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Three levels in culturally oriented product design: a participatory approach to cultural inspiration in design education

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Abstract

Culturally oriented product design relies on inspiration from the local cultural heritage in the creation of unique products with specific local features. An authentic experience of cultural design inspiration can facilitate novel design outcomes. However, only a few studies have investigated the acquisition of cultural inspiration from a participatory perspective in the field. To narrow this gap, a design workshop was organized with local government in China. Design students were asked to combine local cultural characteristics in everyday products and to generate new concepts that reflect cultural diversity and support local tourism development. We collected students' visual representations, text notes and recorded verbal explanations of the concepts behind the created product designs. The entire data was analysed following the method of holistic coding to identify the types of cultural inspiration and cultural levels. Data-driven analysis included two rounds of categorising. Using the product metaphorical mapping tool, we specified three cultural levels and the cultural elements related to them. The analytical method helped reveal students' design intentions in applying both tangible and intangible cultural elements The results demonstrated that design educators can support young designers to apply the participatory approach in bringing ethical cultural transformations regarding visual, behavioural and philosophical design features.

Keywords

cultural inspiration, minority culture, participatory approach, culturally oriented product, product design

Introduction

Interest in design education among the cultural industries and tourism has been growing in recent years, whereby traditional cultural artefacts inspire the creation of new culturally oriented products with unique traditional or ethnic characteristics (Luo & Dong, 2017; Qin & Ng, 2020). Cultural products could have high commercial value and market potential (Chai et al., 2018; Shin et al., 2011). According to Luo and Dong (2017), cultural inspiration (i.e., visual and textual sources) serves as input to the process of cultural product design when the output is a new culturally oriented product. Two terms have been used interchangeably in this context: culturally inspired design (Dong et al., 2023), culturally oriented design (Moalosi et al., 2010; Lupo & Giunta, 2016; Luo & Dong, 2017). In this study we adopt the concept of culturally oriented product design since it highlights the importance of investigation of regional and/or ethnicity-based cultural groups and provides a methodology to investigate culture, identify and

transform cultural values into product forms. In contrast to universal or mass-produced product, culturally oriented design places more emphasis on cultural diversity and actively incorporates it into design processes. Moalosi et al., (2010) have noted that globalization tends to create more uniform lifestyles and perceptions, as similar products spread worldwide, potentially leading to a shared global culture. Despite globalization, users retain their cultural preferences, and designers need to adapt product design to reflect culturally diverse values, norms, and behaviors. Luo and Dong's (2017) research concerns integrating historical originality into product design and focuses on cultural interpretation. They indicated that culturally rich and creatively reinterpreted designs are more appreciated than mass-produced approach. Using cultural features in the process of reinventing new products designers need to be sensitive, respectful and avoid unethical cultural appropriation. However, in design, it is sometimes difficult to identify the phenomena of cultural appropriation and its' nuances. Cultural appropriation means taking an ownership of things that are part of the culture which they do not belong. Sensitive culturally oriented design preserves the local culture and introduces it to the global market at the same time (Dong et al., 2023; Shin et al., 2011). Cultural product design should support culturally sustainable development (Luo & Dong, 2017; Chai et al., 2018; Qin & Ng, 2020; Yang, 2024).

In the present study we held a design workshop for design students that involved experiencing a living minority heritage to inspire new culturally oriented product design. Participating in Chinese minority communities enabled the students to recognize the various cultural activities of the heritage. Our participatory approach included field research involving observations and discussions with artisans to develop new design concepts. The study and the workshop for Minority Culture were run in collaboration with the university of Yunnan University of Finance and Economics (YUFE) and the local government of Maguan County, Yunan Province, southwest China. The study was part of a larger project entitled "Beautiful Villages Construction", conducted in cooperation with the local Culture & Tourism Bureau (MACTB). The project relied on a rural revitalization strategy and tourism development. This research addresses the following questions:

- What kind of cultural inspiration did the students gain from the local minority culture?
- How is cultural inspiration mapped onto culturally oriented product design?

In the following section, we first present our theoretical framework mapping sources of cultural inspiration. We then describe the context of the study, the participants and the data collection and analysis. Finally, we present the results and discuss the implications of the study.

Cultural inspiration and participatory approach

Cultural inspiration is a crucial factor in the ideation process across design fields (Luo and Dong 2017). Sources of inspiration are diverse, encompassing both material and non-material elements such as traditional artefacts, images, material collections, places different texts, rituals, and mythology (Eckert & Stacey, 2003; Yang and Cheng 2020). Ideation is strongly related to inspirational sources that have different roles in the design process, expanding the notion of space and helping to keep the design in its context, thereby triggering idea creation and anchoring designers' propositions. Designers interpret and adapt elements of inspirational sources, such as by simplification or association with new ideas (Eckert & Stacey, 2003). The act of designing is strongly image-oriented (Keller et al., 2006), and previous research has revealed

that visual stimulation triggers analogical thinking (Goldschmidt & Smolkov, 2006). Using a variety of inspirational sources, designers are able to generate new ideas as well as to modify and assimilate specific characteristics in the form of design concepts.

Designers and design students learn to utilize inspirational sources from ethnic and/or local cultures with their unique styles, decoration or functions that are identifiable from the architecture, everyday objects, tools, textile fabrics, ceremonial equipment and pottery, for example. Cultural product design that incorporates local features emphasises cultural value, which is also a critical issue in design education (Hsu et al., 2011). Liu and Chang (2013) analysed the relationship between symbolic Chinese elements and product forms. In another study, Chai et al. (2018) assessed the usefulness of the mean as a doctrine in Confucian philosophy to product design, using students' chair designs by way of illustration. Confucian philosophical system highlights the importance of hierarchy and harmony in social interactions, moral cultivation, and respect for tradition influencing various design forms and creating a distinctive cultural identity (Chai et al. (2018). Cultural product design focuses on conveying profound cultural meanings and highlighting cultural values and traditions in the finished product.

There have been previous studies on the inspirational sources of designers and design students, and how they are adapted in practise (Gonçalves et al., 2014; Lou & Dong, 2017; Qin & Ng, 2020). Most studies related to inspiration rely on interviews with the designers, or on analyses of the use of inspirational sources in various experimental settings. Gonçalves et al. (2014) used questionnaire data to study the influence of different types of inspirational stimuli on the design process. They found that visual stimuli played the most important role for designers. Many previous studies have introduced frameworks for cultural product design (Hsu et al. 2011; Qin & Ng, 2020) or have provided guidelines on the use of historical literature resources for cultural inspiration. Some studies, such as those by Lou and Dong (2017) and Qin and Ng (2020), employed individual case studies to illustrate culturally inspired design processes. Importantly, participatory design studies (Mavri et al., 2020; Moalosi et al., 2016) have involved various participants to engage with local cultural heritage and customs through direct contextual experiences. These studies include ethnic cultural immersion (Lemon et al., 2023) and community-based practical participation (Mavri et al., 2020; Moalosi et al., 2016). However, Lemon et al. (2023) argued that indigenous knowledge of curricula is controversial in countries where the minority indigenous population has minimal power and authority. According to them the decolonisation of technology education involves balancing and negotiating the tensions between local indigenous knowledge and general western knowledge.

