2019*, Orlando, FL, USA, July 26-31, 2019, pp. 233–245. doi.org/10.1007/978-3-030-23538-3_18. 4.

[3] UNESCO, "What is Intangible Cultural Heritage?" Text of the Convention for the Safeguarding of the Intangible Cultural Heritage, Article 2 – Definitions. Retrieved on November 2023. https://ich.unesco.org/en/what-is-intangible-heritage-00003.
[4] V. Joshi, "Dynamics of Warp and Weft: Contemporary trends in Naga textiles and the Naga collection at the Pitt Rivers Museum, Oxford,: *Textile Society of America Symposium Proceedings. Santa Fe, New Mexico*, 786, 2000. https://digitalcommons.unl.edu/tsaconf/786.
[5] H. Zhao, and X. Cao, "Analysis on the Value Composition of Textile Intangible Cultural Heritage," Scientific and Social Research, vol. 2, no. 3, 2020. doi.org/10.36922/ssr.v2i3.986.
[6] R. Kunz, and V. Joshi, "Naga - A Forgotten Mountain Region Rediscovered_ EN," *Museum der Kulteren Basel*, Christoph Merian Verlag, 2008.
[7] A. Phonglo, "Understanding traditional belief systems in Northeast India: revisiting the oral world through literature," *Time and Mind* 12(4):305-316, 2019. https://doi.org/10.1080/1751696X.2019.1681758.
[8] Z. Lu, M. Annett, M. Fan, and D. Wigdor, "I feel it is my responsibility to stream: Streaming and Engaging with Intangible Cultural Heritage through Livestreaming," *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI '19), Glasgow Scotland UK, May 2019, pp. 1-14. doi.org/:10.1145/3290605.3300459.
[9] W. M. Wan Isa, N. A. Mat Zin, F. Rosdi, and H. M. Sarim, "Digital Preservation of Intangible Cultural Heritage," *Indonesian Journal of Electrical Engineering and Computer Science, vol.* 12, no. 3, pp. 1373-1379, 2018. https://doi.org/10.11591/ijeecs.v12.i3.pp1373-1379.
[10] R. Waller, "Cultural property risk analysis model: Development and application to preventive conservation at the Canadian Museum of Nature," *Acta Universitatis Gothoburgensis*, 2003. https://doi.org/ 10.2307/25487704.
[11] C. Ebert, M. Harlow, E. A. Strand, and L. Bjerregaard, "Traditional Textile Craft - an Intangible Cultural Heritage?," 2016. https://ctr.hum.ku.dk/conferences/2014/E-Book_Traditional_textile_crafts.pdf.
[12] E. A. Strand, S. Lindgren, and C. Larsson, "Capturing Our Cultural Intangible Textile Heritage, MoCap and Craft Technology." In: M. Ioannides, et al. Digital Heritage. *Progress in Cultural Heritage: Documentation, Preservation, and Protection. EuroMed 2016. Lecture Notes in Computer Science* (LNCS): Springer, Cham, 2016, pp. 10-15. doi/org:10.1007/978-3-319-48974-2_2.
[13] B. Das, "Impact of Globalization on the Folk Life of The Tribes of North East India," *EPRA International Journal of Economic and Business Review*, vol.7, no. 11, 2019. https://doi.org/10.36713/epra2973.
[14] A. Ckj, "Weaving Memoirs among the Naga Tribals: A sociological overview," *EPRA International Journal of Economic and Business Review*, vol. 5, no. 3, 2017. https://eprajournals.com/IJES/article/8450/abstract.
[15] R. M. Dias, J. P. Ogle, and S. Diddi, "Constructing cultural identity through weaving among Ri-Bhoi women weavers: a symbolic interactionist approach," Fash Text 7, 31, 2020. doi.org/10.1186/s40691-020-00220-x.
[16] Ch. V. Devi, "Handlooms for Livelihood in North-Eastern Region : Problems and Prospects," *Journal of Rural Development*, vol. 32, no. 4, pp. 427-438, 2014. https://nirdprojms.in/index.php/jrd/article/view/93328.
[17] R. Prasad, "Lotika Varadarajan's Research Engagements on Textiles of the North East –A Retrospective," *Textiles and Clothing Research Centre e-Journal*, vol. 2, no. 4, pp. 3-10, 2018. https://www.tcrc.in/wp-content/uploads/2020/07/v2i4-Article-1_RR.pdf.
[18] A. Sharma, G. Krishna, and K. Bune, "Legacy of Design; Motifs of Northeast Handloom and its Future,", 2021. https://www.academia.edu/72581571/Legacy_of_Design_Motifs_of_Northeast_Handloom_and_its_Future.
