Implication of Linguistic Landscape to "SONGKLHA TOWARDS WORD HERITAGE SITE" Project

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Abstract

Over the decades, tourism has experienced continued growth and deepening diversification to become one of the fastest growing economic sectors in the world. Modern tourism is closely linked to development and encompasses a growing number of new destinations. These dynamics have turned tourism into a key driver for socio-economic progress. (UNWTO, 2022). It has been found that having a place inscription on the list of UNESCO World Heritage Sites is likely to moderately boost the number of visitors, especially among international tourists (Su and Lin, 2014). As a matter of fact, nations, including Thailand, want this recognition because they can promote a place or practice as a unique cultural tourism attraction. Songkhla, a province located in the southern part of Thailand, has been striving to be inscribed on the list of UNESCO of World Heritage Sites. The 'Songkhla towards World Heritage Site' project aims to display Songkhla's readiness to be listed as a historic site because of the charming traditional architectural style of buildings in its old town (hereafter, Songkhla Old Town). However, this paper argues that whether or not, Songkhla Old Town is ready to accommodate foreign tourists should not be looking only at the infrastructure and tourism campaigns, but local tourism organizations should focus and consider also whether the barrier of communication between the site itself and its foreign tourists need to be pointed out and adjusted. This paper emphasizes that a World Heritage Site tourist attraction should be ready to welcome visitors from all around the globe. However, one of the challenges to be overcome before suitable historical and cultural sites achieve their "inevitable

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destiny" (Pederson, 2012) of being listed as World Heritage Sites is demonstrating their readiness to cater for foreign tourists and their ability to accommodate their needs through publicly displayed language material such as signage and billboards in the towns.

Keywords: Linguistic Landscape, World Heritage Site, Language and Tourism

Unveiling Linguistic Creativity: Exploring English Code-Mixing in Thai Hip-Hop Songs

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Abstract

This research study explores the linguistic phenomena of code-switching and code-mixing in Thai popular songs, specifically focusing on Thai hip-hop music. Through the lens of sociolinguistics, the study aims to analyze the characteristics of Thai-English code-switching and code-mixing in songs and to uncover the underlying linguistic functions contributing to the presence of mixed codes. Using a qualitative research approach, a dataset of 20 Thai hip-hop songs from the Thai Hit 2022 playlists on YouTube was analyzed.

The findings reveal that code-mixing occurs at different linguistic levels, including single words, phrases, clauses/sentences, and tag/fillers, reflecting the artists' creative choices and stylistic preferences. Two emerging functions of English code-switching and code-mixing in Thai hip-hop songs are poetic devices and identity markers. Poetic devices, such as onomatopoeia, internal rhyme, and repetition, enhance the musical and rhythmic elements of the lyrics, contributing to the global appeal of Thai hip-hop. Identity markers, including explicit language and references to taboo subjects, establish a distinct hip-hop identity within the songs, aligning with the rebellious and provocative nature often associated with the genre. The exploration of English code-switching and code-mixing in Thai hip-hop songs reveals a profound example of linguistic creativity to produce distinctive lyrical compositions.

Keywords: Code-Switching, Code-Mixing, Sociolinguistics, Thai Popular Songs

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Introduction

The linguistic phenomenon of code-switching and code-mixing has been the subject of extensive scholarly investigation, with researchers analyzing various linguistic elements, conceptual frameworks, and theories in order to gain insight into the reasons and functions behind this phenomenon (Blom & Gumperz, 1972; Auer, 1995; Mahootian, 2003; Myers-Scotton, 1993; Sarkar & Winer, 2006). Despite extensive research on the subject, there is no single or universal definition of code-switching and code-mixing, as each researcher defines the terms differently and the two terms are frequently used interchangeably. However, the two words generally refer to the process through which speakers switch or mix between different codes within the same utterance.

Code-mixing and code-switching, which involve the mixing or switching between different linguistic elements within or between sentences, have been explored by scholars to better understand how they are utilized. (Stavans & Hoffman, 2015; Berthold, Mangubhai, & Bartorowicz, 1997; Meyerhoff, 2019; Muysken, 2000; Wardhaugh, 2006). For example, Stavans and Hoffman (2015) highlight that code-mixing involves mixing linguistic units within a sentence, while code-switching involves switching between sentences. Muysken (2000) defines code-mixing as the presence of lexical items and grammatical structures from two languages within the same sentence. Similarly, Berthold, Mangubhai, and Bartorowicz (1997) explain that code-switching occurs when speakers switch between languages in a conversation, also known as code mixing, language mixing, or language alternation. Wardhaugh (2006) notes that code-switching generates a new code when speakers switch or mix codes within an utterance. Meyerhoff (2019) adds that code-switching involves switching between distinct language varieties, with variations influenced by community, individual, and situational factors. In the present study, code-switching is defined as the act of switching to another language between sentences, while code-mixing refers to the blending of languages within a single sentence.

Code-switching and code-mixing are also examined in terms of their functions. For example, Blom and Gumperz (1972) identified situational switching and metaphorical switching by which situational switching occurs when speakers switch to a different code in response to a change in social context, reflecting distinct social functions associated with each code while metaphorical switching involves language shifts that convey symbolic or metaphorical meanings without changing the topic or social context. Holmes and Wilson (2022) identified five distinct functions of

code-switching and code-mixing. Situational code-switching involves language changes that reflect shifts in the social situation and express group membership, solidarity, or positive attitudes. Metaphorical code-switching serves rhetorical purposes, influencing the audience's thoughts or actions through language shifts. Referential code-switching occurs when speakers switch between codes to facilitate the discussion of specific topics. Emblematic code-switching or tag switching serves simpler functions, such as using expressions or fillers from another language. Affective code-switching reflects the speaker's emotional state, with language switching used to convey emotions like anger or strong feelings. Myers-Scotton (1993, 1998, 2002) contributed to the understanding of code-switching and code-mixing with the Markedness Model which consider code-switching between marked and unmarked codes based on expectations in a given context. The marked choice occurs when a speaker intentionally switches to a code that is not the norm or expected choice in a given linguistic and social context. Unmarked choices, on the other hand, refer to the use of a code that is considered the default or expected choice in that context. The markedness of a code choice is influenced by factors such as language dominance, power dynamics, social status, and identity construction. The model provides a valuable perspective on how code-switching is influenced by sociolinguistic factors and sheds light on the complex interplay between language choice and social dynamics.

This present study is based on the sociolinguistic approach, which is used to explore the relationship between language and society (Holmes, 1992). Sociolinguistics plays an essential role in understanding the relationship between code-switching and code-mixing in language use. It analyzes how individuals customize their linguistic choices within social contexts to navigate diverse social and communicative situations, as well as the functions and motivations behind these choices, such as the desire to display a specific identity or convey group belonging.

The analysis of code-switching and code-mixing in songs has received a lot of attention by researchers from various cultures. For instance, Chan (2009) investigated the use of English in Hong Kong, Davies & Bentahila (2008) investigated the use of French and Arabic code switching in Algerian and Moroccan rai songs, Moody (2006) and Moody & Matsumoto (2003) looked into the use of English in Japanese popular music, and Jin & Ryoo (2014) examined into the use of English in Korean popular music. These studies demonstrate that language blending in music serves different purposes than it does in spoken language. Moreover, the concept of a poetic device emerges as crucial as linguistic integration serves as a powerful artistic tool, transcending conventional language boundaries. For instance, in Hong Kong's Cantopop, English words are ingeniously utilized not just to adopt Western identity but as poetic devices, offering rhyme,

delineating song structures, and expressing emotions. Similarly, in J-pop, the integration of English into Japanese lyrics exemplifies a playful and inventive approach, enhancing the linguistic fabric of the songs.

To elaborate, Chan (2009) examines the functions of Cantonese–English code-switching in a corpus of Cantonese pop music (Cantopop) in the Hong Kong context in which code-switching to English has primarily been viewed as adopting Western identity rather than local identity. The finding, however, shows that the functions of English words in songs are diverse and flexible. For example, it can be used as a poetic device to rhyme with Cantonese words or designates elements in pop music such as line breaks, the beginning of choruses, and the separation of the lead voice from the supporting voices. English words can also be used to imitate Cantonese vernacular, allude to other media texts, or convey the singers' emotions and identities.

Moody and Matsumoto (2003) examined language mixing in J-pop lyrics, focusing on "The Southern All Stars" and "Love Psychedelico." They found that integrating English lyrics into Japanese songs, while potentially ambiguous, led to creative language mixing. For instance, the Japanese phrase "douitashimashite" phonetically resembles the English "Don't touch my moustache," showcasing how this blending adds a playful and inventive dimension to J-pop's linguistic fabric. In line with Chan's (2009) study, this research underscores how the creative use of English mixing serves as a poetic device, transcending linguistic boundaries to facilitate innovative and artistic expression.

In a multilingual setting, Bentahila and Davies (2002) studied raï songs from Algeria and Morocco. The researchers found that the practice of code-mixing Arabic and French in these songs amplified the rhetorical and aesthetic impact, intertwining with lyrical structures like rhyme, line breaks, and stanzas to create diverse patterns. Moreover, they argued that the hybridization of Arabic and French allows the two contradictory trends of globalization and localization to be merged as glocalization. The term glocalization, according to Kraidy (1999), refers to "the local, national, regional, and global contexts of intercultural communicative processes," perceiving the global and the local as not wholly incompatible but rather strongly interwoven.

This study parallels Jansen and Westphal's (2017) analysis of language mixing by Rihanna, the globally acclaimed singer and songwriter originating from Bridgetown, Barbados. Rihanna, celebrated for her Caribbean heritage, adeptly weaves elements of both English and her native Caribbean English Creole into her diverse musical repertoire, encompassing genres such as pop, hip-hop, R&B, and reggae. In her hit song "Work," she skillfully incorporates numerous Caribbean English Creole morpho-syntactic features, including the use of na for negation, hafi instead of have

to, se in lieu of say, and a go to convey future tense. Rihanna's seamless transitions between Standard American English and Caribbean English Creole serve as poetic devices, setting her songs apart, allowing her local identity to shine, and facilitating her connection with a broader audience.

In Thailand, code-switching and code-mixing, which entail the integration of English into the Thai native language, have become pervasive in daily life. For example, street signs in both English and Thai are widespread, meeting the requirements of both local people and international visitors. Similarly, restaurant menus incorporate English names and details alongside Thai, ensuring accessibility to a wide range of customers. In everyday conversations, it is common to hear Thai speakers seamlessly switch to English phrases or mix some English words when discussing modern or technical topics. Significantly, this phenomenon sparks academic interest across various domains, including magazines (Janhom, 2012; Thongsombat, Sangsuwan & Suwannatrai, 2021), television programs (Kannaovakun, 2006; Kuptanaroaj, Srinoparut, Chomaithong, & Vichulta, 2020; Preechaamornkul, 2005), classroom interactions (Promnath, 2016), internet chatrooms, social media (Kongkerd, 2015), and song lyrics (Chairat, 2014; Likhitphongsathorn & Sappapan, 2013). These studies provide valuable insights into the mix of English into Thai texts, reflecting the dynamic interplay of languages in contemporary Thai society.

Recently, tuning into Thai popular music on a radio or music streaming platform, the likelihood of hearing English words mixed in with Thai lyrics is now very high. Among JOOX's playlist featuring the 50 most popular Thai hits from 2012 to 2022, there is a noteworthy trend: the number of songs blending English with Thai lyrics has more than doubled since 2017. This trend mirrors the heightened prevalence of English mixing in Thai popular music over the past decade.

In the realm of research, Likhitphongsathorn and Sappapan (2012) are considered among the earliest researchers who are interested in studying the phenomenon of code-switching and code-mixing of Thai contemporary music. They collect data from 146 Thai pop songs with English codes released between 2008 and 2012 with the focus on classifications of English words, phrases, clauses, sentences, and nativization features that appear in Thai pop songs lyrics. The research found that English words had the most numbers and occurrences, followed by sentences, phrases, and clauses. Moreover, reduplication emerges as the most prominent nativized feature, implying that the process of nativizing English words in the discourse of Thai pop songs differs from other Thai code-mixing studies. The researchers confirm that song lyrics are a special type of communication, and reduplication is useful for adding playfulness to the song. While these words

have little inherent meaning, they are used to develop the song's tempo and melody, such as "love love love," "baby baby," and "kiss kiss."

Despite the increasing prevalence of English language integration in Thai songs, this phenomenon has received limited scholarly attention. Consequently, the present study aims to address this gap, with a particular focus on the hip-hop music genre. Hip-hop music is notable for its unique characteristics influenced by African American Vernacular language and culture. Through the sociolinguistic lens, the use of English in Thai hip-hop songs is investigated to understand how Thai hip-hop artists tailor their linguistic choices to embody the hip-hop identity within the Thai context.

Research Objectives

The objectives of this study are twofold. Firstly, to investigate and analyze the prominent characteristics of Thai-English code-switching and code-mixing in songs. Secondly, to identify the underlying linguistic functions that contribute to the presence of mixed codes in these songs.

Methodology

This study utilizes qualitative methods to understand the lyrical language use of Thai popular music artists, aiming for a comprehensive understanding of the phenomenon. The qualitative analysis provides a detailed description of how these language features are employed in the songs.

The researcher establishes specific criteria for selecting songs as data, which include the following: (1) Thai songs with more than ten English words, (2) Thai songs performed by contemporary Thai artists, and (3) Thai songs that were popular in the year 2022. To fulfill these criteria, the researcher chooses songs from the Thai Hit 2022 chart on YouTube. YouTube is particularly chosen as the platform due to its widespread popularity among Thai and global audiences as a hub for music and entertainment. As of 2022 statistics, YouTube is utilized by over 42.8 million Thais, which accounts for 61.1% of the total population. Moreover, it serves as a favored medium for Thai artists to release their music. Consequently, the songs featured

on YouTube's popular chart are considered reliable in reflecting the song's popularity among a large number of music enthusiasts.

A comprehensive survey was conducted on a total of 260 Thai songs derived from five YouTube “Hit” playlists of 2022. These playlists encompassed various genres, including “Thai Pop Hits” (50 songs), “Thai Rock Hits” (55 songs), “Thai Hip Hop Hits” (53 songs), “Thai Indie Hits” (55 songs), and “Lukthung Hits” (47 songs).

Among the 260 Thai songs surveyed, 72 of them incorporate English, accounting for 27% of the total. The analysis process focuses on songs containing at least 10 English words, while those with fewer than ten English words are excluded. This results in a dataset of 54 songs used for the study. It is important to note that certain English loanwords commonly used in Thai, which are included in the Royal Institute Dictionary, are not considered as English words in this study. Moreover, due to time constraints, the examination will only focus on songs from the hip-hop genre, known for featuring a high frequency of English word combinations. In summary, a total of 20 songs from the Thai Hip Hop Hits 2022 playlist will be analyzed for their English usage in this study.

To facilitate data collection and analysis, a coding scheme has been established to categorize and analyze the presence of English words in Thai popular songs. The coding scheme encompasses two main categories: linguistic characteristics and linguistic functions. Under linguistic characteristics, the subcategories include musical filler, single word, phrase, and clause/sentence. In terms of linguistic functions, the subcategories consist of literary elements and identity markers. This coding scheme provides a structured framework for systematically categorizing and examining the occurrence of English words in Thai popular songs.

Results

This section presents and discusses the study’s results, focusing on the characteristics of Thai-English code-switching and code-mixing in songs, as well as the linguistic functions behind mixed codes. These findings shed light on the intriguing phenomenon of English word mixing in Thai songs and contribute to the existing knowledge in this field.

The Analysis of Linguistic Characteristics

Based on the analysis of the 20 songs, the data indicates that single words were observed 201 times, phrases were observed 219 times, clauses/sentences were observed 106 times, and tag/fillers were observed 84 times. The findings suggest that phrases were the most commonly used, followed by single words, clauses/sentences, and tag/fillers.

The variations in occurrence highlight the diverse ways in which code-switching and code-mixing are manifested in Thai songs, reflecting the artists' creative choices, stylistic preferences, and the intended impact on the hip-hop identity.

Single Word

The result shows that single words of English were observed 201 times with most words are code-mixed within a Thai sentence or intra-sentential level.

Examples:

"*Everywhere* โยกไปกับพี่ *BKK* ฉีกทุกทฤษฎี"

(Translation: *Everywhere*, rocking with me *BKK*, breaking all theories)

"ปากบอก *kidding* แต่ผมน่ะคิดจริง"

(Translation: "Mouth says *kidding*, but I really think.")

In the first example, English code-mixing occurs seamlessly within the Thai context. The mixing of English words disrupts the linguistic pattern and draws attention to itself, making it a marked choice, adding emphasis and impact to the lyrics. Similarly, in the second example, the English word *kidding* within a predominantly Thai sentence can be considered a marked choice. Also, this code-mixing highlights the contrast between the surface meaning of "kidding" and the underlying intention of "...really think".

Phrase

English phrases were detected 219 times, indicating the highest frequency of occurrence among the linguistic elements analyzed. Unlike single words, English phrases were seamlessly integrated into the flow of the song lyrics at both the inter-sentential and intra-sentential levels. At the inter-sentence level, it was common to find entire phrases expressed in English

without any mixing with the Thai language. This included the consecutive use of English phrases across multiple bars, a characteristic frequently observed in Thai Hip-Hop songs.

Example:

"เอาแต่ *smoking on za* นั่นแหละที่เธอได้กลิ่น
อยากจะได้นาฬิกาหรือว่าจะเป็น *big ring*"
(Translation:
"Just *smoking on za*, that's how you smell.
Do you want a watch or a *big ring*?")

In this example, the English phrases are employed, enabling a transition between languages. Grammatical integration allows the English phrases to conform to Thai sentence structures, ensuring syntactic harmony. The semantic significance of these English phrases contributes specific meanings and connotations, such as connoting luxury or desire.

Clause/Sentence

A total of 106 instances of clauses/sentences were recorded. Although less common than incomplete sentences or phrases, the presence of complete sentences in Thai Hip-Hop songs was similarly observed at the intra-sentential level. While clauses/sentences offer a more narrative and insightful message in English, it is likely influenced by the genre's inclination towards concise and impactful phrases that align with rhythmic patterns.

Example:

"ไม่รู้ตอนนี้อยู่ที่ไหน
Oh baby you make me falling
Yeah you keep making me falling
And falling and falling for you"
(Translation:
"I don't know where I am now.
Oh baby you make me falling
Yeah you keep making me falling
And falling and falling for you")

In terms of grammatical structure, the Thai sentence in the example follows the grammatical rules of Thai language with respect to word order, verb conjugation, and sentence formation. However, immediately after this Thai sentence, English sentences are introduced adhering to English grammar rules, including subject-verb agreement and the use of articles and prepositions. Unlike intra-sentential mixing, which occurs within a single sentence, inter-sentential mixing involves the use of different languages in separate sentences or phrases. When languages are mixed at the inter-sentence level, there is often more freedom to experiment with grammatical structure and language mixing. This allows artists to play with the overall structure and flow of the lyrics, creating a distinct style and artistic effect.