In the study by Mavri et al. (2020), design students interacted directly with industry professionals through participatory communities that offered authentic learning experiences and bridging the gap between academic practice and professional expectations. According to Mavri et al. (2020), novel design outcomes can only be achieved in authentic contexts, and by taking a participatory approach. Similarly, in the study by Moalosi et al. (2016), the designers immersed themselves in the handcraft community and identified cultural memory factors associated with local traditional crafts and cultural events.Thus, instead of seeking inspirational sources solely from visual and written historical literature or museums in the present study we utilized the authentic cultural context, and we adopted a participatory observation within ethnic minority communities, integrating both visible and nuanced cultural elements into the

student designer's product designs. The participatory approach (Roque et al., 2023; Van Oorschot et al., 2022; Manzini, 2016) which includes the use of informants, field observations, and active participation in real-life cultural activities can provide design students with richer, more locally embedded inspirational stimuli within minority community-based cultural contexts.

Sources of cultural inspiration and metaphorical mapping

Culturally oriented products draw on traditional cultural elements, such as form, decoration, and technique, to inspire both designers and consumers. For example, inspiration is sought from the nation's antique artifacts in the creation of cultural products with distinctive ethnic characteristics: in other words, "ancient cultural artifacts" work as "cultural inspiration" (Luo & Dong, 2017). The traditional culture and its artifacts, like other sources, inspire the localization of product design. By referencing local heritage, folklore, and cultural artifacts, these products provide a fertile ground for innovation across handicrafts, the creative economy, and cultural tourism (Summatavet & Raudsaar, 2015). In particular, heritage products function as bridges linking heritage, craft, and design, fostering collaboration between designers and craftspeople through boundary objects that serve as design tools (Suib et al., 2020).

Previous research has illuminated various ways designers engage with traditional culture. Kouhia's (2016) study underscores how material engagement through craft making and a range of traditional resources, from visual material, tactual and structural elements to personal interpretative associations, stimulate creative design. Kouhia and Seitamaa-Hakkarainen (2017) further identify three key strategies: a preservation strategy that faithfully reproduces traditional details; an application strategy that combines tradition with new materials and elements; and a transformative strategy that generates innovative concepts and entirely new product ideas. Rynning (2021) adds that national culture continues to inspire graphic designers even as they navigate the tension between globally accessible digital influences and local, traditional sources. Her findings suggest that designers integrate their cultural heritage into modern designs, blending national identity with global trends. Students are aware of their own cultural heritage and manage to balance national elements with global trends (Rynning, 2021). Gimeno-Martinez (2016) also discusses the importance of everyday objects as carriers and signifiers of national cultures.

Cultural elements tend to be adapted for its outer (visceral) appearance (i.e., colour, texture and form), emphasizing the aesthetic aspect. Within academic design settings, however, inspiration often comes from literature-based sources rather than participatory approaches, which can inadvertently foster design fixation. Seeing visual examples could halt the search for new inspiration and prevent the exploration of new possibilities. To counteract this, researchers such as Suib et al. (2020) emphasize the importance of real-world contexts and participatory approaches that engage tacit cultural knowledge and hands-on skills, helping students draw meaningful inspiration from traditional cultural narratives. Zhu (2020) examined the impact of visual and textual sources, or triggers, as cultural stimuli in cultural product design, using experiments to explore the impact of this information on the creativity of novice designers. The results of the study showed that the visual triggers, especially partial images with low pictorial richness, were more effective than textual triggers in stimulating creativity among novice designers. Complementing these insights, Lou and Dong (2017) reveal that different types of cultural triggers (pictorial and textual) impact creativity differently, with

cultural-textual sources fostering deeper engagement and more innovative outcomes by tapping into the symbolic and historical dimensions of cultural artifacts.

Lou and Dong (2017) analysed the role of various forms of cultural inspiration in the designing of cultural products. They distinguished two types of inspiration: cultural-pictorial including shapes, decorations, colours, lines and textures) and cultural-textual (including information about usage, symbolism and aesthetics, technological information about materials and workmanship, as well as historical information such as folk stories). The experimental setting reflected the nature of the inspirational sources i.e., visual vs textual. The students produced a similar number of cultural features, but those who worked with cultural-textual inspiration produced more creative outcomes than those who worked with pictorial inspiration. Furthermore, those in the cultural-textual group tended to focus on the inner level of a cultural object, such as the connotation that made them think more about the internal elements of a product. In the other study, Dong et al., (2023) analysed differences among students engaged in cultural product design in experimental settings with two conditions: a guideline-aided condition and an unaided condition. The aim was to find out whether design guidelines for traditional cultural artefacts are useful and effective as a tool in the process of designing cultural products. Dong et al., (2023) concluded that the design guidelines for cultural products promoted deeper analysis of cultural features and increased the novelty and quality of the outcomes. More specifically, the guidelines were more supportive during the identification stage than in the translation stage.

Dong et al., (2023) proposed that the cultural design process had three phases: identification (extracting cultural features from an original cultural object), translation (transforming these features into design information and design elements) and implementation (designing the cultural product). Conceptual frameworks for cultural product design focus on how designers extract typical features through inspiration derived from culture. Qin and Ng (2020) adapted the concept according to previous research Siu (2005), who emphasized the layered mapping of intangible and tangible aspects between traditional culture and modern lifestyles. They introduced the metaphorical mapping framework, which is considered for designers to introduce traditional cultural elements into a product design to create novel cultural meaning (see Figure 1). The idea is based on guidelines concerning the use of traditional cultural properties to assess and protect objects rooted in local historical beliefs, customs and practices.