[19] M. Wettstein, "Naga Textiles: Design, Technique, Meaning and Effect of a Local Craft Tradition in Northeast India," Stuttgart: Arnoldsche Art Publishers, 2014.
[20] N. Lyndem, and V. Bhandari, "Cultural appropriation with reference to textiles handwoven in nagaland, india," *EPRA international journal of multidisciplinary research*, vol. 8, no. 11, pp. 12-28, 2022. https://doi.org/10.36713/epra11686.
[21] J. MV, and A. Chupuo, "Preservation of Naga Cultural Heritage," *International Journal of Creative Research Thoughts*, vol. 9, no. 11, pp. a600-a612, 2021. https://ijcrt.org/papers/IJCRT2111073.pdf.
[22] D. Tapscott, "Grown up Digital: How the Net Generation Is Changing the World,", *New York: McGraw Hill*, 2009.
[23] D.J. D'souza, and Nirupama, "Understanding the personality traits of Generation Z in the Indian Scenerio," *International Research Journal of Modernization in Engineering Technology and Science*, vol. 3, no. 7, pp. 1335-1341, 2021.

https://www.irjmets.com/uploadedfiles/paper/volume3/issue_7_july_2021/14949/1628083581.pdf.
[24] D. Mishra, and M. Saxena, "Gamification and Gen Z in Higher Education: A Systematic Review of Literature," *International Journal of Information and Communication Technology*, vol. 17, no. 4, pp. 1-22, 2021. https://doi.org/10.4018/IJICTE.20211001.oa10
[25] D. Hernández-Leo, K. Manatunga, and J. Melero, "Group-based mobile learning: Do group size and sharing mobile devices matter?," *Computers in Human Behavior*, vol. 4, no. 15, pp. 377-385, 2015. https://doi.org/10.1016/j.chb.2014.11.078.
[26] J. Hamari, J. Koivisto, and H. Sarsa, "Does Gamification Work?—A Literature Review of Empirical Studies on Gamification," *In 47th Hawaii International Conference on System Sciences*, Waikoloa, HI, 2014, pp. 3025-3034. https://doi.org/10.1109/HICSS.2014.377
[27] R. N. Landers, "Gamification Misunderstood: How badly executed and rhetorical gamification obscures its transformative potential," *Journal of Management inquiry*, vol. 28, no. 2, pp. 137-140, 2019. https://doi.org/10.1177/1056492618790913.
[28] R. Hunicke, M. LeBlanc, and R. Zubek, "MDA: A formal approach to game design and game research," *In proceedings of the AAAI Workshop on Challenges in Game AI*, 2004. https://users.cs.northwestern.edu/~hunicke/MDA.pdf.
[29] R. Dillon, "Teaching games through the A.G.E. framework,", IGDA Perspectives Newsletter, 2012.
[30] Y-K. Chou, "Learn how to use Gamification to make a positive impact on your work and life," *Octalysis: Complete Gamification framework*, 2015. https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/.
[31] R.M. Ryan, and E.L. Deci, "Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being," *The American psychologist, vol.* 55, pp. 68-78, 2000. https://doi/org/10.1037/0003-066X.55.1.68.
[32] J.D. Gould, and C. Lewis, "Designing for usability: key principles and what designers think," *Communications of the ACM, vol.* 28, no. 3, pp. 300-311, 1985. https://doi.org/10.1145/3166.3170.
[33] A.M. Toda, A.C.T. Klock, W. Oliveira, P.T. Palomino, L. Rodrigues, L. Shi, I. Bittencourt, I. Gasparini, S. Isotani, and A. I. Cristea, "Analysing gamification elements in educational environments using an existing Gamification taxonomy," *Smart Learn. Environ.*, vol. 6, no. 16, 2019. https://doi.org/10.1186/s40561-019-0106-1.
[34] K.S. Tekinbas, and E. Zimmerman, "Rules of Play: Game design fundamentals," MIT Press, 2003.
[35] F.F-H. Nah, Q. Zeng, V.R. Telaprolu, A.P. Ayyappa, and B. Eschenbrenner, "Gamification of Education: A Review of Literature," *In International Conference on HCI in Business*, LNCS Springer, pp. 401-409, 2014. https://doi.org/10.1007/978-3-319-07293-7_39.
[36] M. Sellers, "Advanced Game Design: A Systems Approach," United Kingdom: Addison-Wesley, 2017.
[37] S. Gilbert, "Designing Gamified Systems. Meaningful Play in Interactive Entertainment, Marketing and Education," Routledge publisher, 1st edition, 2015. https://doi.org/10.4324/9781315856674.