Tag/Filler

According to the findings, tag/fillers were observed 84 times, including interjections and short phrases. Tag/fillers are typically short, repetitive phrases that create a melodic or rhythmic pattern within the song. They may include sounds, words, or phrases that are catchy and easy to remember. In many cases, these tag/fillers are chosen for their sound or the way they fit into the overall flow of the music, rather than for their semantic content. They often involve single word or phrases that have little or no specific meaning in the context of the song. They are strategically employed within Thai Hip-Hop songs to enhance the flow and rhythm of the songs, as shown in below example.

"*Oh yeah* กูอยากให้มึงเข้ามา vibe
บอกให้มึง turn on the lights"
(Translation:
"*Oh yeah*, I want you to come in vibe
Tell you to turn on the lights"

According to the data, it becomes evident that English code-mixing occurs within a single sentence, encompassing phrases, single words, and tag/fillers. Sometimes, English elements are mixed into predominantly Thai sentences, while at other times, English elements make up the majority of units mixed with Thai. Alternatively, English code-switching is detected through the use of English clauses and sentences, encompassing shifts between Thai and English sentences. Notably, the practice of using multiple English sentences to form complete stanzas, which then alternate with full Thai stanzas, is becoming more prevalent.

The Analysis of Linguistic Functions

The analysis of linguistic functions in Thai popular music provides valuable insights into the diverse ways English words contribute to the lyrical composition. Based on the findings of this study, linguistic functions are categorized into two types: poetic devices and identity markers.

English Code-Switching and Code-Mixing as Poetic Devices:

Onomatopoeia: It refers to words that mimic the sound they represent. In hip-hop, artists often incorporate onomatopoeic words or sounds to create rhythmic patterns and add sonic texture to their lyrics. These words can evoke specific sounds or actions, enhancing the overall auditory experience for the listeners. As exemplified below, the English phrase “Beep beep” imitates the noise produced by a car horn.

“ตอนอยู่ภูเก็ตกูนั่ง Jeep yeah
กูกลับมาที่กรุงเทพกูอยู่ใน Benz *beep beep* yeah”
(Translation:
“When I was in Phuket, I rode a Jeep yeah.
I’m back in Bangkok, I'm in a Benz *beep beep* yeah”

Rhyme: This is a fundamental technique in songwriting that involves using words with similar sounds, creating a rhythmic and melodic effect. Rhymes can be found within the same line as well as between different lines, typically in the final word of a verse or sentence. The inclusion of English words in the lyrics enhances the possibilities for creating rhymes, extending beyond the boundaries of language, and enabling the interplay of rhyming patterns between English-English and Thai-English verses. By utilizing rhymes, artists can also make their verses more engaging, memorable, and potentially catchier for the listeners. In the below example, the word “passion” and the phrase “have fun" rhyme with the Thai word "แยกกัน" (pronounced “yaek gan”), which means “separate.” The use of English words in the lyrics allows for the exploration of new rhyming possibilities and adds an extra layer of musicality to the verse.

“ถ้ามี *passion* แล้วค่อย have *fun*
ก่อนจะแยก**กัน** แล้วตื่นมาดูแสงแรก**กัน**”
(Translation:

"If you have *passion*, then have *fun*.
before we separate and wake up to see the first light."

Repetition: It is the repetition of sounds that help create a smooth and captivating flow within the song. Additionally, a significant number of English words are repeated for their sound rather than conveying specific meanings, contributing to the unique hip-hop style.

"*Whiskey Whiskey* เหล้าไม่หมดกูไม่กลับ
Whiskey Whiskey ตอนนี้เมาอยู่ในคลับ"
(Translation:
"*Whiskey Whiskey*, not run out of liquor, not leave.
Whiskey Whiskey, now drunk in the club."

These sound-based poetic devices are commonly utilized in hip-hop to enhance the musical and rhythmic elements of the lyrics. By employing these techniques, artists can enhance the musicality and rhythmic appeal of the songs, adding depth and aesthetic qualities to the lyrics.

English Code-Switching and Code-Mixing as Identity Markers:

Based on the findings, English code-switching and code-mixing in Thai popular music play a significant role as identity markers. The presence of explicit language, cursing, profanity, and references to taboo subjects such as sex, drugs, and guns reflects the rebellious and provocative nature often associated with hip-hop culture. These linguistic choices serve as a means for artists to express their individuality, challenge societal norms, and convey authentic experiences.

"I got the strap and she a nat
เธออยากจะแดกกูเหมือน cereal aye
She suck this dick fast and furious aye
I fucked her then I disappear aye"

By incorporating these elements, Thai hip-hop artists establish a distinct hip-hop identity within their songs. The intentional inclusion of explicit language and controversial themes

helps to connect with their target audience and resonate with the experiences and emotions of their listeners. These linguistic choices may be perceived as controversial or offensive to some, but they contribute to the construction of a specific hip-hop identity that aligns with the rebellious and provocative nature of the genre. Through English code-switching and code-mixing, artists have the freedom to push boundaries, challenge societal norms, and express their artistic vision in a way that reflects the cultural and social aspects of hip-hop.

Discussion

The examination of English code-switching and code-mixing in Thai hip-hop songs has yielded noteworthy linguistic characteristics and functions. It is important to note that, in the context of English code-switching in songs, code-switching types, such as situational and metaphorical, differ significantly from those observed in everyday conversations (Blom & Gumperz, 1972; Holmes & Wilson, 2022). Situational code-switching in songs reflects changes in social context, often emphasizing group membership and solidarity, serving as identity markers within artistic expression. Conversely, metaphorical code-switching in songs is a rhetorical device, contributing to the artistic and persuasive elements of the lyrics. These distinctions highlight how code-switching in songs serves unique creative and communicative functions, distinct from its usage in conversation, where language integrations often occur spontaneously in response to social cues or situational changes.

1) Diverse and Non-Rule-Governed Linguistic Characteristics:

Examining English code-switching and code-mixing in Thai hip-hop songs reveals their diverse and unrestricted patterns. The analysis shows a prevalence of phrases, followed by single words, clauses/sentences, and tag/fillers. This differs from Likhitphongsathorn and Sappapan's (2012) study on English code-mixing and code-switching in Thai pop songs, where English words had the highest frequency, followed by sentences, phrases, and clauses. It could be argued that the English code-switching and code-mixing in Thai songs are distinguished by its variability rather than being governed by fixed rules. The linguistic characteristics of songs may differ due to the difference in their themes, contexts, and genres, the lack of rigid rules in songwriting as artists tend to follow individual expression, or the constantly changing trends

in the music industry, particularly listeners' tastes and artists' styles. All of these factors could result in a range of unexpected code-switching and code-mixing behaviors. The occurrence of phrases, single words, clauses, and tag/fillers in various combinations inside or between sentences emphasizes language's flexibility within its artistic context.

It is also worth noting the distinct characteristics of English code-mixing and code-switching discovered in this study. Code-mixing within a single sentence involves phrases, single words, and tag/fillers, which are short and hybridize in the sentence's structure when mixed, creating a seamless blend with Thai language. In contrast, code-switching between sentences uses entirely English clauses and sentences, which is lengthier and more complex, emphasizing language contrast when mixed. The length of English code-switching could be an entire English stanza or more which tend to signify a transition from singing part to the rap part or from one singer/rapper to another.

Moreover, the findings in this present study show that, in some cases, English components are mixed into predominantly Thai sentences, while in other cases, English elements become the dominant part of the mixture alongside Thai. The variability in the mix of English elements could be explained using Myers-Scotton's Markedness Model (1993, 1998, 2002), which considers code-switching as a choice between marked and unmarked codes based on contextual expectations. Here, when English words or phrases are integrated into predominantly Thai sentences, it can be seen as a marked choice because it deviates from the expected norm of using Thai. Artists might strategically introduce English components to create emphasis, add lyrical complexity, or connect with a global audience familiar with English terms, emphasizing the impact of contextual expectations on language usage. English elements can create unique linguistic patterns that enhance the rhythm, flow, and overall aesthetic of the song. They allow artists to experiment with language and expression. Again, the choices between marked and unmarked codes are unpredictable, given the diverse nature of songs, the lack of fixed rules in songwriting, and the ever-changing nature of music scene, as previously discussed.

To conclude, the non-rule-governed nature of language mixing encourages an atmosphere of creativity, allowing artists to freely experiment with their songwriting.

2) Linguistic Functions as Poetic Devices and Identity Markers:

This study highlights the significant roles of English code-switching and code-mixing as effective poetic devices and identity markers in Thai hip-hop songs. Poetic devices such as

onomatopoeia, internal rhyme, assonance, consonance, and repetition enhance the musical and rhythmic elements of the lyrics, showcasing the creativity and innovation of Thai hip-hop artists. The presence of these poetic devices aligns with the findings of previous studies, such as the study by Likhitphongsathorn and Sappapan (2012) on Thai pop songs, which highlighted the use of reduplication as a nativized feature to add playfulness and tempo to the songs.

Language often functions as an in-group marker, reinforcing a sense of belonging. In Thai hip-hop songs, the blend of English creates a linguistic boundary between insiders and outsiders. The shared use of English codes such as rappers' slang, violence theme or explicit words becomes a form of in-group signaling among those who understand the hip-hop culture. Moreover, the blend of African American hip-hop flavor that goes hand in hand with Thai style hip-hop fosters a sense of local pride while maintaining the particular spirit of global hip-hop culture. This aligns with the findings of previous studies, such as Chan (2009), which highlighted the use of English code-switching in Cantopop songs in Hong Kong in which the code-mixing in Cantopop songs not only represents Western ideas but also allows local Hong Kong to express their identities. Furthermore, the hybridization of Arabic and French in raï songs from Algeria and Morocco, as studied by Bentahila and Davies (2002), signifies a unique form of blending global and local influences seamlessly. This concept finds resonance in the work of global icon Rihanna, whose adept incorporation of Caribbean English Creole into her songs, spotlighting her local identity while captivating a global audience. In essence, the concept of a poetic device within code-switching and code-mixing illuminates the intricate balance between local authenticity and global appeal.

Conclusion

To conclude, the exploration of English code-switching and code-mixing in Thai hip-hop songs reveals a profound example of linguistic creativity to produce distinctive lyrical compositions. Thailand, like many nations, is experiencing the effects of globalization. The integration of English within Thai songs reflects the fusion of global influences with local culture. The linguistic creativity through the use of English in Thai hip-hop songs may inspire aspiring Thai musicians to explore this technique in their own compositions. Additionally, further exploration into the motivations and intentions of artists behind their use of English code-switching and code-mixing would provide insights into the artistic decision-making

processes and the ways in which they navigate between different linguistic and cultural contexts. Lastly, examining the influence of English code-switching and code-mixing in Thai popular music on language attitudes and language learning could provide valuable insights for language educators and learners interested in the use of music as a pedagogical tool.

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Designing a Digital Trip Planning Platform to Spotlight Thailand's Lesser-Known Travel Destinations and Foster Local Businesses: A Software Engineering Perspective

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Abstract

Tourism is a key economic driver in Thailand, increasingly bolstered by e-tourism. However, online platforms do not fully represent Thailand's tourism potential, often neglecting lesser-known attractions and local businesses while lacking personalized trip planning options. Our study aimed to address these issues by creating 'Nimbus,' a user-centric web application that offers customized travel plans based on user preferences, integrating both mainstream and hidden travel spots. Using the System Development Lifecycle (SDLC) approach, 'Nimbus' is designed to boost Thailand's e-tourism post-COVID era by presenting a more comprehensive range of experiences, potentially increasing tourist numbers and stimulating the local economy. User acceptance tests found 'Nimbus' efficient and user-friendly, highlighting the importance of adhering to established user interface and experience guidelines in e-tourism systems development. The adaptability of 'Nimbus' indicates it could be utilized for other destinations in Thailand and other countries, showing the flexibility of software engineering approaches in meeting modern e-tourism demands. This reinforces the essential role of Information and Communication Technology (ICT) in advancing global tourism, requiring future research to harness ICT's transformative potential in enhancing the tourist experience.

Keywords: Tourism, Software Development, Usability and User Experience, Thailand, Human-Computer Interaction

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Introduction

With its strategic focus on mass tourism and enduring "Land of Smiles" slogan, Thailand has established itself as a notable global destination, garnering economic benefits and employment opportunities (Kaosa-ard, 1994). The transition from its agricultural roots to a more industrialized and service-driven economy has underscored the growing significance of tourism as a catalyst for economic growth (Rezk & Rosario, 2019). Recent reports from the United Nations travel agency reiterate Thailand's persistent allure as a tourist hotspot, consistently securing a place among the top ten popular global destinations. This reflects an enduring appeal and attraction for visitors worldwide (Marukatat, 2018). In 2019, Thailand clinched the 5th spot worldwide as a global tourism hotspot, with a remarkable influx of tourists contributing significantly to its economy (Worlddata.info, n.d.). The Economist Intelligence Unit (2022) highlights that in 2019, revenue from tourism constituted around 11% of the country's total economic output (GDP), translating to US$59.8 billion.

However, the advent of the COVID-19 global pandemic in March 2020 brought the thriving tourism industry and other related services to a standstill, owing to the government's stringent regulations and emergency protocols to curb the virus spread. The pandemic-induced fear and widespread concerns significantly dampened travel and tourism activities in Thailand, adversely affecting both Thai residents and international tourists (Marome & Shaw, 2021). Although the Tourism Authority of Thailand (2022) projected a recovery with an estimated 25 million visitors after the easing of COVID-19 restrictions, this figure fell short compared to the record-breaking 39.8 million visitors in 2019. The Bank of Thailand's recent forecast portrays a positive outlook with a notable increase in international tourists, estimating around 28 million visitors for 2023. This optimism stems from the relaxation of COVID-19 restrictions and the rekindled global interest in travel (Abhasakun, 2023). By strategically navigating through the challenges and leveraging the anticipated surge in international tourism, Thailand can cultivate a resilient and prosperous tourism industry, paving the way for robust economic recovery in the post-pandemic era.

Problem Statement

The global COVID-19 pandemic has profoundly impacted Thailand's tourism sector, significantly reducing its contribution to the nation's economy to a mere 1% in 2021 (Saxon et al., 2021). This downturn has led to severe financial losses for businesses such as hotels, restaurants, and airlines, culminating in a staggering reduction of 1.33 million jobs in the travel and tourism sector during 2021 (International Monetary Fund, 2021). The economic repercussions of the pandemic on local businesses, particularly small and medium-sized enterprises (SMEs), underline the necessity for governmental initiatives to promote the resurgence of SMEs in the post-COVID era, considering their crucial role in the tourism ecosystem.

In recent years, platforms like Agoda, Hotels.com, Expedia, and TripAdvisor have revolutionized travel planning, providing a one-stop solution for booking flights, accommodations, and car rentals. Thailand, too, has embraced internet and web technologies over the past decade to enhance its tourism industry and support related businesses. However, Thailand's e-tourism platforms face challenges concerning multifunctionality, personalization, and real-time data updates, which, in turn, impact user satisfaction.

Moreover, promotional efforts within Thailand's tourism industry have predominantly highlighted specific categories of attractions like cultural landmarks, natural wonders, culinary explorations, and contemporary amenities. A deep dive into each category reveals the unique charm of renowned attractions such as the Grand Palace, the ancient city of Ayutthaya, the coastal paradise of Phuket, the dynamic metropolis of Bangkok, and the vibrant and varied street food scene (Bindloss, 2022). Yet, this focus often overshadows lesser-known destinations, creating a need for a balanced promotion that comprehensively captures Thailand's diverse allure.

Unfortunately, while landmarks like the Grand Palace and Phuket have achieved global recognition, many of the country's hidden gems remain unexplored (Thailand Insider, 2020). This lack of diversification in promotion hinders Thailand's ability to attract a broader international audience and offer a more diverse and authentic tourism experience. Therefore, it becomes imperative to devise resilient strategies to bolster and sustain Thailand's tourism sector, ensuring that the promotion of lesser-known sites and improved accessibility to these destinations are prioritized. These measures can play a pivotal role in drawing a larger audience to Thailand's varied attractions, aiding in the recovery and long-term sustainability of the nation's tourism industry in the post-pandemic world.

Proposed Solution

Advancements in information technology present a pivotal opportunity to rejuvenate Thailand's tourism sector post-pandemic. Utilizing this potential can significantly enhance e-tourism offerings and improve customer experiences in Thailand (Buhalis, 2020). Specifically, strategies catering to tech-savvy travelers, providing personalized trip schedules, and promoting undiscovered destinations are essential to diversifying tourism nationwide. A crucial aspect of this endeavor is bolstering local small and medium enterprises, which form the backbone of Thailand's tourism ecosystem (Economist Intelligence Unit, 2022).

In light of these objectives, this study proposes the development of a user-centered travel planning platform, 'Nimbus.' Unlike existing platforms, 'Nimbus' leverages cloud computing to store and process vast amounts of data securely and machine learning algorithms to align travelers' preferences with suggested destinations in Thailand. This entails considering their interests, constraints, and travel logistics to offer a bespoke travel experience. The primary ambition of 'Nimbus' is to unveil hidden locales and augment the visibility of local small and medium enterprises, thus creating a win-win scenario for both travelers and local businesses.

By integrating 'Nimbus' into Thailand's tourism ecosystem, the platform can simplify travel planning, deliver personalized recommendations, and substantially revitalize the tourism sector. This paper elucidates the application of the System Development Life Cycle (SDLC) in the meticulous design and development of 'Nimbus,' setting a precedent for how tailored IT solutions can significantly contribute to the resurgence and sustained growth of tourism in Thailand.

Research Objectives

A set of objectives guides this study to accomplish its goals.

- To design and develop a user-centric personalized web-based application system for Thailand's tourism and hospitality sector,

- To investigate the usability and user experience of 'Nimbus' application,

- To understand its feasibility and potentiality in Thailand's tourism industry by promoting lesser-known or hidden gems in Thailand and boosting local businesses.