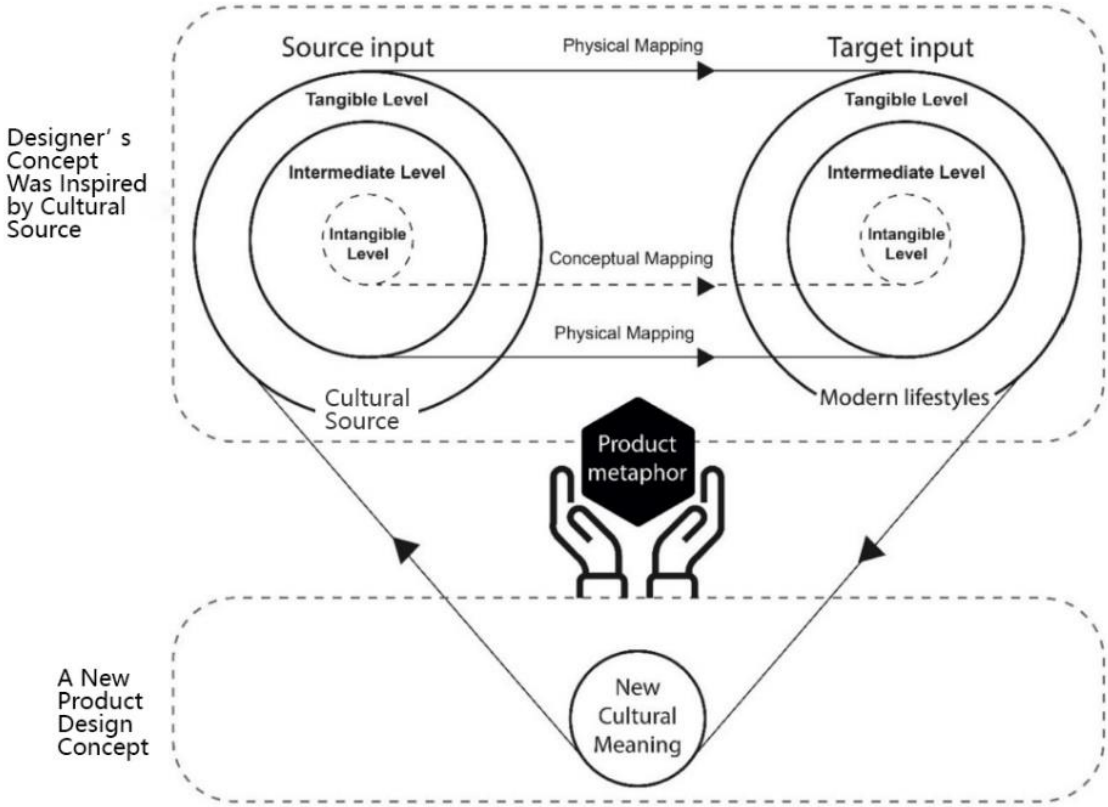


Figure 1. Conceptual framework for designing metaphorical mappings between cultural sources and modern lifestyles adapted from Qin and Ng (2020).

According to Qin and Ng (2020), the metaphorical mapping model distinguishes three layers of culture. (1) The outer layer corresponds to the tangible category and is related to physical and material culture, such as daily objects and tools. (2) The intermediate layer corresponds to the social and behavioural activities (i.e., rituals and customs) required to build a connection with the outer layer and the inner conceptual layer. (3) The inner layer corresponds to an intangible category (spiritual or ideal culture) that works as the core value to stimulate cultural thinking and association. The basic idea behind new cultural product design is to apply metaphors to map two distinctive, previously unrelated thoughts to produce a new hybrid idea. The three levels provide the designer with the physical experience needed to trigger the metaphorical connection. In other words, the new cultural meaning is stimulated when the source element's cultural features and the target element of modern lifestyles are mapped onto each other. The outer layer concerns visceral aspects such as colour, texture, form, decoration and surface pattern; the behavioural level concerns function, usability and safety; and the inner level concerns reflective design with special content, such as stories, emotions and cultural features. The diagrammatic tool enables researchers to interpret the designer's intention by analysing the levels of cultural sources. It was tested on students of product design in Qin and Ng's (2020) study, the aim being to analyse different historical Chinese cultural elements in new design concepts. Yang et al. (2022) used the three levels of cultural hierarchy to provide new insights into improving and adapting teaching practices in the field of cultural design.

Methods

Participants and the studied context

The aim of the study was to analyse how design students who participated and familiarized themselves with minority communities utilized resources of cultural inspiration for designing cultural products. The research design was based on the participatory approach, that incorporating informants, observations, and active participation in ethnic cultural activities, can provide expanded resources for understanding traditional cultures and provide design students with rich sources of inspiration. The study was conducted as part of a design course for fourth-year undergraduate students, namely Cultural and Creative Product Design. As part of the course, a Design Workshop for the Minority Culture was organized in collaboration with the university (YUFE) and the local government (MACTB) of Maguan County, Yunan Province, China.

Eight participants who were not familiar with the minority culture voluntarily attended the design workshop. The first author, who was responsible for the course and participatory field study, organized the workshop. It was based on the sociocultural learning approach, according to which learning is viewed as a deeply social process (Manzini, 2016; Mavri et al., 2020; Roque et al., 2023). In the design task, students were asked to combine local cultural characteristics into products for daily life, to generate new product concepts, and to consider how cultural product designs could be created to attract the tourism market.

During the participatory field study, the students visited two heritage villages and five different local sites. Southwest China is known as a multi-cultural and multi-minority area, and the traditional cultural forms of the ethnic Zhuang minority and Dai have been explored in Chinese studies (Bai, 2012; Sun & Ren, 2017; Li & Liu, 2021). Zhuang people are one of the largest ethnic groups in China and they belong to the Tai-Kadai linguistic group. Dai people belong to the Tai linguistic family and they have a rich cultural heritage rooted in Buddhism and indigenous religious practices. Zhuang people have strong cultural ties to agriculture, nature worship, and traditional festivals. Both minorities have strong tradition on craft cultures such as brocade weaving, embroidery and silver jewellery making. During the preparation stage, several meetings were held to formulate the field survey among the Masa Village committee and MACTB, and the first author searched for relevant literature of the ethnic cultures and visited local sites to plan the course agenda. Xiao Magu and Masa Villages were selected for the participatory observation including documentation and residents' interviews, because the rich territorial capital provided the students with a sociable element in the minority community.

The five-day field study comprised the visits described in Table 1. During designing, identifying socio-cultural factors is an essential phase of the design process (Manzini, 2016; Roque et al., 2023). The students were asked to make observation notes, take photos, interview residents and conduct online literature research for their project work. They also carried out a survey in the marketing area addressing the target products so as to understand user needs and relevant contexts of use. During the field visit, they met various local experts, artisans, museum curators, shopkeepers, and villagers; walked across tourist attractions; and participated in various events with the local people. These interviews and participatory observation focused on local minority traditions such as rituals, music and sports (sources of intangible cultural inspiration), as well as on tangible sources such as buildings, tools and traditional clothing. The participatory documentation focused on their memorable experiences and in-depth learning about the local environment and the design context.