[38] K. M. Kapp, "Once Again, Games Can and Do Teach," Learning Solutions Magazine, 2013.
[39] L. Blair, K.M. Kapp, R. Mesch, "The Gamification of Learning and Instruction Field book: Ideas into Practice," New York, NY: John Wiley & Sons, 2013.
[40] S. Nicholson, "A user-centered theoretical framework for meaningful gamification," Paper presented at Games+Learning+Society 8.0, Madison, WI, 2012. http://scottnicholson.com/pubs/meaningfulframework.pdf.
[41] F. Ke, "A qualitative meta-analysis of computer games as learning tools," Handbook of Research on Effective Electronic Gaming in Education Vol. 1, pp. 1-32, 2009. https://doi.org/10.4018/978-1-59904-808-6.ch001.
[42] R.T. Hays, "The Effectiveness of Instructional Games: A Literature Review and Discussion," Orlando, FL: Naval Air Warfare Centre Training Systems Division (No. 2005-004), 2005. https://takeielts.britishcouncil.org/prepare-test/understand-test-format/speaking-test.
[43] J.D. Solis, "Robert A. Reiser and John V. Dempsey, trends and issues in instructional design and technology (2nd ed.)," *Educational Technology Research and Development* vol. 55, no. 2, pp. 193-196, 2007. https://doi.org/10.1007/s11423-006-9030-5.
[44] T. Sitzmann, "A meta-analytic examination of the instructional effectiveness of computer-based simulation games," *Personnel Psychology* vol. 64, no. 2, pp 489-528, 2011. doi: 10.1111/j.1744-6570.2011.01190.x.
[45] J. Hammer, and J.J. Lee, "Gamification in Education: What, How, Why Bother?," *Academic Exchange Quarterly* vol. 15, no. 2, pp. 1-5, 2011.
[46] A. Hein, S. Heidig, S. Hessel, M. Hupfer, H.M. Niegemann, and A. Zobel, "Kompendium multimodales Lernen," [Compendia multimodal learning; in German]. Berlin: Springer, pp. 85, 2008.
[47] Y. Weng, T. Shen, S. Chen, and B. Xiao, "Gamification in Local Intangible Cultural Heritage Museums for Children: A Case Design," Design, User Experience, and Usability. Application Domains: In proceedings of *8th International Conference, DUXU 2019*, Part of the 21st HCI

International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, pp. 233-245. doi: 10.1007/978-3-030-23538-3_18
[48] C-H. Wu, Y-L. Chao, J-T. Xiong, and D-B. Luh, "Gamification of Culture: A Strategy for Cultural Preservation and Local Sustainable Development," *Sustainability, vol.* 15, no. 1: 650, 2023. https://doi.org/10.3390/su15010650
[49] Z. Liu, S. Yan, Y. Lu, and Y. Zhao, "Generating Embodied Storytelling and Interactive Experience of China Intangible Cultural Heritage "Hua'er" in Virtual Reality," In *CHI Conference on Human Factors in Computing Systems (CHI EA'22*), Association for Computing Machinery, New York, NY, USA, 439, 2022, pp. 1-7. https://doi.org/10.1145/3491101.3519761.
[50] F. Cesaria, M. Cucinelli, G. De Prezzo, and I. Spada, " Gamification in Cultural Heritage: A Tangible User Interface Game for Learning About Local Heritage," *In: Kremers, H., Eds., Digital Cultural Heritage., Cham: Springer*, 2020, pp. 411-422. https://doi.org/10.1007/978-3-030-15200-0_28.
[51] K.L. Tan, and C.K. Lim, "Digital heritage gamification: An augmented-virtual walkthrough to learn and explore historical places," *AIP Conference Proceedings*. 1891(1):020139, 2017. https://doi.org/1891.020139. 10.1063/1.5005472.
[52] V.I. Cassone, and F. Viola, "Echoes of the Past: A Gamified Initiative for Audience Development of Cultural Heritage," *Transforming Society and Organizations through Gamification*, pp.271-288, 2021. https://doi.org/10.1007/978-3-030-68207-1_14.
[53] S. Roy, P.P. Singh, and A. Padun, "Game-Based Learning for the Awareness of Culture & Tradition: An Exploratory Case Study on the Indigenous Naga Tribe," *In the book series Design for Tomorrow–Volume 2, Smart Innovation, Systems and Technologies 222, Chakrabarti, A., Poovaiah, R., Bokil, P., Kant, V. Eds., Singapore: Springer*, 2021, pp. 293-304. https://doi.org/10.1007/978-981-16-0119-4_24.