System Development Life Cycle (SDLC)

Our project, titled ‘Nimbus,’ involved structuring a web application development, diligently following the System Development Life Cycle (SDLC) phases - planning, analysis, design, and implementation (Jalote, 2005). In the planning phase, roles were assigned, sub-teams were formed, key features were established, and tools were selected. A suitable software development methodology was chosen after considering various factors such as project scale, timeline, and team expertise. The choice was also backed by a detailed project plan as outlined (Sommerville, 2015). During the analysis phase, stakeholders and users were identified through mixed-method data collection, including surveys and interviews, resulting in user requirements that significantly informed our design alterations (Beyer & Holtzblatt, 1998). The design phase witnessed the creation of two prototypes, refined based on user testing and feedback, ensuring that the developed features aligned well with user expectations. In the implementation phase, the developed features were integrated into a web application, each undergoing thorough testing to ensure seamless functionality (Futrell, Shafer, & Shafer, 2002).

By adopting a hybrid of prototyping and parallel development approaches, our ‘Nimbus’ development was user-centric and efficient. Parallel development, a methodology in which different parts of an overall system are developed simultaneously to reduce development time and increase productivity, significantly expedited the software implementation phase (Dennis, Wixom & Tegarden, 2020). Furthermore, incorporating prototyping, which involves developing and evaluating initial system versions until a satisfactory prototype is attained, played a crucial role in enhancing our comprehension and ability to fulfill user requirements effectively (Dennis, Wixom & Tegarden, 2020). Although the 'Agile' methodology was initially considered due to its iterative nature and flexibility, prototyping was selected as it facilitated quality feedback and focused programming, aiding in better alignment with user requirements.

Adhering to the SDLC ensured a structured and systematic approach to our ‘Nimbus’ project, which was pivotal in meeting the user requirements effectively and efficiently. Regular meetings throughout the phases fostered an organized work environment and ensured adherence to the project plan (Jalote, 2005). Figure 1 below illustrates the life cycle of software development in our project.

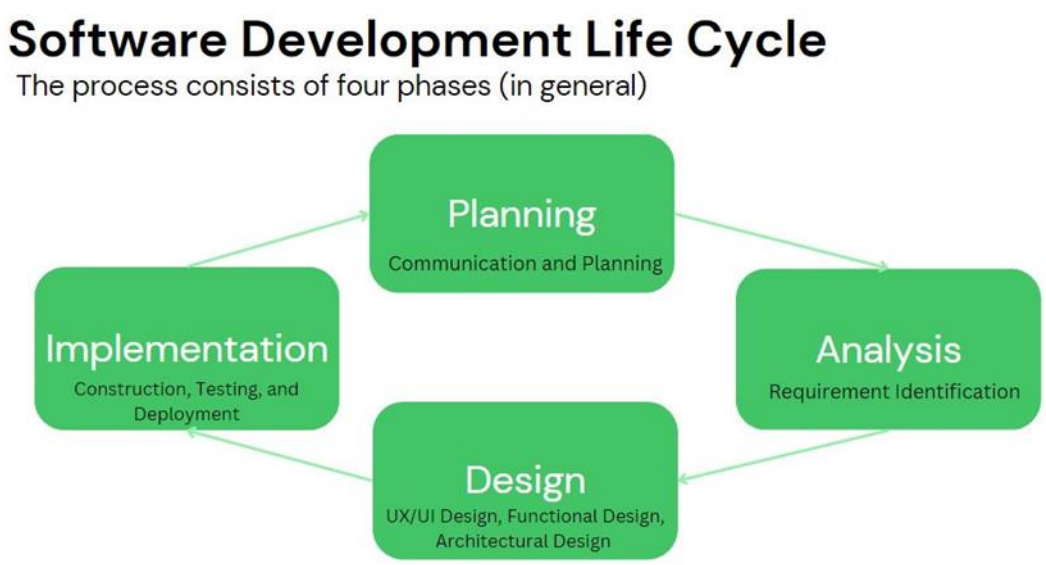

Figure 1: Software Development Life Cycle

Planning

In the planning stage, we initiated a comprehensive proposal detailing the prevailing issues, proposed solutions, a detailed project management strategy, feasibility analysis, market research, and a projected budget. With the proposal's approval, we launched a thorough technology analysis alongside other imperative tasks, including an in-depth feasibility study. Analyzing existing systems such as Google Maps, TripAdvisor, and Wongnai revealed their limitations in offering comprehensive trip planning features compared to our proposed web application. While Google Maps focuses on general purposes and TripAdvisor requires users to create plans, Wongnai lacks robust trip planning capabilities. These systems fail to address the exhausting and time-consuming nature of vacation planning, where users gather information from multiple platforms and struggle to arrange schedules. To alleviate these challenges, our web application aims to provide auto-generated personalized trip plans, reduce planning time, minimize research workload, visualize routes with Google routes API and Mapbox, offer travel instructions through Google directions API, enable plan saving with account creation, and ensure reliable reviews. The analysis also highlighted potential improvements to enhance the overall user experience; hence, we aim to design a user-friendly interface for target users and improve user experiences.

Our team has developed the ‘Nimbus’ system to revolutionize the trip-planning process. The proposed solutions leverage identified opportunities to enhance user experience. For instance, the system simplifies trip planning, saving users' time and effort. Users can log in and input their preferences, constraints, and goals. The website then creates a personalized trip plan with alternate destinations if desired, dynamically updating maps and transport routes. ‘Nimbus’ also offers a browsing feature for exploring categorized destinations, complete with user reviews. It also includes distinctive features such as suggesting lesser-known attractions throughout Thailand and actively supporting local SMEs. This streamlined approach distinguishes ‘Nimbus’ from existing systems, ensuring a consistently positive user experience throughout the trip planning process. Figure 2 shows the conceptual diagram of our to-be system, 'Nimbus.'

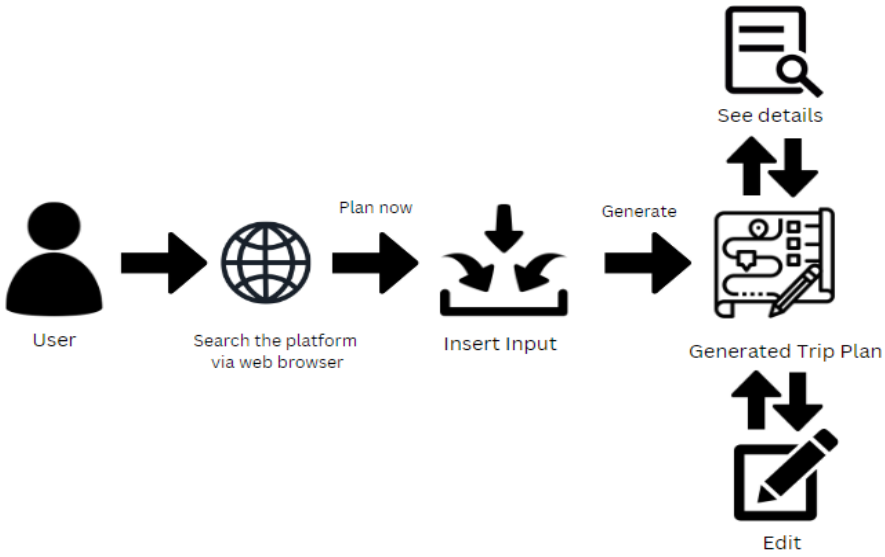

Figure 2: To-be system design

Our study incorporated a comprehensive feasibility analysis - encompassing technical, economic, and organizational aspects - which corroborated that our project presented minimal technological risk. With a skilled team experienced in travel planning, web development, algorithm design, database management, and UX/UI design, the implementation was solid. Also, the manageable team size of 15 members and 4-month duration further ensured success. As the project was developed from scratch, the risk of technical disruptions and compatibility issues was minimal. Economically, the current

budget reflected a streamlined version of the final product, reducing costs by developing the prototype in-house. The server and storage needs align with our cloud service provider's complimentary allowances, and advertising expenses are moderate. The budget was economically viable for the project's current scope, although additional features and destinations may require future cost adjustments.

Regarding organizational feasibility, the project benefited from solid project champions, with funding and supervision provided by experts. The project team was committed to following the SDLC steps to ensure success. As for the users, the findings showed that the majority are familiar with using smartphones, tablets, and personal computers for trip planning. Regarding competitors, TripAdvisor offers trip creation and location recommendations but cannot auto-generate trip plans and validate reviews. Similarly, Wongnai provides information and reviews on restaurants, accommodations, and tourist attractions but lacks trip arrangement and review validation capabilities. These weaknesses presented an opportunity for our project, 'Nimbus,' which aims to address these limitations and provide an enhanced user experience for trip planning.

The diverse team, comprised of a product manager, project manager, project secretary, business analysts, database developer, web developer, and algorithm developer, played crucial roles in the project. The product manager directed the product lifecycle, liaising between customers and team members. The project manager managed prototype iterations, while the secretary coordinated communication and documentation. Business analysts defined user needs, the database developer ensured data integrity, web developers handled full-stack development, and UX/UI designers created quality prototypes from the analysis. Algorithm developers guided core function integration. Standards for project clarity included documentation practices like naming conventions and pagination, coding readability, database norms like snake case naming, procedural consistency with approvals and progress tracking, and UI design uniformity. The consistent use of Times New Roman for font and Figma for collaborative development was also emphasized. These standards streamlined development, improved communication, and guaranteed a high-quality final product.

Analysis

During the 'analysis' phase of the SDLC for 'NimBus,' we thoroughly explored user needs and business requirements. Utilizing stakeholder interviews and surveys, we

amassed valuable insights into prospective users' preferences and expectations, identifying key features for addressing the existing challenges in travel planning. This pivotal phase extended to a competitive landscape analysis, positioning 'Nimbus' distinctively within the market. The insights acquired became the bedrock for outlining the functional specifications, seamlessly bridging into the design and development phases. In the subsequent post-analysis segment, we delineated the functional and non-functional requirements of 'NimBus.' The functional requirements detailed system functionalities, encompassing user capabilities and facilitating travel route planning in Thailand (Sommerville, 2015; Dennis, Wixom & Tegarden, 2020). Conversely, non-functional requirements encapsulated system performance and operational facets, such as response speed and user data security (Sommerville, 2015; Dennis, Wixom & Tegarden, 2020).

Table 1: Functional Requirements

No	Actions	Requirements
1	Authentication (Login/Logout)	The system shall allow users to log in using their email address and password.
		The system shall allow users to log in using a Google account.
	Authentication (Registration)	The system shall allow users to register a new account.
		The system shall provide a means for users to retrieve forgotten credentials.
2	Home Page (Preset Plan)	The system shall show preset plans made by other users.
		The system shall allow users to input their preset plan.
		The system shall allow users to save the preset plan.
	Home Page (Iconic Places)	The system shall show recommended iconic places.
		The system shall show iconic places, and clicking on each will show their description.
	Home Page (Trending Places)	The system shall show trending places, and clicking on each will show their description.
	Home Page (General Search)	The system shall allow users to search for locations and their descriptions.

Table 1: Functional Requirements (Continue)

No	Actions	Requirements
3	Planning (Parameters)	The system shall allow users to input a desired location as a reference for trip generation.
		The system shall allow users to input desired tags for trip generation.
		The system shall allow users to input the duration of the trip.
		The system should allow users to input the budget.
		The system should allow users to input the radius of travel from a pinpoint location.
	Planning (Generated Plan)	The system shall show alternative options for each location.
		The system should allow users to swap each location's order.
		The system shall show the details of each location.
		The system shall show reviews of each location.
		The system shall allow users to save the generated plan.
	Planning (Hotel)	The system should show a list of hotels/accommodations near the generated trip.
4	Map (Routing)	The system shall show the route trip for each day
		The system may show the means of transportation.
	Map (Timing)	The system shall display the travel time between each location.
5	User Page (Account Management)	The system shall allow users to edit their profiles.
	User Page (Saved Plans)	The system shall allow users to view their saved plans.
6	Store Owner Authentication	The system shall allow store owners to log in using email and password. The system shall allow store owners to log in using a Google account.

Table 1: Functional Requirements (Continue)

No	Actions	Requirements
7	Store Owner	The system shall allow store owners to register a new account. The system shall provide means to retrieve forgotten credentials for store owners.
8	Store Operations	The system shall allow store owners to add, edit, view, and delete stores with necessary details. The system shall validate the provided store information for completeness and accuracy during addition and editing. The system shall provide a confirmation prompt for intentional store deletion.

Table 2: Non-functional Requirements

No	Actions	Requirements
1	Availability (Operating System)	The system should be accessible on any operating system
		The system should be accessible on any browser.
	Availability (Operating Time)	The system should be accessible all the time
2	Performance (Response Time)	The API should return relatively quickly, within seconds
3	Security and Privacy (Database)	The system should protect against SQL injection
	Security and Privacy (User Data)	The system should prevent user information from leaking
	Security and Privacy (API)	The API key should be encrypted.

Table 2: Non-functional Requirements (Continue)

No	Actions	Requirements
4	Reliability (Backup)	The system should be backed up in case of information loss
	Reliability (Backend)	The API should handle error cases accordingly
		The database should handle type errors based on set conditions accordingly.
5	Accuracy (Information)	The system should keep the information displayed up to date
	Accuracy (Map)	The system should display the correct route for the trip
6	Response Time (API)	The API should return relatively quickly, within seconds

Within the requirements analysis for 'NimBus,' we incorporated functional, structural, and behavioral models, following the essential protocols of the SDLC. The functional models were articulated through use-case and activity diagrams, encapsulating core operations, functionalities, and user activities. On the flip side, structural models were constructed utilizing class diagrams, offering a glimpse into the system's organization, relationships (e.g., classes and relationships), and the configuration of data structures and modules. Behavioral models, illustrated through sequence diagrams and state machines, captured the dynamic interactions and responses between users and the application. Employed during the analysis phase, these models were instrumental in guiding the design and development trajectory of ‘Nimbus’ (Pressman & Maxim, 2014; Dennis, Wixom & Tegarden, 2020). Figure 3 presents a use case diagram of the application, demonstrating a visual representation of user interactions within the ‘Nimbus’ system.

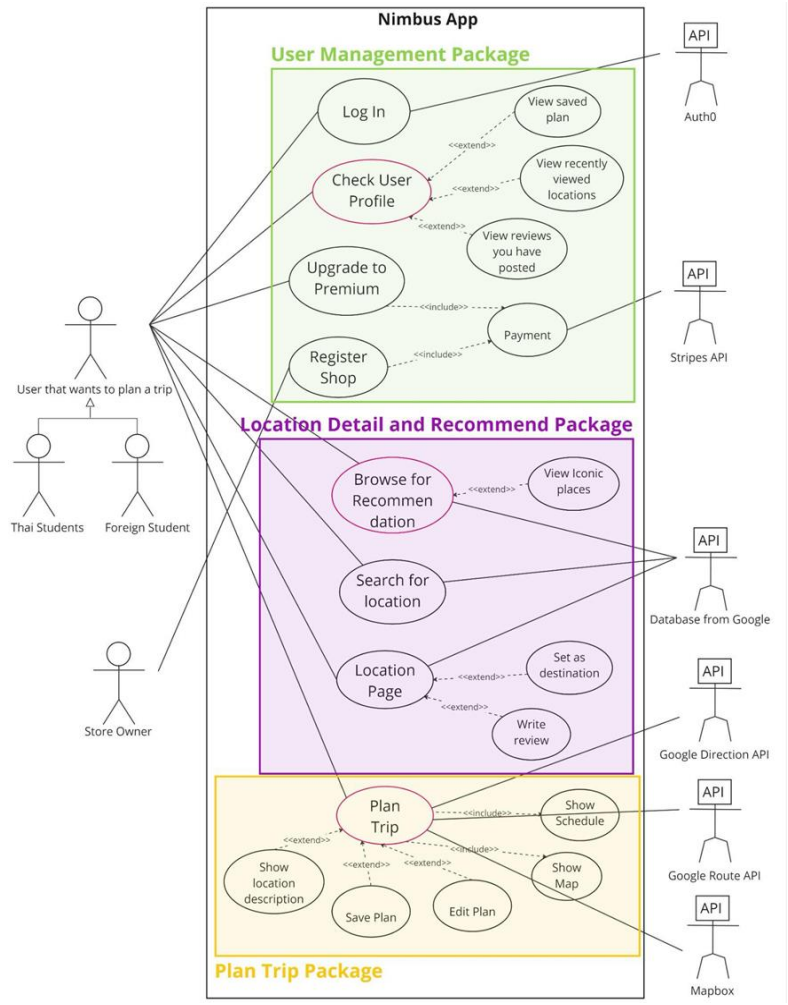

Figure 3: Use-case diagram

Design

The 'Design' phase signifies a pivotal juncture in the SDLC, serving as the crucible wherein system and software design specifications are meticulously sculpted, grounded on the requisites amassed during the preceding 'Requirements' phase. This phase envelops system architecture, database design, user interface design, and the delineation of technical structure. The overarching goal is to pave the way for the development of proficient, reliable, and robust software by pinpointing the requisite hardware and system configurations. An adeptly executed 'Design' phase lays the groundwork for seamless subsequent development and testing endeavors while bolstering software consistency, reusability, and modularity. In contrast, a haphazardly conducted design phase can spawn complications, inefficiencies, errors, and a slump in maintainability. Certain assumptions concerning backend capacity, frontend rendering, secure authorization, algorithm

performance, browser compatibility, and hardware specifications were formulated within this phase. Operational assumptions encompassed stable network connections and unbroken service availability.

Design standards predominantly revolve around consistency, intelligibility, and visual allure. Adhering to these standards, ‘Nimbus’ aligns with UX principles and embraces Nielsen and Molich's ten UI guidelines (Nielsen, 2020), manifesting a layout rooted in Gestalt principles to amplify comprehension and aesthetic appeal (Interaction Design Foundation, n.d.). Navigation, screen design, and layout were honed utilizing Miller's law with 7±2 items, acclimating to varying screen dimensions (Yablonski, 2020). These elements were conceived to aid users with suggestions and a step-by-step structured methodology, diminishing cognitive load and preventing potential errors. ‘Nimbus’ also unveils a map page mirroring real-world map utility, invoking Hick's law to pare down user choices and lessen mental effort during trip planning (Yablonski, 2020). The aesthetic framework of ‘Nimbus’ has been diligently curated to enrich the user experience. It brandishes a travel-inspired color palette embodying relaxation, with uniform styling and animations lending a pleasing and organic ambiance. Icons, elected for consistency and hailing from various libraries, were tactically dispersed throughout the platform to alleviate the cognitive load. Typography is woven into Nimbus's design standards, where font consistency is upheld using the sans-serif family. Specific fonts like Montserrat and Inter are earmarked for text elements such as titles, headers, buttons, descriptive text, engendering readability, and visual harmony across the platform (see Figure 4).