Table 1. The schedule and basic information about the field

Schedule	Places	Basic information	Cultural Sources
The first day at the Maguan Area History Museum		*The museum shows the development of the society in the Maguan area. It introduces visitors to the multiple aspects of Maguan society.*	*Various aboriginal objects including historical relics and productivity tools, as well as daily-living products, minority fashions, craftsmen and skills.*
The second day at Xiao Magu Village		*Xiao Maga Village is the biggest region for the Dai people and one of the aboriginal culture villages that has been assessed as a 3A scenic spot.*	*Dai Minority living heritage, folk houses, living heritage activities, original architecture, customs and clothing.*
The third day in the Aboriginal Clothing Street Area		*The street is famous as a marketing centre in Maguan County. The local government emphasizes features of the Zhuang nationality, combining their culture and clothing, and accessories for sustainability.*	*Most of the stores had many handcrafted fabric products, supplying all kinds of materials, clothing, and accessories related to the minority culture and heritage.*
The fourth day at Masa Village		*The village has more than 400 years of history and the ethnic Zhuang minority live in the area. At present, it is designated a 3A scenic spot, but it lacks tourism facilities, services and products.*	*Zhuang Minority living heritage and environment, folk houses, minority customs, artisans and traditional skills, village museum and various heritage objects.*
The fifth day in the Cultural Core Area at Zhongshan Park		*The garden is culturally oriented and promotes nature and the charm of the ancient. Zhongshan Pavilion stands on the top of the hill and people climb up to gaze at the panoramic view of the county.*	*Some buildings represent Chinese traditional architectures by combining elements of the local minority culture.*

The local guides in the different villages were responsible for assisting the students by guiding them into the village. The Masa Village and its surroundings are rich in intangible and tangible cultural heritages, where the students participated in a traditional Zhuang minority wedding event (see Figure 2). There are also other various types of traditional music and dance rituals, such as the paper horse dance, the handkerchief dance and the “Nong Ren, 侬人” music concert. For example, the design students were able to join in the Masa dance and use headwear worn by the Zhuang minority (Figure 3). They learned traditional wood-cutting techniques, such as “A Er, 阿峨Woodcut”, and took part in daily life on the farm.

Figure 2 and 3. Students participating in a traditional minority wedding (figure 2); one tried on the minority headwear (figure 3)

After the field visit the students returned to their school campus to sketch culturally oriented new products. The product-design concepts they introduced were analysed.

Methods of data collection and analysis

For the data analysis we collected visual representations, text notes and recorded verbal explanations of the novel product concepts. We recorded the verbal explanations during interview meetings, which were later transcribed. Each of the interviews lasted approximately thirty minutes. The entire data was analysed following the method of holistic coding, as outlined by Saldaña (2009), to identify the types of cultural inspiration and cultural levels. Data-driven analysis included two rounds of categorising. The first step in the data analysis was to identify the design students' sources of cultural inspiration from notes, photos, and verbal explanations. Secondly, we used a metaphorical mapping tool (Qin & Ng, 2020) to specify the cultural levels and cultural elements of their design concepts. It is noted that these cultural levels are not necessarily mutually exclusive.

Table 2. The three-level structure and its subcategories

Cultural Level	Cultural Elements
Outer level: Corresponding to the tangible category, such as visual symbols, artifacts, normally in response to graphic elements.	Colour, Pattern, Materials, Form, Structure
Intermediate level: Corresponding to behavioural activities in a traditional institution or a contemporary lifestyle, which could be selected to build a connection with the outer layer and the inner layer.	Craft skills, Operation, Function, Expression of customs
Inner level: Corresponding to the intangible-implication category with a reflective design, and serving as the core value (e.g., beliefs among the minorities to stimulate cultural thinking and reflection).	Spiritual values, Religion, Philosophical thinking, Aesthetics

Results

Eight student designers completed the task, producing a total of 13 sets of new culturally oriented product concepts (see the Appendix for an overview of the product-design concepts

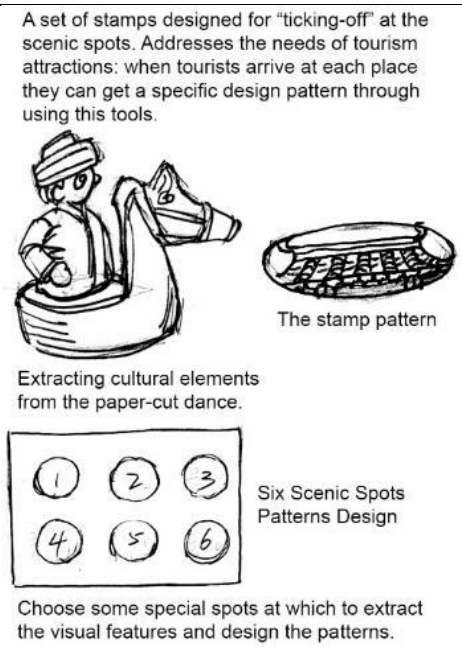
reflecting the source of cultural inspiration and the cultural levels). As predicted, most of the concepts were on the outer level, and the product's features derived from visual elements of the minority artifacts, sculpture and fashion, among other things. For example, the make-up set design (a bag for cosmetic tools) and red envelopes (to be used during the Chinese Lunar New Year) clearly reflected the visual element of embroidery patterns in minority clothing. In the same way, the toiletry designs were visually inspired by the artefacts in Xiao Magu village. Only a few of the design concepts were inspired by behavioural aspects of the rituals and the artefacts used in them. One example was the souvenir concept of a bull's head for home decoration and bracelets inspired by the minority wedding and the headwear used during that event. In addition, two of the design concepts referred to the inner level that represented the spiritual values or philosophical thinking of the minority culture. Thus, the main results indicate that cultural product design focuses on the use of apparent (superficial) cultural features such as shapes and patterns (cf. Qin et al. 2019). However, the direct visual-tangible outer elements can be transformed in a new setting or context. In the following we describe three examples of culturally oriented product concepts representing three cultural transformations with visual, behavioural and philosophical design features, respectively.

Masa Village seal set design derived from the outer level

The seal set design was inspired by the Masa artifact - a horse feature made by paper-cutting for a local traditional dance event. Related to the cultural source, the Masa artifact in traditional dance rites reflects the minority's ancestor worship (Bai, 2012). Nowadays, the dance combines physical activity, pleasure and education in minority living, and sustains such a cultural heritage. This new design concept - a seal set design (see Table 3) was intended for tourists visiting different scenic spots; they collect a distinctive stamp at each location and experience the visit as well-structured. Thus, the new product idea was mapped onto the modern tourism context. The student explained her idea:

> *This is used for "ticking off" at the scenic spots. When you arrive at a special spot, the seal is used to stamp the pattern according to your location, stating that you are there. We can select various scenic spots and extract the features from these places for special patterns, which can be stamped on the card.*

In the analysis of the metaphorical mapping the outer level was connected to creating a seal set design by using visual elements of the specific cultural inspiration (Masa paper horse) to map onto the product's features. The graphics on the stamps derived from the selected scenic spots and were deemed valuable for supporting present-day local tourism. The various cultural features of the site are presented through these vivid stamps with their specific graphics. Product features in the sketch solutions such as the stamp's shape, patterns and structure derived literally from the visual elements of the Masa artifacts.

Culture Source	*Created New Product*
	
The inspiration derived from a physical artifact called Masa, a horse feature made by paper-cutting for traditional dance events. Both young men and women of Zhuang minority enjoy dancing with the Masa tool.	

Cultural Transformation with Visual Features

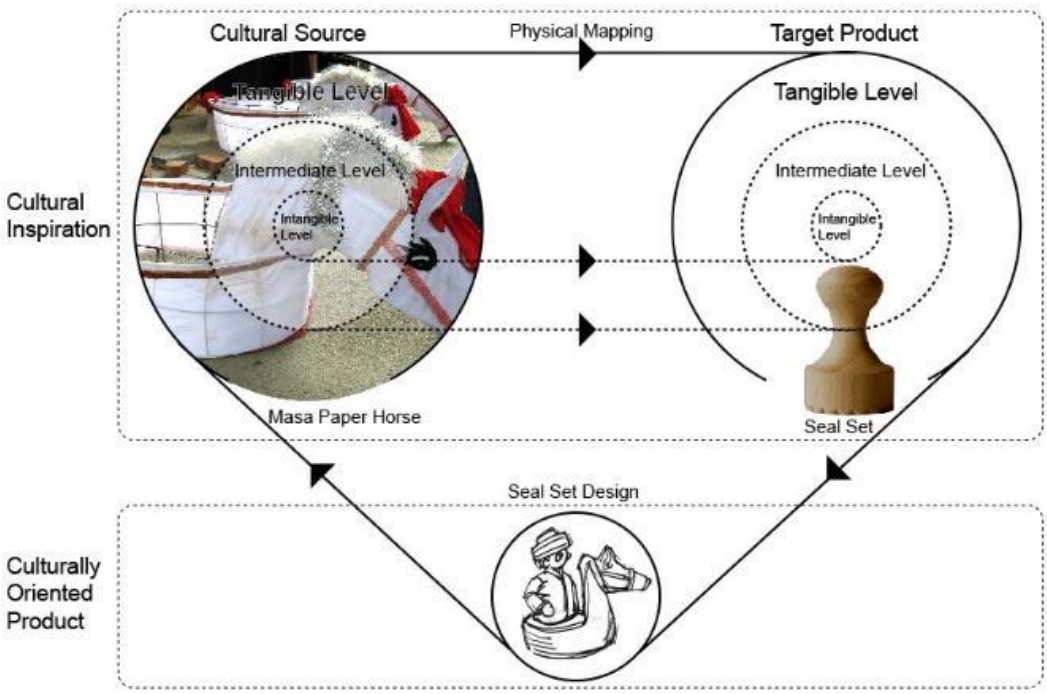


Figure 4. Seal set design with its cultural inspiration

This seal set design follows the three stages: identification, translation, and implementation, to integrate cultural elements into a daily product. The seal set design started by identification of cultural inspiration source from the Masa paper horse tradition, in which key visual elements such as shape, color, patterns, and materials were recognized and analyzed. These traditional motifs were reinterpreted and transformed into new product (i.e. translation to seal set).

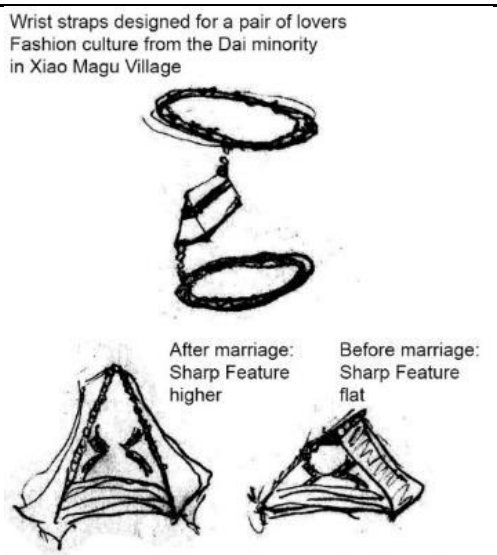
Elements from the Masa paper horse informed the shape, pattern, and modular structure of the product, allowing cultural symbols such as the horse, human figure, and base to be embedded in the product's functional components. The visual design implementation focused on the development and refinement of sketches, ensuring both aesthetic and functional harmony.

Jewellery design for lovers derived from the intermediate level

The concept of jewellery design for young people is embedded in family values from the Dai Minority. The design concept was inspired by the headwear and its context. During a traditional wedding ceremony, the bride is adorned with beautiful headwear, the metaphorical meaning of which is that no matter where she is after her marriage, her family always accompanies her (Sun & Ren, 2017). However, before she marries, she wears a flat version of the headwear rather than the more elaborate one. In this case, the headwear as a symbol plays a significant role in signifying that the original family relationship could be sustained. The student designed a pair of triangular-shaped bracelets to combine the functions of the product. He explained it as follows:

It is possible to assemble two objects for jewellery design. For example, they can be separated to become flat in each one. They were assembled here to become sharp. The hat that is put on before marriage is flat. After marriage, women wear a hat with a sharper shape. I am interested in how meaning can be used when one is designing for a pair of lovers.

The "wrist straps" set was designed to acknowledge the close relationship between a pair of lovers by emphasizing the connection on the bracelets (see Table 4). When used, each can be snapped into two parts. When the two straps are not in use, they can be detached and reconnected as a whole, symbolizing the close relationship between the lovers. The student's idea concerned the cultural elements in the use of headwear, functions and craft techniques connected with the minority's wedding custom. Related to the intermediate level, this metaphorical design reflected the close relationship behind the wedding custom whereby a pair of bracelets connoting the specific cultural inspiration (the headwear) was created to map onto the features of the jewellery design.