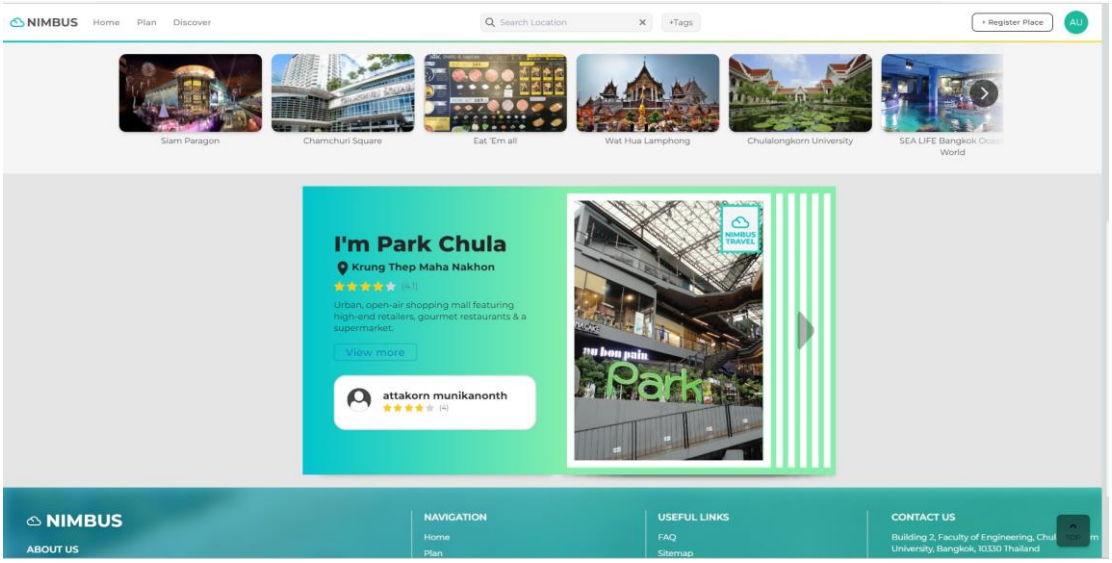

Figure 4: Nimbus, personalized trip application's location page layout

Upon delineating the use cases, the application's preliminary, low-fidelity user interface (UI) was conceptualized. This rudimentary blueprint epitomizes the app's features, layout, and user navigation pathway, encapsulating merely the quintessential elements such as screen displays and arrows to indicate navigation. The subsequent illustration exhibits a low-fidelity UI wireframe (see Figure 5) encapsulating all the accessible user pages. In the ensuing meeting with the product manager, the application's cardinal features were cherry-picked and honed into a medium-fidelity prototype (see Figure 6). These key features encompassed the home page, the plan generation page, the plan page, and the place registration page.

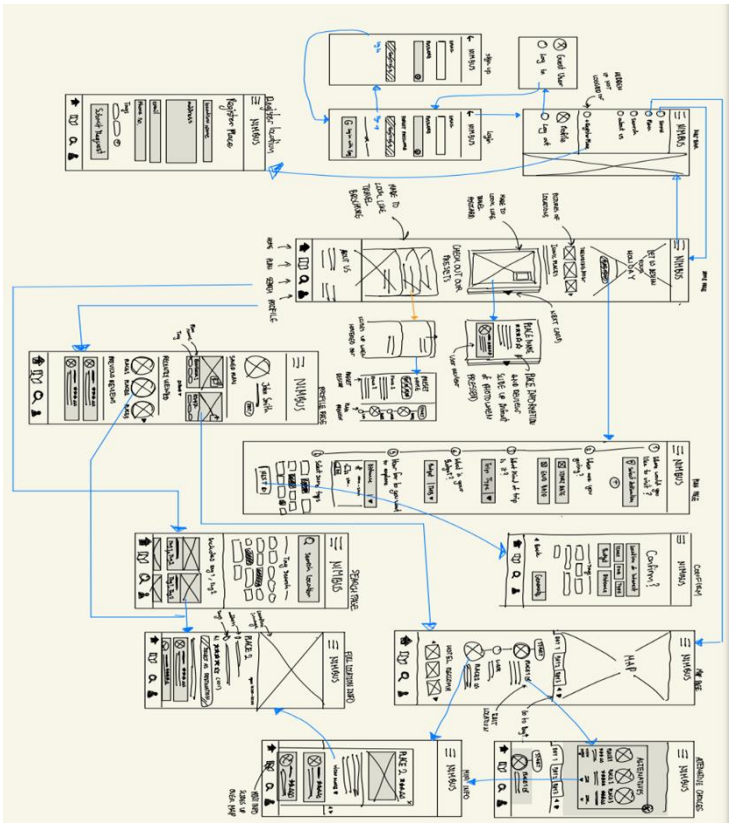

Figure 5: Low-fidelity UI Wireframe of 'Nimbus,' which includes all the pages the user could access.

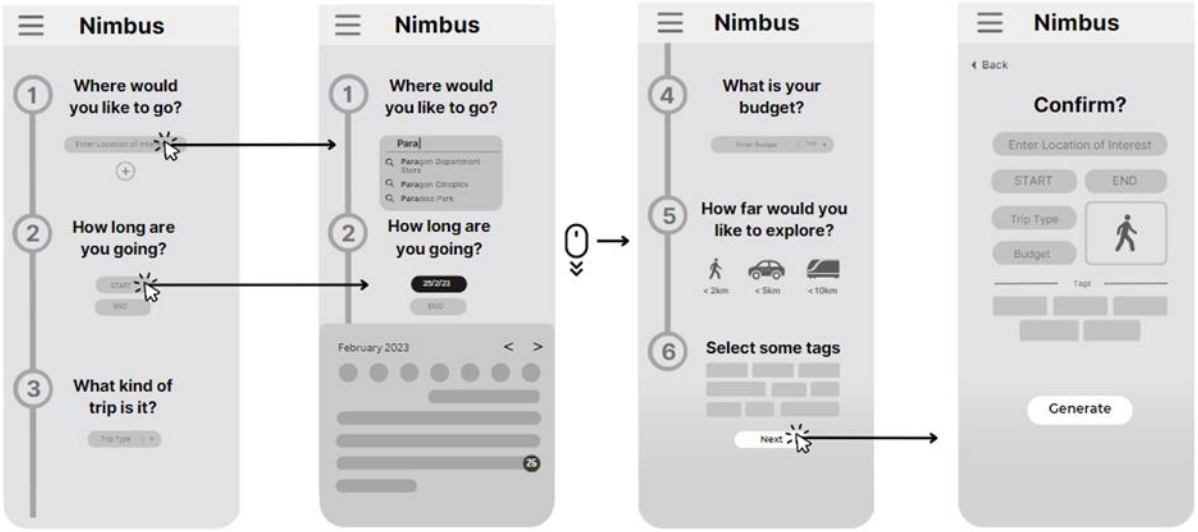

Figure 6: Low-fidelity design of 'Nimbus' (Plan Generation)

The usability testing undertaken for 'Nimbus' yielded pivotal insights, which steered the refinement of the interface, significantly enhancing the user experience with notable input from UX experts. This iterative process culminated in the development of polished, high-quality prototypes. The 'Home Page' elegantly showcases revered tourist landmarks and burgeoning local attractions within Thailand, spanning temples, malls, museums, and dining establishments (see Figure 7). Users are endowed with the flexibility to tailor their exploration through a keyword-search feature, allowing for inquiries based on interests such as 'art,' 'food,' or 'shopping.' In a more personalized vein, the algorithm-driven local attractions feature proffers curated suggestions of businesses, including restaurants, aligning with user preferences (see Figure 8). This feature endeavors to furnish users with bespoke, local travel experiences, fostering a more intimate acquaintance with the authentic essence of the destinations. The nuanced features and interface design of 'Nimbus' are expansively depicted in Figures 9 to 14.

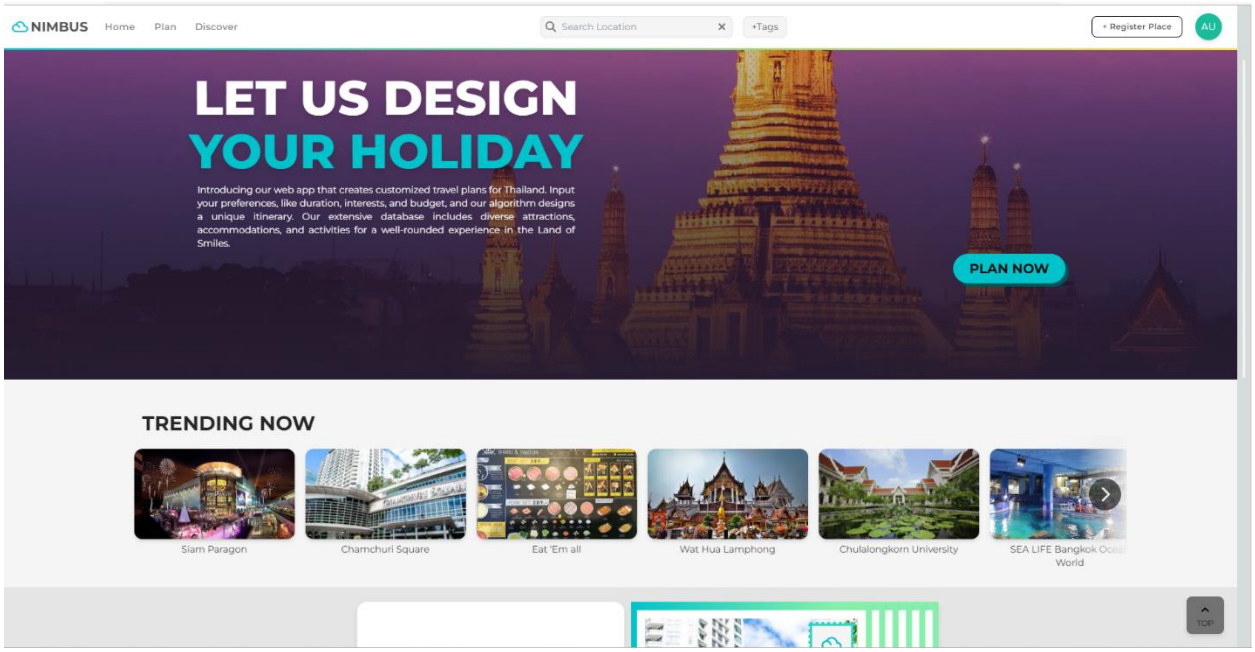

Figure 7: Captivating banner showcasing renowned tourist destinations in Thailand.

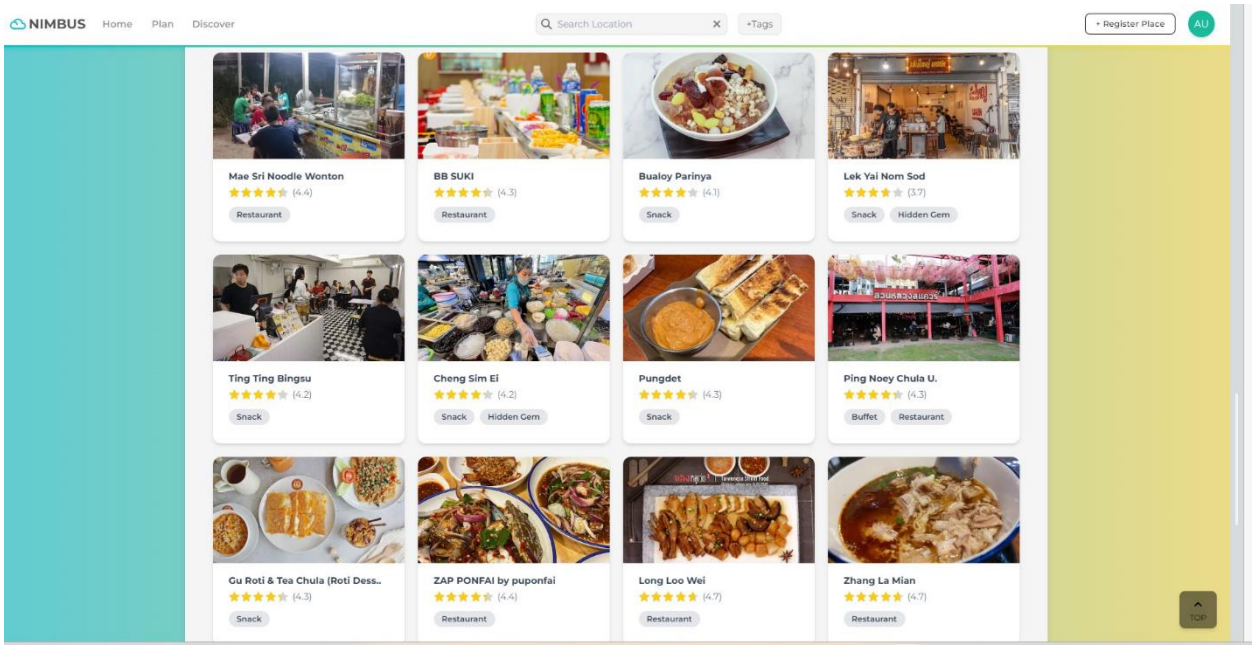

Figure 8: Algorithm-generated recommendations for local restaurants filtering based on user preferences and tags

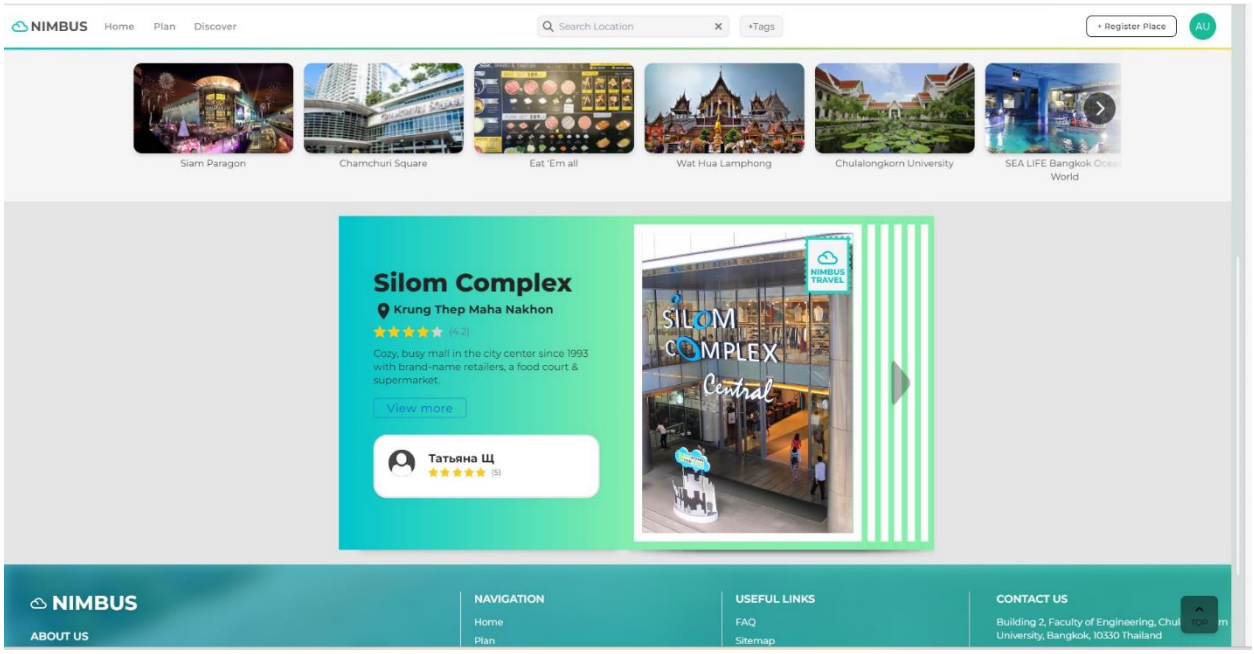

Figure 9: NimBus-recommended lesser-known local destinations with review information.

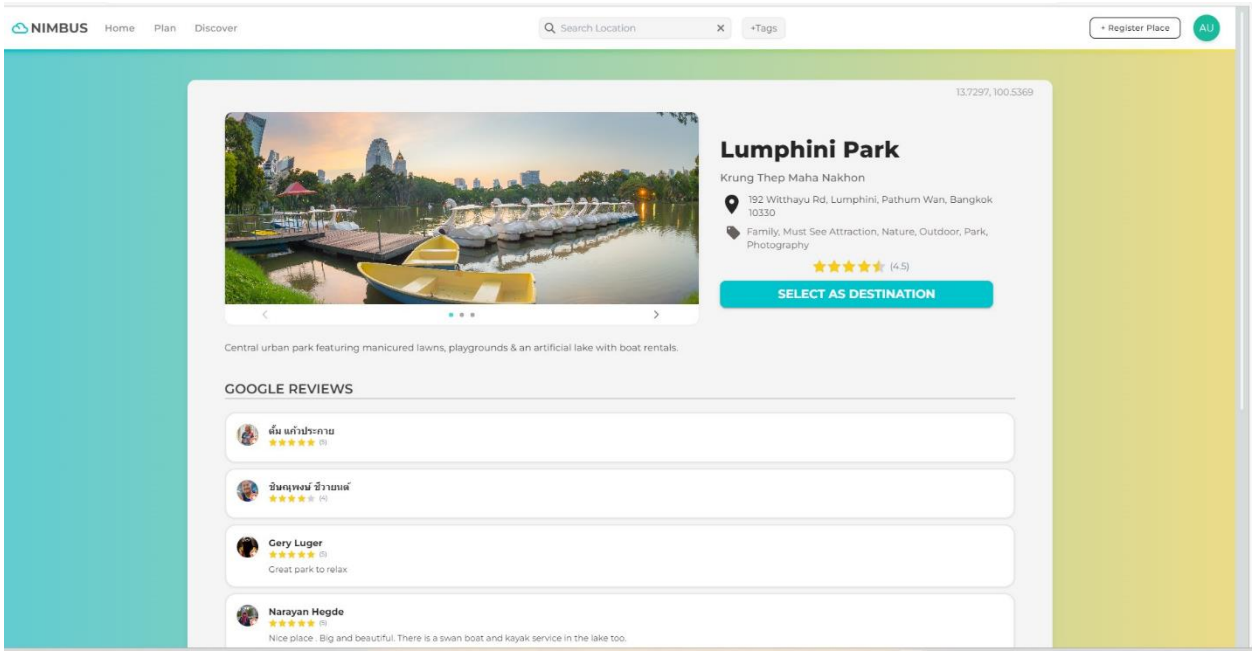

Figure 10: Expanded Google reviews of the NimBus-recommended lesser-known local destination.