Culture Source	Created New Product
	
The beautiful headwear is the inspiration for Dai minority fashion. The shape resembles the rooftop of a folk house, metaphorically putting the family on her head to signify their certain family value.	
Cultural Transformation with Behavioural Features	

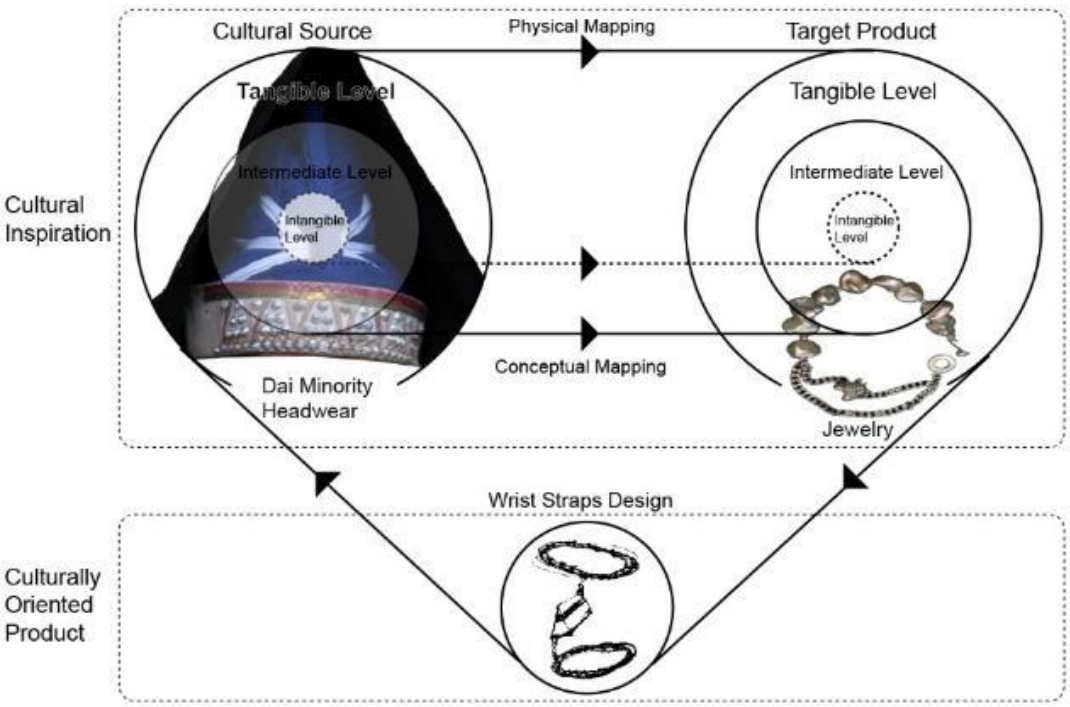


Figure 5. Culturally inspired jewellery design

In the jewellery design process, the outer and intermediate levels were clearly combined. The intermediate layer refers to the social and behavioural activities such as custom of traditional minority wedding and requires building the connection with the outer layer (headwear). The process started by identifying and extracting outer level cultural elements of the Dai wedding

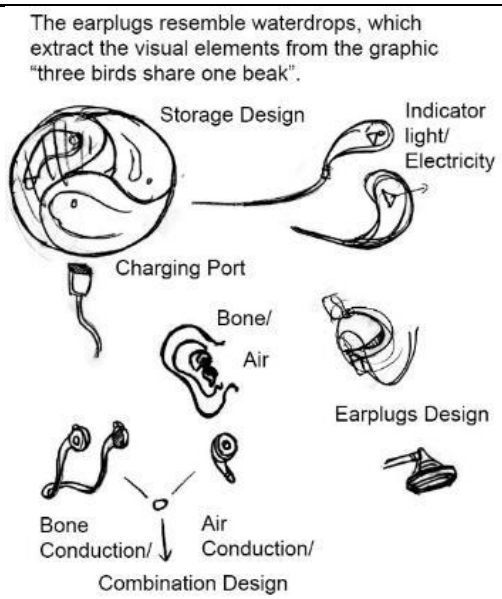
ceremony such as the headwear and its decorative components (e.g., embroidery, metal ornaments, wrapping forms). These outer elements were applied to product features, e.g., connecting parts and beads. In the translation process the behavioral activity (close relationship between the lovers) was integrated into the product's structural aspects including multiple parts, e.g., bracelets, beads, and various connection components and methods.

Earphone design derived from the inner level

The earphone design was inspired by the image of three birds sharing one beak, a symbol in Zhuang national territory that represents the origin of life in their philosophy. They believe that the universe is divided into three worlds: the upper sky, the middle earth and the low water. Gods, people and creatures exist separately on the different levels (Qin, 1990). However, these connotations reflect their philosophical thinking, and are embedded in the graphic (see the photo in Table 5), whereby the three birds are abstracted and intertwined, metaphorically implying sky, earth and water. The shapes and their connotation of the sign map onto the visual features of the ellipse. The student wrote in the final report:

My research emphasized an example called "Three birds share one beak". The colours of the three birds are separately seen as blue, red and striped black and red, these mean that sky, earth, and water are the elements in nature to nourish the minority people [Zhuang minority]. This graphic is widely applied in the scenes of their daily life, such as the traditional concert hall and the central square. It is distinctive with auspicious implications and sustainable value when utilized for creating cultural products.

Table 5 shows how the inner level was connected for creating an earphone by using connotation of the specific cultural inspiration (the sign) to map onto product's features of the earphone design.

Culture Source	*Created New Product*
	
The inspiration is from the image "three birds share one beak", which is a known symbol in Zhuang national territory. It gives an insight into life's origin in the Zhuang minority's philosophy.	
Cultural Transformation with Philosophical Features	

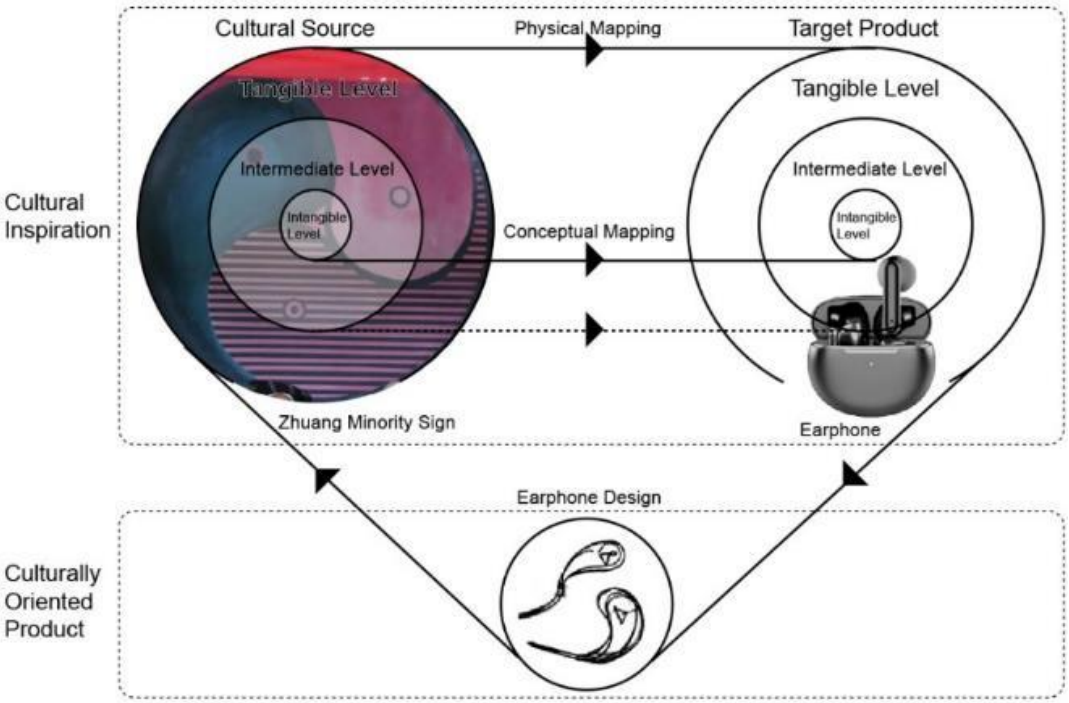


Figure 6. Culturally inspired earphone design

On the inner level, the intended meaning of "heaven's blessing" was to apply the product design through dividing and assigning the cultural elements to its different parts, namely aesthetic manner (water-drop shape), spiritual culture (nature worship) and philosophical thinking (belief in three worlds). The intended design context is a subway journey with the considered problems of machine vapidity and noise from people. Thus, the design solution toward the non-in-ear concept (bone conduction) is reflected as part of people's urban sound context and health issues:

I think it's possible to combine using bamboo-carbon fiber (material) for the health-related earphone product, such as applying it to the earplug or an outer layer, and considering the shape of the graphic (the three birds), like this...

The transformation process of earphones connected the traditional cultural elements (philosophical thinking of Zhuang minority and symbol of Zhuang national territory) toward totally new product (earphones). It conveyed culturally enriched concepts that symbolizes the relationship between sky, earth, and water. Specifically, the metal symbolizes the earth and acquired expression through the earplug components, which were assigned with a metallic material, also involving relevant product attributes. The water element was intended through the charging display indicator and cultural waterflow-pattern features were considered taking on the outer shell.

Discussion

The present study highlighted the importance of inspirational sources of minority heritage for culturally oriented product design. According to Qin and Ng's (2020) diagrammatic tool for specifying culturally oriented design elements and how they could be analysed on tangible-intermediate-intangible levels. We used the findings in addressing two research questions:

What kind of cultural inspiration did students of product design gain from the local culture? How is cultural inspiration mapped onto culturally oriented product design? The focus was on the cultural experiences of the students, and the metaphoric mapping method was utilized to analyse their new design concepts. Our findings indicate that the field study to minority villages and active participation in the minority heritage played significant roles as inspirational sources for new product design.

Culturally oriented product design has emerged as a desirable technique, and there is increasing demand for cultural products that incorporate specific cultural knowledge into their design (Luo & Dong, 2017). Guidelines and historical literature as inspirational sources could help novice designers to deepen their knowledge of cultural features, but do not sufficiently support idea transformation to culturally oriented product design. As ancient cultural artifacts are usually located in museum collections, designers acquire pictorial and textual information more easily than a physical (tangible and visible) object in this process. However, traditional villages and minority cultures offer a more authentic experience. Furthermore, the participatory approach has been used successfully in the designing of events for tourism experiences (Tussyadiah, 2014). Thus, in line with the participatory approach adopted in the present study, design students were required to participate actively in the local culture (such as in festive ceremonies, craft workshops), observing and documenting events, touching and using physical objects, as well as interviewing residents and artisans. Participation means participatory engagement in the context and the design process (Van Oorschot et al. 2022). The results demonstrated that design students are able to use local cultural sources of inspiration together with participatory observation, and to apply acquired knowledge to meet the demand for local tourism products. MACTB officers and guides (such as village tour leaders, curators, museum guides and artisans) acted as informants, and shared knowledge of their cultural inheritance regarding crafts, tools, habits and rituals.

Culturally oriented design always requires sensitivity and empathy for the indigenous cultures, backgrounds, and ethnicities and avoid unethical cultural appropriation. However, there is always a danger of superficial cultural appropriation to a product designed for commercial outcomes if the students are not familiar with the minority culture and are immersed in it for only of a limited period of time. As designers naturally gain cultural inspiration and build on existing ideas the line between inspiration and appropriation is blur. Navigating between this delicate balance requires careful consideration and a deep appreciation for cultural heritage from the design students. Cultural appropriation occurs when designers adopt elements of a minority culture without understanding or acknowledging the community from which they originate. In the present study, the students were familiarized to the cultural contexts beforehand, and the participatory approach relied on the official collaboration between Yunnan University of Finance and Economics (YUFE) and the local government of Maguan County. In the present pedagogical setting, there was not an extension with long-term collaboration. Through direct engagement, design students actively participated in cultural heritage and tourism contexts, adopting more sensitive, respectful, and collaborative design methods. Thus, participatory approach can help prevent harmful misinterpretations by allowing participants to directly correct or adjust aspects of the design (Mavri et al. 2020). It is important to develop pedagogical approaches that guide students in creating sustainable, innovative, and culturally sensitive products (Yang, 2024).