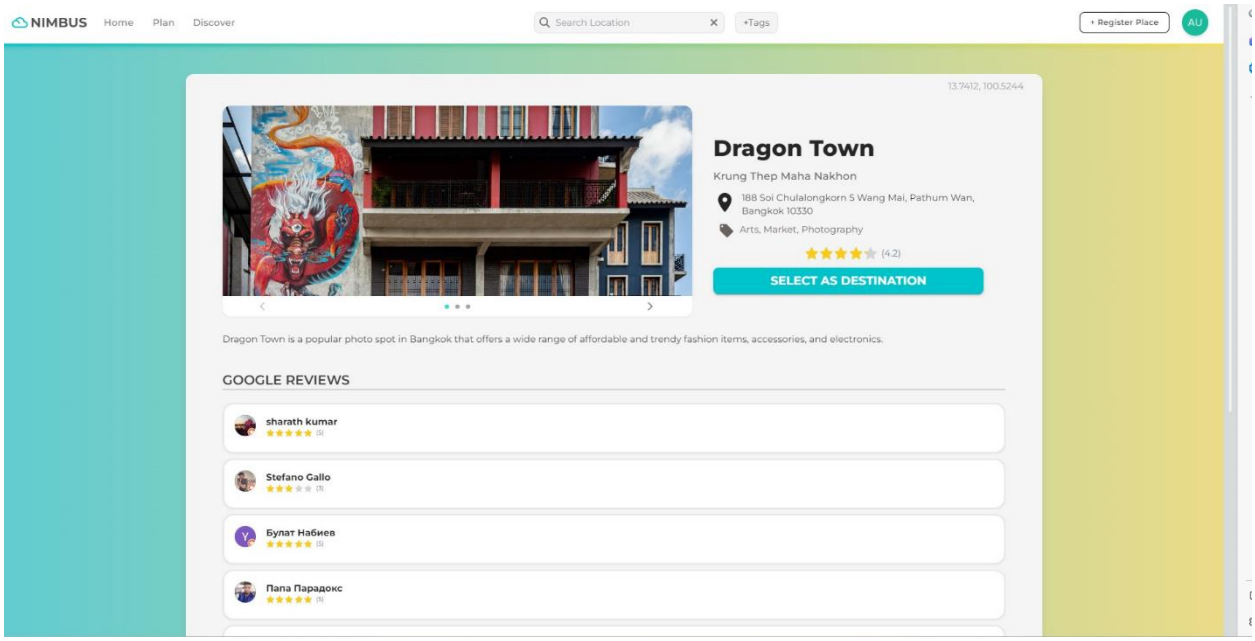

Figure 11: Expanded Google reviews of the NimBus-recommended lesser-known local destination.

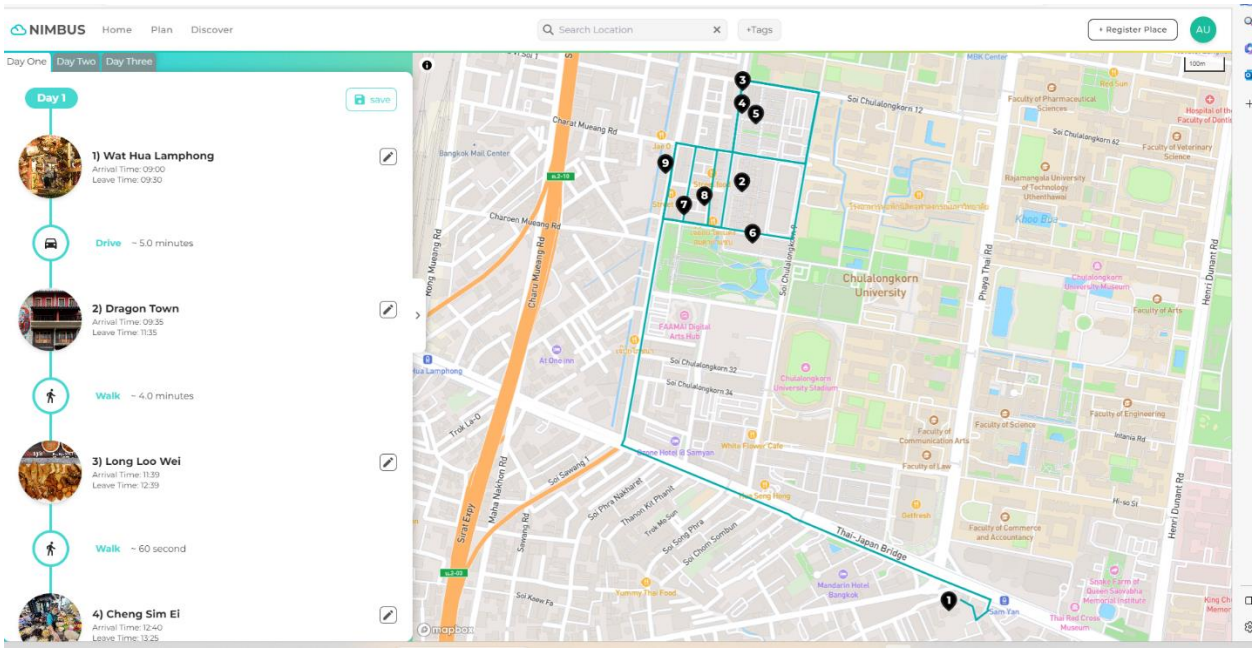

Figure 12: Visual representation of the trip plan and map

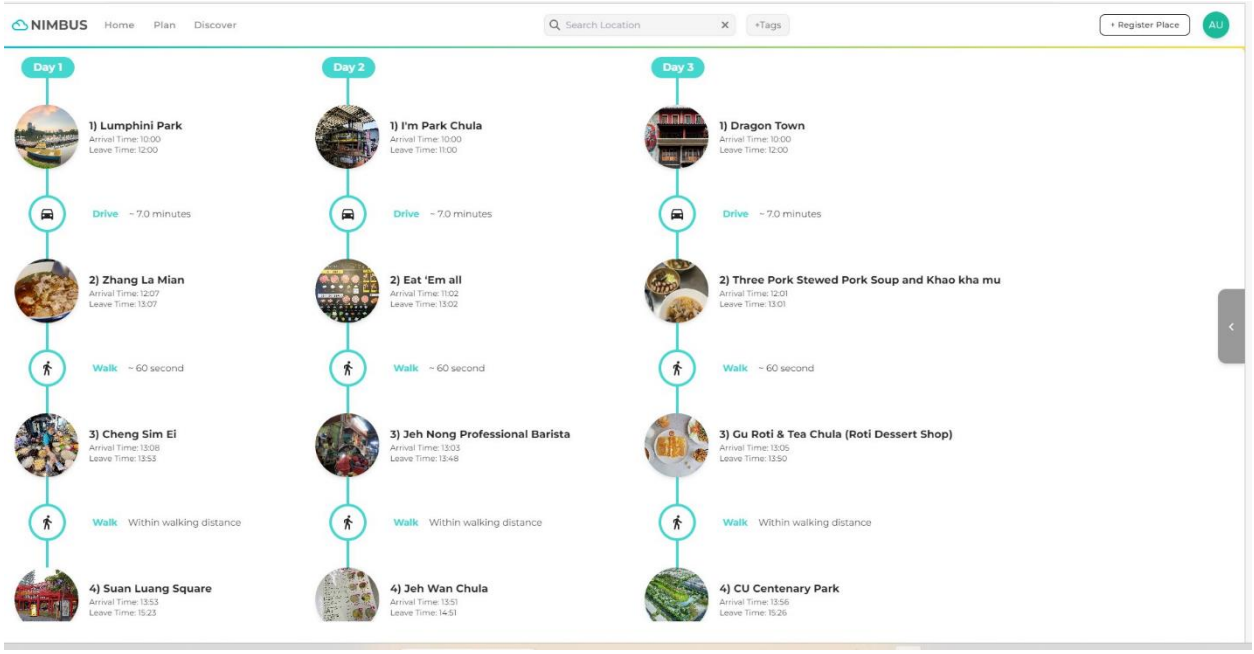

Figure 13: Overview of the trip plan.

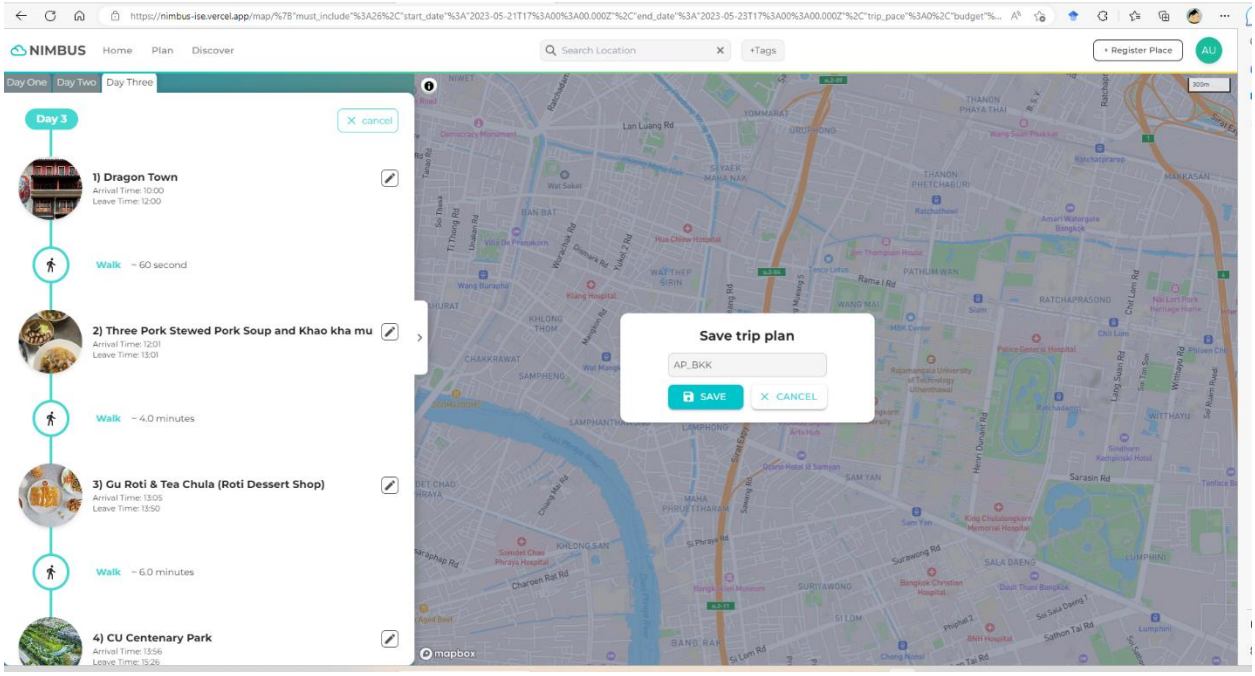

Figure 14: Saving the trip plan

Implementation

During the 'Implementation' phase of the Software Development Life Cycle (SDLC), the devised software design is meticulously translated into source code. This is achieved by adhering to the established coding guidelines and employing the programming languages, and technologies delineated during the planning phase. This stage encompasses the integration of software components, the execution of preliminary testing, and the rectification of any unearthed issues or bugs before advancing further. The crux of this phase lies in transforming the software design into a functional product that seamlessly aligns with the stipulated specifications.

Our system design capitalizes on a client-server framework coupled with a RESTful API, facilitating efficient interaction between users and servers. The frontend development, propelled by Next.js, embraces server-side rendering, thus elevating performance. The deployment of the front end on Vercel simplifies the management of servers and infrastructure. For the backend development, Flask was the chosen medium due to its simplicity, readability, and adept database connectivity, effortlessly amalgamating our personalized itinerary algorithm crafted in Python. The robust backing of Flask's developer community empowers us to architect a scalable web application, availing resources as required. Hosted on Google Cloud, our backend assures scalability and reliability, enriched by Cloud Logging and Monitoring tools, easing system management.

Our database, constructed using PostgreSQL on AWS, also provides a foundation for scalable and reliable data storage. As depicted in Figure 15, the system architecture encompasses three cardinal components: the algorithm, the database, and the website, each deployed on distinct platforms. The algorithm, conceived in Flask and deployed utilizing a WSGI server on Google App Engine, interfaces with the database through third-party libraries. Conversely, the website, engineered with Next.js and stationed on Vercel, liaises with the algorithm application via HTTP requests.

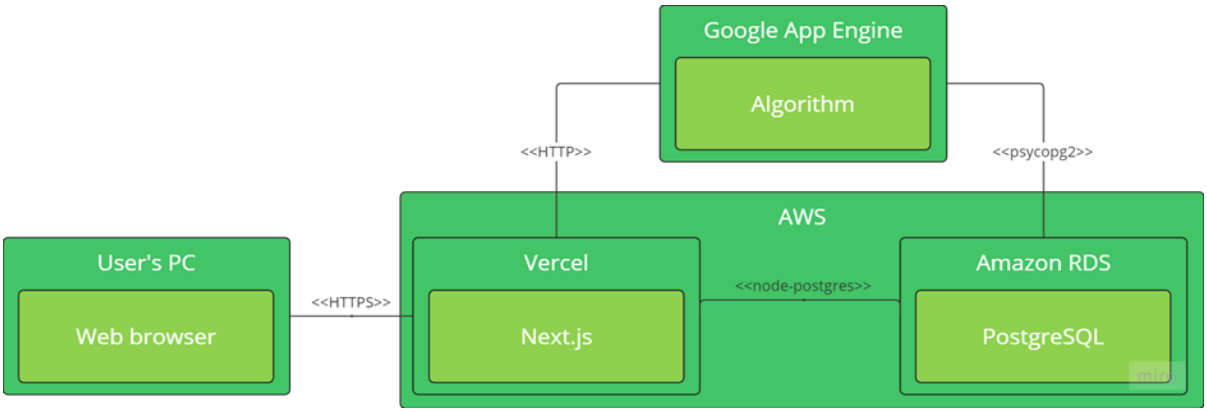

Figure 15: Physical Architecture Diagram

Software Testing and User Acceptance Test (UAT)

Software testing and User Acceptance Testing (UAT) play a vital role in the System Development Life Cycle (SDLC) because it promotes the creation of high-quality software that meets user needs and requirements. Testing detects and resolves bugs throughout development while improving functionality, reliability, and performance. UAT, conducted in the final stages of SDLC, allows end-users to validate the system's real-world suitability. Both types of testing are vital for minimizing project risk, enhancing user satisfaction, and facilitating successful deployment and adoption of the software. A comprehensive test plan was created for the 'Nimbus' application to evaluate its adherence to user requirements. Various testing techniques were employed, including unit testing using Storybook for isolated component testing, system testing with Cypress for automated end-to-end simulations, integration testing using Vercel's tools, and acceptance testing involving usability evaluations by the target demographic. Regression and security tests were also conducted to ensure system resilience against potential attacks.

Developing new features and functionality for 'Nimbus' undergoes tests to ensure they enhance the user experience before deployment. As the application nears completion, user acceptance testing was conducted, with each test case evaluating specific functions. A successful application that meets all test case expectations is deemed functional and user-ready. Planning for this process involved system resources, such as computational resources, stable internet connections, testing devices, and human resources, including developers, testers, and users. The multifaceted testing environment encompassed developer-led isolated case testing, automated functionality checks using Cypress, manual code reviews, and a final pipeline build for secure deployment to Vercel. Test deliverables included three stages: pre-testing (preliminary plans, cases, and pipeline), testing (system behavior, performance metrics, test refinements, user preferences, and improvements), and post-testing (results and reports). Specific use cases, like the 'Plan trip' case, offered insights into test cases and results. Successfully navigating a diverse range of test cases demonstrated the robustness and readiness of 'Nimbus' for real-world use. Its resilience in passing stringent tests highlighted its reliability as a dependable application that met technical criteria and fulfilled user expectations. With a solid foundation established through thorough testing, 'Nimbus' is

functional, user-ready, and positioned for ongoing refinement and evolution in the dynamic digital ecosystem.

Table 3: Test plan scope

Feature	Description
Plan trip	Users can plan a trip.
Edit trip	Users can edit trips and select among the three alternative locations, and the plan will adapt to accommodate the change.
Login	Users can create or log in to their account using an existing Google account or creating a new one with *Nimbus*.
Save trip	Users can save the generated trip plan into the database.
Profile page	Users can access the profile page and see their view history and previously saved plan(s).
Discovery	Users can discover a new plan.
Search	Users can search for the desired location.
Upgrade	Users can upgrade to the premium tier.
Filter by tags	Users can filter by tags.
Home page	Users can see and interact with trending and iconic places.
Delete account	Users can delete the account.

The ultimate stage of usability testing was a joint venture between the 'Nimbus' user research and the UX/UI teams. To ensure we had a fair sample, ten participants were enlisted, including six Thai university students, three international students, and a shop owner, in accordance with our designed personas and user target analysis. A blend of physical and online formats was used for the interviews. Participants were requested to consent for their interviews to be recorded and utilized for 'Nimbus' project development before each session. Each interview, which included 17 subtasks within three primary tasks (see Table 4), lasted around 30 minutes. Upon completing each primary task, respondents were asked three After

Scenario Questionnaire (ASQ) items and given a 5-point Likert scale. Subsequently, they were asked three additional questions to provide their impressions on the entire system's usability after all tasks were finished. Task completion times and interview responses were documented in a Google spreadsheet. The plan was assessed utilizing three distinct scoring methods: the System Usability Scale (SUS), the Post-Study System Usability Questionnaire (PSSUQ), and the Net Promoter Score (NPS). We used 5-point and 7-point Likert scales for SUS and PSSUQ, respectively, while a scale of 1-10 was used for NPS. Table 5 shows the ASQ results.

Table 4: Three preliminary tasks for the interview

Titles	Tasks
Major Task 1	Log in/Sign up function
	Look for an Iconic place and go through it.
	Search for the Location Details of a place called Chamchuri Square.
	Locate the Comment section of the review of Chamchuri Square.
	Set Chamchuri Square as a destination to visit
	Go back to the Home page.
Major Task 2	Create a trip plan.
	Find more details about Chamchuri Square on the schedule page.
	Change Samyarn Mitrtown to Siam Paragon for the location to visit.
	Show Schedule for Day 3
	Show Full Schedule
	Save Plan

Table 4: Three preliminary tasks for the interview (Continue)

Titles	Tasks
Major Task 3	Go to the User Profile Page
	View your saved plan.
	Visit the Chamchuri Square location page you visited before through this page.
	Request to register your store or place it into the system.
	Find the sign-out function.