The cultural sources of the tangible and intangible features were revealed in the design concepts, including the artifacts, behaviours and values of the minority. Furthermore, the traditional artifacts that were intricately connected to the people, their environment, social contexts, histories and cultural heritage, inspired product development (Suib et al., 2020). Interestingly, an open formulation of the given design task—designing daily products—also expands concepts such as user and use contexts, and brings out new ideas to enhance user experiences. The student who designed the Masa Village seal set considered broader aspects of sustainable tourism and the attraction of the minority's cultural heritage. Most of the students' culturally oriented design concepts relied on the outer cultural level. Those focusing on devising appealing tourism attractions needed to rely on the tangible and visible aspects of cultural artifacts (i.e., the Masa horse), so that the seal set could later evoke memories of the visits. Similarly, the jewellery design has visible inspirational features from the heritage artifact (headwear), which was transformed into other objects such as bracelets. Significantly, however, the bracelets included the intermediate level expression of the local wedding custom—symbolizing the close connection of the young couple. Sustaining the cultural elements in these design concepts could have allowed more combinations between contemporary and minority heritage in both examples. There were far fewer intermediate- and inner-level culturally oriented product-design concepts. The third example, the earphone product, represents the inner philosophical level of local heritage. The earphones carried the tangible, visual symbols and inner-level heritage features in their new design. The user and user context (subway) exemplified modern, everyday products with the new non-ear function. In other words, some of the culturally oriented product designs rely on a preservation strategy that approached tradition, reproductively focusing on the outer level of detail. Some product designs rely on an application strategy that hybridized tradition with function, whereas the transformative strategy generated new innovative concepts whereby inspiration was gained from the inner level (cf. Kouhia & Seitamaa-Hakkarainen, 2017).

The findings of this study open new perspectives on stimulating creativity in the design of cultural products, and three-level metaphorical mapping could be used also as a pedagogical tool to analyse the sustainable value linking the cultural aspects and the target products. Metaphorical mapping could be used in teaching design to analyse the relationships among various product elements of the cultural heritage. The metaphorical mapping framework emphasizes the creation of new meaning during the design process, whereas cultural inspiration from minority traditions could help to stimulate design. Our results imply that the intermediate or inner level could trigger realization of the metaphorical connection, rather than focusing only on the visual or physical aspects of the artifacts. Further, to better support students inner level designing, the design process could be more scaffolded to support new ways of thinking. These prompts could help students to move beyond the outer level in their design thinking. Also, developing deeper cultural understandings might require more extensive time frame and more intensive co-designing sessions with minority people to understand and connect the inner level in the new cultural products.

The present study has its limitations. The qualitative data analysis was limited to the sketches, notes and voice-recorded explanations. The study would have benefited from more longitudinal data on the participatory approach from site visits to feedback with local participants. It would also have been useful to analyse differences in culturally oriented product design between expert professional designers and novice student designers. Finally, it would be

beneficial to extend co-designing among participants, as well as to maintain longer-term collaboration. This could result in more extensive collaboration and synergy among designers, local artisan groups and authorities that would stimulate the development and preservation of heritage crafts.

To conclude, our findings shed new light on student creativity in culturally oriented product design. Student designers should use minority capital to stimulate tangible and intangible cultural inspirations and thereby enhance their creativity. Furthermore, minority behaviour, thinking and beliefs should be considered in creative concepts to realize product usability and aesthetics. Collaboration between academics and local government is vital to ensure an inspirational cultural context. The cases under study serve as examples of how design students are inspired by collaboration with local governments and communities. Active participation in various attractions and events offers experiences and ideation activities. Specifically, future study contexts with territorial capital could also be more participatory in design or designer-artisan collaboration to vitalize local crafts. Inspiration for developing new products stems from participating in minority cultures, which are unique cultural assets with social and innovative value, and serve as a basis for design practice. Such participation could maximize the potential to create viable designs and contribute to the sustainable development of local crafts.

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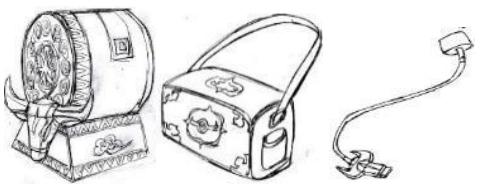
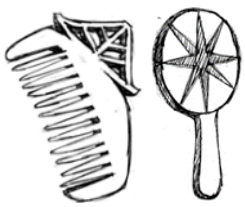
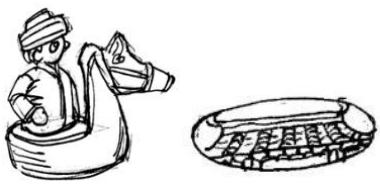
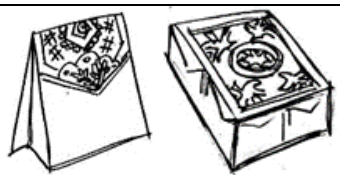
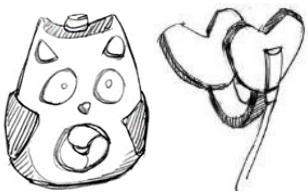
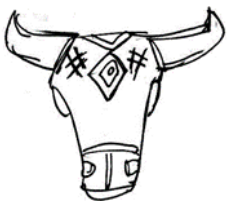
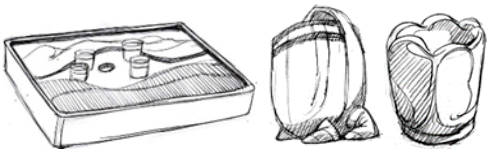
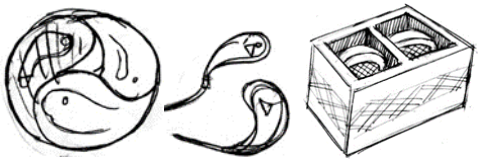
Appendix (Product Design Concepts)

Cultural Level	*Product Designs*	*Cultural Inspiration*	*Cultural Elements*
Outer Level	*Makeup Set (Cosmetic storage bags)*	*Minority fashion (textile)*	*Embroidery of patterns and graphics*
	Red Envelopes	*Minority textile artefact*	*Embroidery of patterns and graphics*
	Electronic Products 	*Minority artifacts and embroidery*	*Embroidery of patterns and graphics*
	Toiletry Products 	*Minority artefacts from Xiao Magu village*	*Local artifacts e.g., headwear and the bronze drum to form and decorate the products*
	Seal Set 	*Masa paper horse dancing*	*Form of the ritual artefact*
	Packaging Bags	*Minority artefacts/fashion*	*Minority embroidery of patterns and graphics*

			
	Sachet Set 	*Minority artefacts/fashion*	*Minority embroidery of patterns and graphics*
	Incense Burner 	*Minority artefacts*	*Form and pattern from the bronze drum, and musical instruments*
	Sleeping Aid 	*Sign of the graphics*	*Minority sign of "three birds share one beak"*
Intermediate level	*Wrist Straps* 	*Wedding rituals*	*Minority headwear*
	Home Decoration 	*Buffalo soul festival rituals*	*Form and pattern of bull heads*

Inner level	*Tea Set* 	*Minority's philosophy*	*Public sculpture, forms of the frog shape and lotus leaves*
	Earphone Set 	*Minority's philosophy*	*Minority sign of "three birds share one beak"*