Table 5: ASQ results

Major task	Question	Average score
1	Overall, I am satisfied with the ease of completing the task in this scenario.	4.60
	Overall, I am satisfied with the amount of time it took to complete the task in this scenario.	4.70
	Overall, I am satisfied with the support information (online help, messages, documentation) when completing the task.	4.40
2	Overall, I am satisfied with the ease of completing the task in this scenario.	4.10
	Overall, I am satisfied with the amount of time it took to complete the task in this scenario.	4.20
	Overall, I am satisfied with the support information (online help, messages, documentation) when completing the task.	4.20
3	Overall, I am satisfied with the ease of completing the task in this scenario.	4.70
	Overall, I am satisfied with the amount of time it took to complete the task in this scenario.	4.70
	Overall, I am satisfied with the support information (online help, messages, documentation) when completing the task.	4.30

The System Usability Scale (SUS), Post-Study System Usability Questionnaire (PSSUQ), and Net Promoter Score (NPS) were used to evaluate Nimbus's usability. The SUS, a 10-item questionnaire measuring usability aspects such as ease of use and satisfaction, resulted in an average score of 87.5/100 for Nimbus, placing it in the 96th -100th percentile with an A+ grade. The PSSUQ, a 16-item questionnaire assessing usability satisfaction, scored 1.70 for Nimbus, indicative of a good performance, with lower scores being preferable. Lastly, the NPS, a metric of customer loyalty based on the likelihood of recommending a product or service, scored 'Nimbus' at +50%, with 60% of participants being promoters and 10% detractors, suggesting a strong propensity for users to recommend the application. Participants in the final usability test commended the ease of use and high satisfaction levels while interacting with the system, attesting to its successful design.

Nevertheless, valuable feedback was gleaned, highlighting areas like button clarity and mobile interface optimization, where enhancements could further elevate user experience. The user research team painstakingly analyzed and synthesized all responses and test results, ensuring no insights were untapped. This information was meticulously relayed to the developer team, facilitating a roadmap for final refinements to the 'Nimbus' web application. Beyond mere adjustments, this process fostered an ongoing dialogue between user feedback and technical implementation, embodying a user-centric design philosophy. It's our conviction that this iterative process of constant learning and refining, rooted in user experience, will position 'Nimbus' as an adaptable, intuitive platform that delivers unrivaled user satisfaction. Through these concerted efforts, we aspire to corroborate that every interaction with 'Nimbus' embodies seamless functionality, efficiency, and delight, creating an unparalleled user journey. Figure 16 shows the PSSUQ results.

The qualitative findings unveil a generally favorable user perception of the UI design and constructive suggestions for enhancements and additional features. Most users found the interface straightforward to learn, albeit some pointed out areas needing refinement for better intuitiveness, such as clarifying the 'view full plan' function and improving the 'flow of function.' One user highlighted the iPhone 11 screen ratio as a concern. A significantly appreciated feature was the ease of adjusting recommended locations, showcasing a preference for personalized user experiences. Users also lauded the 'alternative function' and the provision of multiple location suggestions, indicating a penchant for variety and exploration. The feedback underscores a demand for social interaction and detailed contextual features. Suggested improvements encompassed sharing plans with friends, displaying location images

when hovering over map pins, and the ability to copy location names for Google searches. According to users, these enhancements would enrich the user experience by fostering social sharing and offering more contextual location information.

In light of users' fondness for discovering 'hidden gems' and exploring 'local foods and shops,' the features above could serve as conduits to unearth lesser-known spots and businesses. Moreover, users expressed an affinity towards Nimbus' recommendation features for uncovering lesser-known travel destinations in Bangkok, finding value in the application's capability to introduce them to new locales. This aspect resonates with the general inclination towards personalized experiences and exhibits the potential to drive local exploration and discovery further. Enhancing these UI elements can substantially augment discovery and local exploration, potentially escalating user engagement and satisfaction.

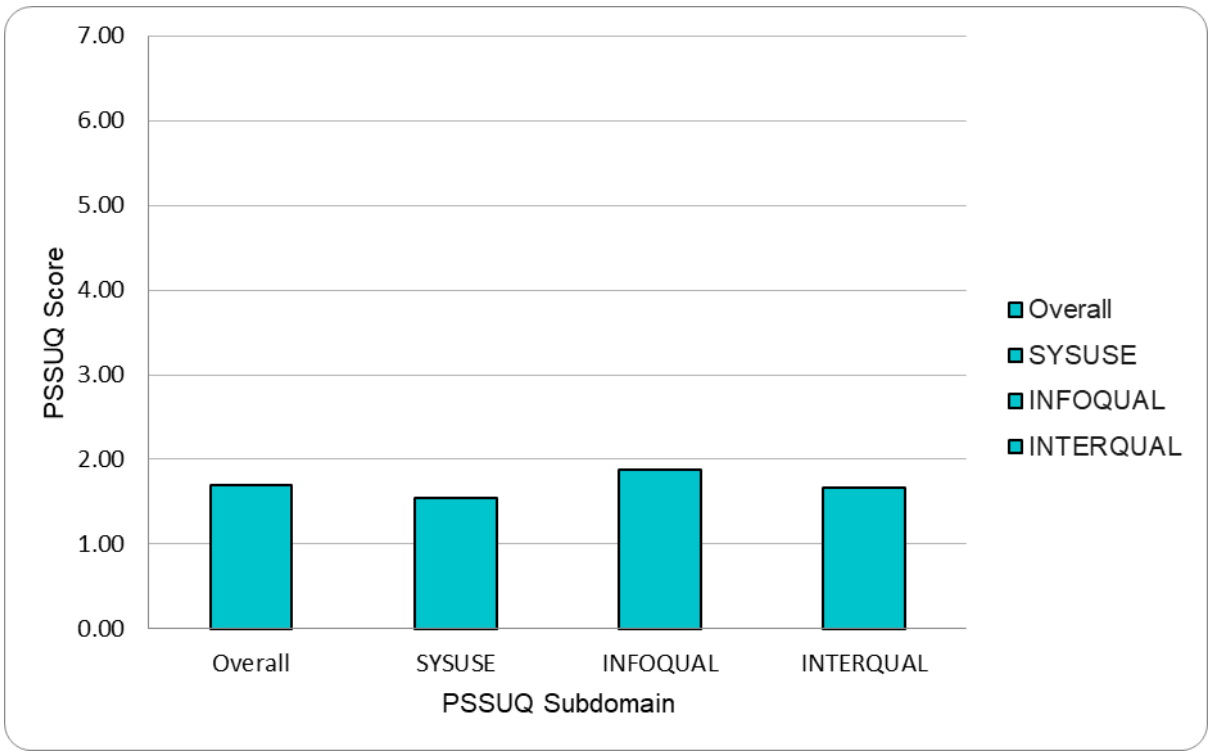

Figure 16: PSSUQ results

Based on the findings, the ‘Nimbus’ application has gained positive reception due to its user-friendly interface and intuitive design. High user acceptance and satisfaction reflect Nimbus's effectiveness as a trip planning tool. Users find it easy to use and appreciate its seamless functionality, showcasing the success of its design. Despite strong user approval,

areas like button clarity and mobile interface optimization are identified for enhancement. The ‘Nimbus’ team values this feedback and maintains a user-centric approach, continuously refining the application to meet user needs better. This commitment to ongoing improvement, grounded in user feedback, allows ‘Nimbus’ to adapt and deliver an unrivaled user journey. Their focus on ensuring a seamless, efficient, and delightful user experience set ‘Nimbus’ as a premier choice for trip planning.

Discussion

The exploration of usability and user experience in the context of travel applications provides essential insights into technology's potential contribution to the tourism sector, particularly in Thailand. The extensive use of SDLC and software methodologies, such as parallel and prototyping, has proven instrumental in understanding the underlying functionalities, reliability, and overall performance of travel applications, exemplified by our study on the ‘Nimbus’ application. Also, the meticulous testing mechanisms deployed greatly enhanced the reliability of 'Nimbus,' establishing it as a trustworthy travel assistant. These comprehensive tests demonstrated the application's resilience and readiness for real-world scenarios, enhancing user confidence, acceptance, and adoption. These testing strategies, from unit testing to user acceptance tests, were critical in ensuring that the application effectively catered to end-user requirements, ultimately contributing to enhanced user experience and satisfaction.

Nimbus, a travel app, has enhanced its stringent testing protocols with the use of robust evaluation instruments, such as the System Usability Scale (SUS), Post-Study System Usability Questionnaire (PSSUQ), and Net Promoter Score (NPS). These instruments provide crucial insights into the app's usability and user satisfaction levels. The favorable SUS and PSSUQ scores signify Nimbus' effective usability and satisfactory user experience. These high scores fortify its standing as a top-notch travel application, endorsing its exceptional user interface and functionality.

Similarly, a high NPS score denotes a strong propensity among users to recommend the app to others. This highlights the app's usability and its potential to cultivate a dedicated user base, an essential attribute for any successful application. These aspects prop up Nimbus as a leading travel application, establishing a high benchmark for user experience in the sector.

Concerning Nimbus's contributions to Thailand's tourism landscape, it is a potent tool in elevating the travel experiences for both domestic and international tourists. The app simplifies trip planning and navigation by providing an exhaustive database of destinations, promoting a more delightful and convenient travel journey. This resonates with the ongoing shifts in the tourism sector, where the appetite for personalized and efficient travel solutions is on the rise.

Moreover, the adoption of Nimbus within the tourism realm can significantly uplift Thailand's tourism by drawing in a broader spectrum of tech-savvy tourists. This, along with the user-oriented design ethos and sturdy functionality of Nimbus, aligns with the unfolding dynamics of the tourism sector, catering to the growing demand for personalized and efficient travel solutions. Nimbus, laden with dependable features and superior user experience, can be pivotal in spotlighting Thailand's hidden treasures and bolstering the nation's SMEs, especially those connected to the tourism sector. To begin with, Nimbus's broad spectrum of locations can be harnessed to highlight lesser-known attractions in Thailand. Showcasing these "hidden gems" on the app could entice both local and international tourists to venture beyond the customary tourist spots, thereby broadening the tourism narrative in the country. Discovering new territories can reveal distinctive cultural, historical, or natural landmarks that might have been overlooked otherwise.

Additionally, by shining a light on these less explored locales, Nimbus can invigorate local economies and directly favor SMEs. Enhanced tourist influx can broaden these businesses' customer base and pave the way for economic advancement. This holds particular significance for SMEs reliant on tourism, like local hospitality entities, eateries, tour guides, and artisanal shops.Additionally, Nimbus's user-centric design philosophy and robust functionality cater to the evolving dynamics of the tourism industry, where personalized and efficient travel solutions are increasingly in demand. This aspect of the application is particularly beneficial for tech-savvy travelers, expanding the range of tourists drawn to Thailand. Finally, adopting a technologically sophisticated travel tool like ‘Nimbus’ within the tourism sector can significantly enhance Thailand's global competitiveness. By setting a high standard for user experience, ‘Nimbus’ not only improves individual travel experiences but also contributes to the overall growth and development of the tourism sector in Thailand. This promotes a positive cycle of improvement and innovation that further strengthens the tourism industry and its SMEs. Our findings underscore the critical role of usability and user experience testing

in developing travel applications. This guarantees a robust and reliable application and enhances users' satisfaction and loyalty. Moreover, adopting such technology signifies a significant stride toward the digital transformation of Thailand's tourism sector, presenting an exciting avenue for future research and development.

The study has primarily focused on the usability and user experience of the 'Nimbus' application and has identified potential extension areas to enhance the platform's functionality further. While the current phase did not include features for store or business owners, this opens an exciting avenue for enriching local commerce engagement within the app, set to be explored in the next phase. The introduction of metrics to assess the system's effectiveness in revealing hidden gems and supporting local businesses is acknowledged as a valuable addition and is planned for integration in Phase 2. Additionally, harnessing user feedback to refine the machine learning model and improve trip planning outcomes has been recognized as a pivotal step forward, with upcoming implementations aiming to further align the app's offerings with user preferences and local discovery. The revenue model for Nimbus 2.0 includes in-app purchases and business partnerships, commencing with a free initial launch. A detailed cost analysis is essential to address the costs related to API requests and cloud services, ensuring alignment between the Use-case diagram and functional requirements. This analysis will also aid in setting up proper performance metrics, utilizing user data for improvements, and understanding the system's cost and revenue strategies moving forward.

Software Installation, Deployment, and Operation

'Nimbus,' a web-based platform, can be accessed via supported web browsers, including Chrome 64+, Edge 79+, Firefox 67+, Opera 51+, and Safari 12+. Its deployment involves a tripartite architecture, each component using its ideal technology stack: the Algorithm API, Database, and Frontend/Backend logic. The Algorithm API is built with Flask, a Python web framework, and deployed on Google App Engine via a WSGI server, ensuring optimal load management. Amazon RDS hosts the PostgreSQL database, providing efficient transaction management, scalability, and robust security features. The Frontend/Backend logic is constructed on the Next.js framework and deployed via Vercel, a developer-friendly platform offering automated deployment, static page generation, and serverless functions.

Regarding operations, 'Nimbus' will continuously improve its algorithm based on user feedback. Routine database backups will be maintained, and server performance will be

monitored and optimized. The database will be regularly updated with new locations for maintenance, and user submissions will be reviewed and added accordingly. Regular dependency updates will also be conducted to maintain security, and any codebase changes will be carefully managed to ensure continuous functionality. Support measures include monitoring and addressing bug reports submitted by users, with a dedicated report channel accessible in the page footer. We welcome feedback and provide an email address for users to voice their concerns or suggestions. This feedback loop is instrumental in refining our platform and enhancing the user experience.

Research Agenda (NimBus 2.0)

Our research agenda centers on upgrading our application's functionality and reach, building on the successes of our initial version. A key focal point is refining our User Interface (UI), using cutting-edge tools like heat maps and A/B testing to foster an even more intuitive, visually pleasing, and user-centric environment. Furthermore, the team is delving into advanced personalization features, leveraging machine learning algorithms to provide intelligent, tailored recommendations based on users' past travels, ratings, and peer input.

The research also intends to expand NimBus's coverage geographically, integrating locations across Thailand beyond Bangkok. User surveys, tourism statistics, and trend analysis will assist us in pinpointing and incorporating the most desired, unique destinations in Thailand. A significant study area will be advertisement and marketing strategies, identifying potent methods of elevating NimBus's visibility through channels like social media marketing, partnerships with local tourism agencies, and SEO techniques. This exploration extends to investigating our current marketing efforts, evaluating their efficacy, and innovating ways to enhance their impact.

Our research agenda includes revenue generation and monetization strategies for sustainable operation and growth. Ideas include adding premium, value-added features, initiating beneficial partnerships with establishments such as hotels and tourist attractions, implementing in-app purchases, and even exploring the viability of a subscription-based model. As we grow and house more user data, more emphasis will be placed on user privacy and data security. We will delve into understanding legal requirements in different markets and industry best practices and employ sophisticated encryption methods to guarantee data integrity and maintain user trust.

An exciting avenue of exploration is the potential expansion into the international market. We will scrutinize market trends, regulatory prerequisites, and the necessary cultural adaptations to eventually make 'Nimbus' a multilingual, culturally aware global trip-planning tool. Concurrently, we'll identify potential partners in travel and hospitality, such as airlines and local tourism agencies. This will involve studying successful collaboration models and creating structures for mutually beneficial agreements. Our vision with this research agenda is to guide NimBus's evolution into a pioneering platform that doesn't just cater to Thailand's tourism sector. Still, it extends its influence globally, revolutionizing how travelers plan and experience their journeys. We outline the research agenda as follows.

Table 6: Research Agenda

Date	Research Tasks
October 2023	Refine NimBus's User Interface (UI) using heat maps and A/B testing.
	Research advanced personalization features and machine learning algorithms.
November 2023	Continue refining UI and start implementing machine learning algorithms for personalized recommendations.
	Conduct geographical expansion research, focusing on integrating more locations in Thailand.
December 2023	Start implementing geographical expansion based on research findings.
	Launch research into advertisement and marketing strategies, including social media marketing, partnerships, and SEO techniques.
January 2024	Implement refined UI and incorporate personalization features.
	Apply findings from advertising and marketing research to enhance marketing efforts.
	Initiate research on revenue generation and monetization strategies.
February 2024	Roll out advertising and marketing strategies based on research findings.
	Initiate the implementation of revenue generation strategies.
	Research user privacy, data security, and legal requirements in different markets.
March 2024	Implement revenue generation strategies such as premium features, in-app purchases, and partnerships.
	Begin initiatives for data security and privacy based on research findings.
	Start exploring potential expansion into the international market, scrutinizing market trends and regulatory prerequisites.

Throughout the timeline, feedback should be consistently collected and analyzed to facilitate further improvements and ensure user satisfaction. By March 2024, ‘Nimbus’ should be well-positioned to become a multilingual, globally recognized trip-planning tool.

Conclusion

This study outlines the creation and implementation of ‘NimBus,’ a web application designed to enhance the visibility of lesser-known Bangkok destinations and local SMEs. Utilizing the system development life cycle (SDLC) methodologies, we ensured a streamlined, user-friendly interface that fosters personalized user experiences. Following a comprehensive testing regime, ‘Nimbus’ proved reliable, functional, and accessible. The research emphasizes the role of such interactive applications in revitalizing the post-COVID-19 tourism sector and supporting local SMEs. ‘Nimbus’ demonstrates how technology can transform tourism and provide SMEs with innovative outreach mechanisms. The study evidences the benefits of such web applications, with ‘Nimbus’ catalyzing enhancing local tourism and empowering businesses. Looking ahead to our research agenda 2.0, we aim to further develop ‘Nimbus’ in line with user feedback and digital trends, incorporating features like Virtual Reality tours, real-time language translation, and transportation integration. We plan to broaden the scope of ‘Nimbus’ to national levels, supporting tourism and SMEs across Thailand. This project thus exemplifies the transformative potential of ICT in tourism and SMEs, setting the stage for future industry-focused digital initiatives.

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Stress resistance Among Junior Miiddle School Students in Chongzuo City, China and Development of Guidelines to Enhance Stress Resistance

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Abstract

Students' stress resistance is fragile. The research objectives are 1) To study the level of stress resistance among junior middle school students; 2) To examine differences in middle school students' stress resistance based on nine demographic variables; 3) To develop guidelines to enhance stress resistance among junior middle school students. This study applied a mix-method approach. 323 students were collected by random stratified sampling in Chongzuo City, China in quantitative research and 10 students and 5 teachers participated in the interviews, using purposive sampling method. The data were analyzed by descriptive statistics, t-test, one-way ANOVA, Pearson's coefficient correlation, and stepwise multiple regression analysis. The data from the interviews were analyzed by content analysis.

The research findings are: 1) The overall students' stress resistance was at moderate level (Mean=3.21). 2) There were significant differences on students' stress resistance based on gender (P=0.21). 3) The correlation was positive between students' stress resistance and academic performance (P<.05). 4) Gender and academic performance were recognized as predictive factors which had significant effect on students' stress resistance in junior middle school (β=-.134 & .130 respectively). 5) Guidelines for enhancing students' stress resistance were developed, focusing on three factors: family factor, school factor and students themselves factor.

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A comparative study should be conducted with more samples on similar topic and could eliminate less relevant factors and explore new ones such as peer relationship, attitude of students towards learning, parents' educational background to get more different findings for future research.

Keywords: Junior Middle School Students, Stress Resistance, Guidelines

Introduction

Students in adolescence are prone to various psychological crises due to the imbalance of physical and mental development. Extreme behaviors such as teenagers' suicide, bullying on campus, are commonly seen in nowadays life and the problems mentioned above pointed to the "fragile" ability of students' stress resistance. Therefore, it is particularly important to pay attention to stress resistance among junior middle school students and develop guideline to enhance students' stress resistance. The study aims to study the level of stress resistance among junior middle school students, to examine differences in middle school students' stress resistance based on nine demographic variables and to develop guideline to enhance stress resistance among junior middle school students. It applied a mix-method approach with a sample of 323 students in quantitative research and 15 informants in the interview. The data in quantitative research were analyzed by descriptive statistics, t-test, one-way ANOVA, Pearson's coefficient correlation, and stepwise multiple regression analysis and the data from the interviews were analyzed by content analysis.

Literature Review

This chapter is designed to present literature support for studying the level of stress resistance among junior middle school students, examining differences in middle school students' stress resistance based on nine demographic variables and developing guidelines to enhance stress resistance among junior middle school students.

The physical and mental developmental characteristics of junior middle school students

Junior middle school students are those who are attending middle school. Junior middle school students, who are in their adolescence periods, possess an imbalance between their physical and mental development. This imbalance forms four main contradictions between the physical and mental development of junior middle school

students. They are: the contradiction between the rapid growth of self-consciousness and the relative delay in social maturity; the contradiction between a strong desire for knowledge and low recognition ability; the contradiction between emotion and reason; the contradiction between ideals and reality. And all these contradictions can lead to distress and frustration among junior middle school students.

Stress

The definition of stress

Stress is a commonly used term that refers to a state of mental or emotional strain resulting from adverse or demanding circumstances. According to Lazarus and Folkman's (1984) transactional model of stress, stress is defined as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Cohen et al., 2017). McEwen (2017) defined stress as a psychological and physiological response to an external or internal stressor that disrupts the body's homeostasis and requires adaptation to restore balance. Stress is a psychological and physiological response to a real or perceived threat or challenge, which can be either acute or chronic, and involves a complex interplay between the individual and their environment (Cohen et al., 2018; McEwen & Lasley, 2019). Robbins' stress theory model suggests that stress is a dynamic situation consisting of environmental, organizational and individual factors, and that individual differences in these factors are the cause of manifest feelings of stress, with the corresponding outcomes consisting of physical, psychological and behavioural symptoms (Robbin & Judge, 2011). To sum up, stress is the physiological and psychological stress that develops in individuals in response to environmental stimuli, and the degree of stress varies from individual to individual.

Stressors

Stressors can be defined as environmental, psychological, or physiological stimuli that produce a stress response in an individual (Cohen et al., 2017). Stressors can include a wide range of events, such as life changes, work-related stressors, social stressors, and traumatic experiences (Slavich & Shields, 2018). Researchers have identified a wide range of stressors that can have negative effects on physical and mental health, including job stress, financial stress, relationship stress, and caregiving stress (Cohen et al., 2017; McEwen, 2017). In recent years, there has been an increasing focus on the role of environmental stressors in shaping health outcomes, particularly in relation to

socioeconomic status and health disparities (Chen & Miller, 2013; Geronimus et al., 2015). Stressors can be classified as internal or external. Based on these, nine stressors or independent variables that are related with demographic are included in this research, which include gender, grade, place of origin, academic performance, only child or not, class cadre or not, family financial status, family type and family parenting style. contemporary junior middle school students face two sources of stress: external and personal factors. External factors include academic stress, the stress of examinations, interpersonal stress and family issues. The personal factor is mainly linked to the personality traits, which arise from the contradictions because of the imbalance physical and mental development of junior middle school students (Zhang, 2016).

Stress faced by contemporary junior middle school students

Robert Agnew's general strain theory mainly discusses the relationship between stressors, negative emotions and transgressive behaviour and delinquency, constructs a theoretical model of stressors, negative emotions and transgressive behaviour, explains the causes of adolescent transgressive behaviour and provides a theoretical basis for preventing the occurrence of adolescent transgressive behaviour (Agnew, 2006). The American Psychological Association (APA) found that the top five reasons for stress were: financial issues (money), career responsibilities (work), family responsibilities, personal health issues,and family health issues. Overall, women reported more stress than men (and the gap has been widening), and children appeared to model their stress behaviors from their parents (who are very stressed) (APA, 2015). Academic-related stress can reduce academic achievement, decrease motivation and increase the risk of school dropout (Michaela et al., 2019). Khadijah et al., (2013) found that higher stress scores were significantly higher among older students (20 and above), females, Malays and those whose family had either low or high incomes compared to those with middle incomes. Kotter et al., (2017) found that grades, homework, and preparing for college were the greatest sources of stress for both genders, and that there was only one gender difference in sources of stress: grades were experienced as a significantly greater source of stress for females compared to male students.

Stress resistance

Vardanyan (2008) defined stress resistance as a special interaction of all components of mental activity, including emotional ones. Khutornaya (2009) defined stress resistance as an integrative part of the psychology of a person, which includes: personal component, that determines the development of cognitive, motivational, emotional and regulatory functions, and behavioral component, that includes the actualisation and application of anti-stress strategies. For Susan Simpson (2018), stress tolerance or resistance is the ability to withstand pressures and strains without collapsing, maintaining an effective level of functioning and a minimum degree of anxiety in conditions that for most people would be stressful or overwhelming. Kohut (2021) definition of stress resistance is as a complex integrative systemic property of personality, where the components of its structure (psycho physiological, emotional, cognitive, volitional) are in a certain ratio and form a holistic structure---a stable internal organization that determines the quality and development of the system. To sum up, stress resistance is the psychological ability of a person to withstand pressures and strains with the help of emotional, cognitive and volitional qualities, maintaining an effective level of functioning and a minimum degree of anxiety in conditions that for most people would be stressful or overwhelming.

Basic researches on stress resistance among junior middle school students in China

Sun et al. (2013) identified factors associated with perceived educational stress among students in China, founding that rural school location, low school connectedness, perceived poor academic grades, female gender, older age and frequent emotional conflicts with teachers and peers were among the strongest correlates, and that most of them are school- or study-related. Academic stress was not significantly related to extrinsic motivation and suggested that reducing academic stress can increase students' intrinsic motivation and reduce their motivation (Liu, 2015). The negative impact of academic stress was not limited to individual psychological health, but extended to social relationships with peers and to attitudes toward authorities and society at large (Xu, 2015). Yuan et al., (2017) found that thinking styles had statistically significant predictive power for academic stress-coping strategies beyond age and gender, largely in the expected directions. Academic stress was consistently the strongest risk factor for depression and anxiety. Grade level, academic performance and gender were found to be the strongest variables predicting academic stress, depression and anxiety symptoms respectively (Fan, 2017). In

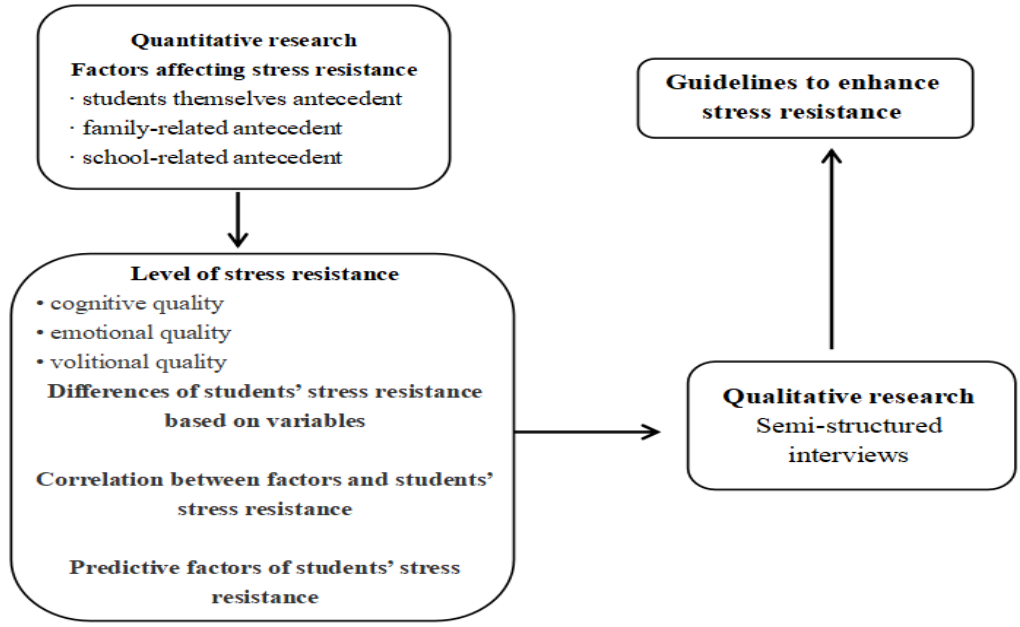
2014, Yang published a journal paper on the causes of low stress resistance and frustration tolerance in junior middle school (Yang, 2014). Yu (2016) pointed out that adolescents have a weak psychological resistance to stress due to the limitations of their physical and mental development levels and the influence of some phenomena in society, and proposed to study the methods of frustration education for secondary school students in four areas. Zhang (2017) pointed out that modern middle school students had been sheltered by their families for a long time and lacked the ability to resist stress in facing difficulties and setbacks by themselves, and suggested that frustration education should be incorporated into language education teaching to cultivate students' psychological ability to cope with setbacks, failures and stress in a subtle way. Li (2018) pointed out that junior middle school students, as the "preparatory army" for social construction, inevitably face stress from society, school and family. Learning problems and goal achievement problems were the main sources of frustration and stress for junior middle school students (Ding, 2018). Gao (2020) pointed out that psycho-social problems, the influence brought by direct interests and interpersonal interactions are the reasons for students' psychological stress, and proposed three guidelines to enhance students' psychological resistance: to create a harmonious family atmosphere; to provide moral education; and to learn to take ownership. Liu (2021) proposed three ways to develop students' psychological resistance: cultivating a positive and optimistic character in secondary school students; strengthening quality education; and creating a good family environment.

Methodology

This study was conducted with a mix-method approach to study the level of stress resistance among junior middle school students, to examine differences in middle school students' stress resistance based on nine demographic variables and to develop guidelines to enhance stress resistance among junior middle school students. It was divided into two phases. The first phase was quantitative research to study the level of stress resistance among junior middle school students, to examine differences in middle school students' stress resistance based on nine demographic variables, to examine the correlation between factors and students' stress resistance and to find out the predictive factors of students'

stress resistance. The second phase was qualitative research, which aimed to develop guidelines to enhance students' stress resistance.

Here below is the research framework of the study:



For quantitative research, the study focuses on 12,778 junior middle school students in Chongzuo City as the target population. 323 students were selected using random stratified sampling based on the following formula:

Sample size= $\frac{Z_{1-\partial/2}{}^{2}P(1-P)}{d^{2}}$ (Charan & Biswas, 2013)

Here

$Z_{1-\partial\backslash/2}$ = Is standard normal variate (at 5% type l error (P<0.05) it is l.96 and at 1% type l error (p<0.01)it is 2.58). As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in this study.

P = Expected proportion in population based on previous studies or pilot studies.

d = Absolute error or precision - Has to be decided by researcher.

Table 1: Number of sample

No.	School name	Sample
1	No.1 Junior Middle School, Jiangzhou District, Chongzuo City	26
2	No. 2 Junior Middle School, Jiangzhou District, Chongzuo City	27
3	No. 3 Junior Middle School, Jiangzhou District, Chongzuo City	27
4	No. 4 Junior Middle School, Jiangzhou District, Chongzuo City	27
5	Jiangnan Experimental School, Jiangzhou District, Chongzuo City	27
6	Ethnic Middle School, Jiangzhou District, Chongzuo City	27
7	Guangxi University Affiliated Middle School	27
8	Peking University Chongzuo Affiliated Experimental School	27
9	Zuozhou Town Middle School, Jiangzhou District, Chongzuo City	27
10	Tuolu Town Middle School, Jiangzhou District, Chongzuo City	27
11	Nalong Town Middle School, Jiangzhou District, Chongzuo City	27
12	Luobai Town Ethnic Experimental School, Chongzuo City	27
Total		**323**

For quantitative research, a self-designed questionnaire by the researcher for all the variables was used as the research instrument. The quality of research instruments was analyzed employing the validity and reliability test. For validity, three educational management experts' Item-Object Congruence(IOC) were invited to analyze the validity of the questions, making sure that the questions meet the requirements of content coverage and relevancy, language accuracy and suitability. The results indicated that the validity score ranged from 0.66 to 1.00, which proved that all the items in the questionnaire meet the requirements of content coverage and relevancy, language accuracy and suitability. For reliability, the items were analyzed by Cronbach's alpha coefficient (α) index. All items of the student's stress resistance were examined by 30 junior middle school students from one middle school in Chongzuo City, China, which were not included in the study. The pre-test proved that all the variables were reliable with Cronbah's Alpha Coefficient value of 0.86 as the reliability scores was greater than 0.70.

The survey questionnaire for this study consists of 2 parts. Personal information is included in part I, filled by students themselves. It includes information about grade, gender, only child or not, class cadre experience, academic performance, place of origin, family type, family financial status, and family' s parenting style, which are categorized into three antecedents: students themselves' antecedent, school- related antecedent, and family-related antecedent. Questionnaire about cognitive, emotional and volitional qualities is presented in part II.

Table 2: Dimensions of the factors affecting students' stress resistance

No	Factors	No of items	Pattern of items
1	Cognitive quality	10	1-10
2	Emotional quality	10	11-20
3	Volitional quality	10	21-30

The questionnaire is scored on a 5-point Likert scale and each item is presented as a self-report. The test taker were asked to choose the item that most closely matched his or her own situation (scored as 1, 2, 3, 4, 5 respectively). Here below is the measurement scale of factors.

Table 3: Measurement scale of factors

Description	Score
Fully consistent	5
Basically consistent	4
Not sure	3
Basically not consistent	2
Not at all consistent	1

In order to avoid the influence of psychological stereotypes, the negative questions in the questionnaire are scored by converting the scores accordingly. The higher the total score, the higher the level of stress resistance, and the opposite, the lower the level.

The interpretation of mean scores of the factors were determined by using Best's criteria (Best & Kahn, 1998) as follow:

$$\frac{\text{Highest Score - Lowest Score}}{\text{level of score}} = \frac{5\text{-}1}{5} = \frac{4}{5} = 0.8$$

Table 4: Interpretation of the range of mean score for factors

Range of mean score	Level of factors
4.21-5.00	Highest
3.41-4.20	High
2.61-3.40	Moderate
1.81-2.60	Low
1.00-1.80	Lowest

Source: Best and Kahn (1998)

As to statistics and data analysis in quantitative research, the statistical package was employed to analyze the data. Frequency and percentage were used to analyze the general information of the students. Mean and standard deviation were used to analyzed the level of stress resistance. Independent t-test and One Way ANOVA were adopted to compare stress resistance of junior middle school student based on nine independent variables through analysis statistics. Pearson's coefficient correlation was adopted to analyze the correlation between nine independent variables and students' stress resistance. Step wise multiple regression analysis was used to find out the predictive factors affecting students' stress resistance.

For qualitative research, a total of 10 students were interviewed as the the key informants. These students come from different schools and are in different grades, with a high level of stress resistance based on the result of quantitative research in phase 1. And 5 teachers of different profiles in terms of gender, teaching experience and subject participated in the interviews, using a purposive sampling method.

Semi-structured interviews are used in this study through site visits and telephone interviews. Four open-ended questions were used to ask the interviewees one by one and the researcher would follow up on their answers if necessary.

Content analysis was employed for this research. The data were analyzed through three steps. First, generate data from transcribed interviews. Second, read the data carefully to look for important information from the interview. Third, develop categories for the data and write in the study.

Results & Discussion

This chapter presents analysis of findings regarding the level of students' stress resistance, the relationship between nine demographic variables and stress resistance and the predictive factors of students' stress resistance, and developing guidelines to enhance students' stress resistance. The findings of this study would be discussed in accordance with the objectives of the research.

Analysis of the level of students' stress resistance

Table 5: Overall level of stress resistance of junior middle school student

Dimensions of stress resistance of junior middle school student	**Mean**	**SD**	**Level of stress resistance**
Cognitive quality	3.10	0.56	Moderate
Emotional quality	3.33	0.59	Moderate
Volitional quality	3.20	0.64	Moderate
overall	**3.21**	**0.52**	**Moderate**

Note: 1.00-1.80=Lowest,1-81-2.60= Low,2.61 -3.40=Moderate, 3.41-4.20=High, 4.21- 5.00=Highest

The research finding showed that overall level of students' stress resistance was moderate with an average score of 3.21, from which the level of emotional quality was highest with a mean score of 3.33 and the level of cognitive quality was lowest among the three variables with a mean score of 3.10. When students have moderate stress resistance, they might struggle to manage and cope with the pressures and demands of academic life, which could lead to a decline in their academic performance, as they may find it challenging to concentrate, stay focused, or effectively study for exams. Also, moderate stress resistance might contribute to heightened anxiety levels and increase the risk of

developing mental health issues such as anxiety disorders or depression. Students may experience overwhelming feelings of stress, worry, or helplessness, which can negatively impact their overall well-being. Students with moderate stress resistance may withdraw from social activities or experience a decline in their engagement with peers. They may isolate themselves due to feeling overwhelmed or unable to handle the stress of social interactions, leading to a sense of disconnection and loneliness. Moderate stress resistance may increase the tendency of straining relationships with peers, friends, and family members. Students may exhibit irritability, mood swings, or difficulty managing their emotions, which can create tension and conflicts within relationships. It is suggested that students' stress resistance should be constantly enhanced. The reasons to account for such finding could be due to some factors related to society, family and the individual student.This finding of the level of stress resistance is in line with the study conducted by Yang (2014) who aimed to find out the causes of low stress resistance of junior middle school students and educational countermeasures.

As per the findings, students' cognitive quality was shown moderate with a mean score of 3.10, which indicated that students' cognitive quality was not so good. Based on this, it could be assumed that students' academic performance would not be so good too. As cognitive quality is part of stress resistance and it is closely related to students' academic performance, guidelines to be developed to enhance students' stress resistance could focus on the possible relevant reasons and countermeasures, so that a more targeted approach to enhancing students' stress resistance can be met. According to the research on the effect of cognitive ability on academic performance: a mediated moderation model by Liang et al., (2020), academic performance was an important indicator of student mastery and was significantly influenced by multiple factors including cognitive quality, social support and motivation to learn, and cognitive quality, social support and motivation are all positively related to academic achievement. This finding is also in line with the study conducted by Xu & Li (2015) in the research about the impact of junior middle school students' cognitive quality on academic performance. The reasons to account for such finding could be due to some factors related to preschool education and family factors. According to the research conducted by Yuan & Zhao (2019) about the effect of preschool education on the cognitive quality of junior middle school students --- an empirical analysis based on CEPS data, the propensity score matching estimates showed that receiving preschool education could increase students' cognitive quality by

0.220 standard scores, and the more robust re-weighted propensity score matching estimates showed an increase of 0.239 standard scores; the potential preschool education gain for students who have not received preschool education is generally consistent with the preschool education gain for students who have received preschool education. Preschool education could be a way to enhance student's cognitive quality. Another factor that could affect students' cognitive quality is family factor. Based on the research by Qi (2017) about a statistical analysis on the factors influencing the cognitive quality of junior middle school students at home, father's educational attainment played an important role in students' cognitive quality.

As to the findings, students' emotional quality was shown moderate with a mean score of 3.33, which could be interpreted that students' self-awareness, self-regulation, motivation, empathy, and social skills were in moderate status. Emotional quality plays a crucial role in a person's life. It influences mental health, relationships, self-awareness, resistance, physical well-being, and overall life satisfaction. Cultivating emotional intelligence and nurturing emotional well-being can lead to a more fulfilling and balanced life. This finding mentioned above is in line with the research conducted by Huang (2016) about the relationship between social-emotional quality and academic burnout among junior middle school students. Based on her study, there were many factors that affect social-emotional quality, including family structure, parental literacy, and whether or not the student is left behind. According to the finding of the interview, all the teachers mentioned that students from single-parent families, divorced families and families with children left behind are more likely to have lower level of stress resistance and students also mentioned that parent-child rapport and communication could also help to release their stress. This finding was just in line with the study by Huang (2016). Family factor plays an extremely important role in students' emotional quality. According to the study conducted by Yao et al. (2019) about the impact of parental and teacher emotional education on the social-emotional competence of junior middle school students, parental emotional education is slightly more influential than teacher emotional education, but teacher emotional education can have a 'substitution effect' to compensate for the lack of parental emotional education; parental and teacher emotional education has a differential impact on students with different levels of socio-emotional competence. This study also pointed to the impact of parenting at home on students' emotional quality and also suggested the substitution effect of teachers on students' emotional education, which

was consistent with the interview findings. Emotional education for students should focus on strengthening the cross-curricular approach between home and school and on the "complementary" role of parents and teachers.

As to the findings, students' volitional quality was shown moderate with a mean score of 3.20, which could be interpreted that weak volitional quality is common among junior middle school students. A weak volitional quality can lead to various reactions and consequences. Weak volitional quality can make it challenging to set and achieve goals. Students may struggle to stay motivated, maintain focus, and take consistent action towards their objectives. They may give in to distractions, procrastination, or lack the perseverance needed to see tasks through to completion. Besides, students with weak volitional quality may exhibit inconsistent behavior patterns. They might find it difficult to stick to routines, follow through on commitments, or make disciplined choices. Their actions and decisions may be driven more by immediate gratification or impulses rather than long-term considerations. Moreover, a weak volitional quality can contribute to feelings of frustration and dissatisfaction. Students may feel disappointed in themselves for not being able to stick to their intentions or make positive changes in their lives. This can lead to a sense of unhappiness and a lack of fulfillment. This finding from the study is just in line with the study conducted by Liu (2018) on the the cultivation of students' volitional quality in physical education as well as the research conducted by Liu (2018) on the correlation between motivation to participate in sports and volitional quality among middle school students in Suzhou. The reasons to account for such finding could be due to some factors related to social factor, family factors and students themselves factor. According to Liu (2018), there were three reasons for the prevalence of weak volitional quality among junior middle school students: social influences, family reasons and students' own reasons. At present, although China has changed its education policy from test-based education to quality education, the results of cultural subjects still play a decisive role in the secondary school examinations. Students are so busy preparing for revision and examinations that they neglect physical training and therefore have relatively weak volitional quality. In terms of family reasons, as people's standard of living has risen, parents' perceptions have changed and they generally believe that no child should suffer even in the most difficult circumstances. As a result, the child's spirit of hard work and endurance is lost, which leads to child's weak volitional quality. For the students themselves, although the two-child policy has been liberalised, the majority of families

nowadays are still only children. Families are able to provide for their own needs to a great extent and are well fed and clothed. In addition, mobile phones, online games and other substances in the virtual world are also encroaching on students' lives, and some students are even addicted to virtual games and cannot extricate themselves from them. All these have greatly weakened students' volitional quality. According to Liu (2018), autonomy motivation is moderately positively correlated with volitional quality in all dimensions of sport motivation. Therefore, schools can develop the level of volitional quality of their students by organizing volitional quality development programmes.

Analysis of differences in students' stress resistance based on nine demographic variables

In order to examine the differences of students' stress resistance among junior middle school students based on nine demographic independent variables, all the factors were tested through t-test and ANOVA F-test.

Gender

Table 6: Differences in stress resistance of junior middle school student based on gender

	Gender	n	Mean	SD	t	P-value
Cognitive quality	Male	132	3.19	.62	2.43	.016
	Female	191	3.03	.51		
Emotional quality	Male	132	3.40	.61	1.91	.057
	Female	191	3.27	.57		
Volitional quality	Male	132	3.27	.58	1.72	.087
	Female	191	3.15	.69		
Level of stress resistance	Male	132	3.29	.52	2.32	.021
	Female	191	3.15	.51		

It was found that there were statistically significant differences on students' stress resistance based on gender (P<.05). In the dimension of emotional and volitional quality, there were no differences between male and female students except that in the

dimension of cognitive quality. Male students had higher mean score than that of female students, which indicated that male students have higher level of stress resistance than that of female students overall. It is worth noting that societal expectations, gender roles, and cultural factors can influence how stress is perceived and expressed by individuals and that these factors may contribute to differences in how males and females students cope with and respond to stressors.

The findings were similar to the research findings conducted by Liu (2018), which found out that there was no significant difference in the level of volitional quality between male and female students, and that the level of volitional quality of junior middle school students tended to decrease continuously with age and grade level.

However, the findings were opposite to the research findings conducted by Wang (2018) on the the development of students' volitional quality in the educational and teaching activities of junior middle schools. According to Wang (2018), there were significant differences in the level of volitional quality between male and female students. Female students scored significantly higher than male students on the total volitional quality score and on the self-control latitude, self-awareness latitude and independence latitude. The findings were opposite to the research findings conducted by Yao et al (2019), which found that girls, children in urban areas and those not left behind have significantly higher emotional quality than boys, those in rural areas and those with left behind experiences. Similar findings were found in the study conducted by Lei (2019), finding that the difference in volitional quality between male and female secondary school students was statistically significant and was significantly higher for male students than for female students.

As to the differences between male and female students in cognitive dimension, the possible reason to account for such findings could be due parental education expectations. According to the research conducted by He (2021) on the mechanism of parental educational expectation on the cognitive ability of junior middle school students, students' perceived parental educational expectations positively predicted junior middle school students' cognitive abilities and the differential analysis of students' gender and household status found that the educational expectations invested in female and agricultural students had a greater impact on their cognitive acquisition than those of male and non-agricultural students. Similar findings were also found in the study conducted by Pang et al. (2013) on the relationship between family socioeconomic status and academic performance of secondary school students, who found that parental expectations had a

significant impact on students' academic performance and that higher the educational expectations of parents, the better the academic performance of the child. However, compared to male students, female students got less educational expectations and were disadvantaged in China. This could be due to traditional patriarchal perceptions in China, which believed that it was the male who would carry on the family legacy and continue the family flame. Even in modern times, this mindset still exists, even more so in remote areas of the townships.

Place of origin

Table 7: Differences in students' stress resistance based on place of origin

	place of origin	n	Mean	SD	t	P-value
Cognitive quality	urban	68	3.24	.56	2.30	.02
	rural	255	3.06	.56		
Emotional quality	urban	68	3.34	.63	.32	.75
	rural	255	3.32	.58		
Volitional quality	urban	68	3.24	.69	.66	.51
	rural	255	3.19	.64		
Level of stress resistance	urban	68	3.28	.54	1.24	.22
	rural	255	3.19	.51		

The finding showed that there was no statistically significant difference in students' stress resistance based on place of origin, which could be interpreted that place of origin had no impact on the level of students' stress resistance. However, it was clear that there were statistically significant differences in the dimension of cognitive quality between urban and rural areas.

The finding was in line with the study conducted by Zheng et al. (2019) on cognitive ability gap between preschool and urban-rural junior middle school students, which found that there was a significant gap between urban and rural junior middle school students in terms of cognitive quality level and preschool experience, especially in the western region and that preschool education was an important cause of the cognitive gap between urban and rural middle school students.

The possible reasons to account for the gap between urban and rural junior middle school students in terms of cognitive quality level could be due to parental education and the allocation of educational resources. According to Qi (2017), father's educational attainment played an important role in students' cognitive quality. The influence of family education on children's cognitive quality is crucial. The family environment is the first classroom for children to grow up in. The socio-cultural background of the family, the parenting style and the parent-child relationship all have an impact on the child's cognitive quality. Besides, parenting styles have an important impact on children's cognitive development. Parenting styles include guidance, motivation, support and supervision. Guidance and motivation can increase children's motivation to learn and enhance their learning outcomes, thus improving their cognitive quality. Support and supervision, on the other hand, can help children establish correct values and moral values and build a good social image, thus improving their cognitive quality. Therefore, parents should focus on developing their children's social awareness and interaction skills and provide a good family environment to create good conditions for the development of their children's cognitive quality.

According to Zheng et al. (2019), preschool education was an important cause of the cognitive gap between urban and rural middle school students. However, the current situation is that the distribution of educational resources between urban and rural areas is unequal. The current lack of investment in rural compulsory education and the poor conditions of rural schools have led to different degrees of educational imbalance, and a large number of young people do not enjoy fair educational opportunities, especially in rural compulsory education, which is far inferior to urban areas in terms of teaching facilities, teaching means, financial security, teacher strength and student sources and other hardware and software conditions of schooling. Secondly, teachers in rural areas have fewer opportunities for further study and further education, and the problems of ageing knowledge and backward teaching methods are more prominent. Rural teachers, especially those in mountainous and impoverished areas, rarely participate in further education and training because their schools do not have sufficient funds for such activities, and they are unable to cope with the new teaching contents and curricula because of their "old knowledge" acquired at school. A considerable number of teachers in rural areas have old-fashioned educational concepts, methods and means of teaching, and basically adopt the methods and approaches of "filling the classroom", "duck-filling"

and "dogmatic", and even the phenomenon of severe corporal punishment, which makes it difficult to mobilize students' interest and enthusiasm for learning and cannot adapt to the needs of educational reform and development.

Only child or not

Table 8: Differences in students' stress resistance based on only child or not

	only child or not	n	Mean	SD	t	P-value
Cognitive quality	yes	37	3.11	.60	.16	.88
	no	286	3.10	.56		
Emotional quality	yes	37	3.14	.52	-2.00	.047
	no	286	3.34	.59		
Volitional quality	yes	37	3.15	.62	-.46	.64
	no	286	3.20	.65		
Level of stress resistance	yes	37	3.13	.47	-.89	.38
	no	286	3.22	.53		

The finding showed that there was no statistically significant difference in students' stress resistance based on only child or not, which could be interpreted that the factor only child or not had no impact on the level of students' stress resistance. However, it was clear that there were statistically significant differences in the dimension of emotional quality between only child and non-only child. The possible reason could be due to individual attention and support. Only children often receive more individual attention and support from their parents or caregivers compared to children with siblings. This focused attention can contribute to a stronger emotional bond and a greater sense of emotional security for only children. They may have more opportunities to express their emotions, receive guidance, and have their emotional needs met, which can positively impact their emotional quality.

The finding was in line with the study conducted by Zhang (2022) on the characteristics and influencing factors of first-born emotional quality in second-born families. According to Zhang (2022), there were significant differences in emotional quality among junior middle school students in terms of grade level, whether they were only children or not, and birth order. Though there was no differences between only child and non-only child in the dimension of volitional quality, only child had

slightly lower mean score than that of non-only child. This could be due to family factor. As people's standard of living has risen, parents' perceptions have changed and they generally believe that no child should suffer even in the most difficult circumstances, especially for those who only have only one child. Parents will give their children all the love they can, which can lead to overindulgence. As a result, the child's spirit of hard work and endurance is lost, which leads to child's weak volitional quality. Though there was no statistically significant difference in the dimension of volitional quality between only child and non-only child in this study, different findings were found in the research done by Lei (2019), finding that only child had higher volitional quality and the difference was statistically significant.

Grade

The findings (table 9) showed that there was no significant difference in students' stress resistance based on grade. However, there was a significant difference in emotional quality of stress resistance between grade 8 and grade 9.

Based on this, it could be interpreted that emotional quality of junior middle school students was related to their grade level, which was in line with the study by Huang (2016) at this point. However, there were differences in details. According to Huang (2016), grade 7 had the highest scores in the dimensions of self-management, management of others, and perception of others, with significantly higher scores than other grades; grade 9 had the highest scores in the dimensions of perception of others, collective perception, and collective management, with significantly higher scores than other grades. Besides, the students in grade 8 had higher mean score than those in grade 7 and 9 in emotional quality, which was opposite to the research by Zhang (2022), finding that students in grade 7 had higher emotional quality than those in grade 8 and 9.

The possible reasons to account for could be due to students' developmental stage, academic demands, social dynamics, transition periods and personal and family factors. Firstly, emotional development is a dynamic process that evolves as children grow. Different grades represent different stages of cognitive, social, and emotional development. Younger students in lower grades may be more emotionally sensitive and exhibit a broader range of emotions as they are still developing emotional regulation skills. Older students in higher grades may have developed better emotional

regulation strategies and a more stable emotional baseline. What's more, as students progress through different grades, the academic demands placed on them tend to increase. Higher grades often involve more challenging coursework, increased expectations, and higher levels of academic pressure. This heightened academic stress can impact students' emotional well-being, leading to differences in emotional quality across grade levels. Also, social interactions and peer relationships play a significant role in students' emotional experiences. As students advance to higher grades, they are exposed to a wider range of social situations and may face new challenges such as peer pressure, social expectations, and the need to fit in. These social dynamics can influence students' emotional experiences and contribute to differences in emotional quality across grade levels. In addition, students often experience significant transitions during their educational journey, such as moving from middle school to high school. These transitions can be accompanied by feelings of anxiety, stress, and uncertainty, which can impact students' emotional well-being. The emotional quality of students may differ during these transitional periods as they adjust to new environments, routines, and social dynamics. Lastly, emotional well-being can also be influenced by personal and family factors that may vary across different grade levels. Factors such as family dynamics, personal circumstances, and external stressors can affect students' emotional quality. For example, students in higher grades may face additional responsibilities or pressures related to college applications, future career decisions, or increased independence.

Academic performance

The findings (table 9) showed that there was no significant difference in students' stress resistance based on academic performance. But it was found that the total score of stress resistance of students with good achievement was significantly higher than that of students with poor achievement. And there were statistically significant differences in the dimension of cognitive quality between students with good achievement and students with poor achievement.

Students with good achievement often exhibit higher cognitive quality compared to those with poor achievement due to various factors, including effective learning strategies, depth of understanding, critical thinking and problem-solving. Students who achieve good academic performance often employ effective learning strategies that

enhance their cognitive abilities. They may use techniques such as active learning, critical thinking, organization, and efficient study habits. These strategies optimize their cognitive processes, including attention, memory, and problem-solving skills, leading to improved academic performance. Besides, students with good achievement tend to have a deeper understanding of the subject matter. They engage in analytical thinking, make connections between concepts, and apply their knowledge to real-world situations. This depth of understanding reflects higher cognitive quality, as it requires complex cognitive processes such as analysis, synthesis, and evaluation. What's more, good academic achievers typically demonstrate strong critical thinking and problem-solving skills. They can analyze complex problems, evaluate evidence, consider multiple perspectives, and generate creative solutions. These cognitive processes are fundamental to higher-order thinking skills and are closely linked to academic success.

The findings of the study were in line with the study by Liang et al. (2020). Based on this study, it was found that academic performance was an important indicator of student mastery and was significantly influenced by multiple factors including cognitive quality, social support and motivation to learn, and that cognitive quality, social support and motivation are all positively related to academic achievement. The better the academic performance and the stronger the predictive effect of their cognitive ability on academic performance. Though there was no statistically significant difference in the dimension of volitional quality between students with good achievement and students with poor achievement in this study, different findings were found in the research done by Lei (2019), finding that students with good achievement had significantly higher volitional quality than students with poor achievements.

Class cadre or not

The findings (table 9) showed that there was no significant difference in students' stress resistance based on class cadre or not, which could be interpreted that class cadre or not had on effect on students' stress resistance. However, different findings were found in the research conducted by Lei (2019), there was a significant difference in volitional quality between students who were student cadres and those who were not, with students who were student cadres having significantly higher volitional quality.

The possible reasons to account for could be due to students' leadership and responsibility, goal-oriented mindset, problem-solving skills, time management and prioritization, interpersonal skills and teamwork. Student cadres are typically entrusted with leadership roles and responsibilities within their school or college. They are often responsible for organizing events, managing teams, and representing their peers. These experiences help develop qualities such as self-discipline, time management, decision-making, and accountability, which are essential components of volitional quality. Besides, student cadres are often tasked with achieving specific goals or targets, whether it's organizing a successful event or implementing a project. This exposure to goal-setting and working towards objectives enhances their volitional quality by fostering a proactive and goal-oriented mindset. They learn to break down tasks, plan effectively, and persistently work towards their goals, which translates into better volitional control over their academic endeavors. Also, student cadres frequently encounter challenges and obstacles while fulfilling their roles. They develop problem-solving skills, adaptability, and resilience when faced with unexpected situations. These experiences strengthen their ability to overcome academic challenges, think critically, and find innovative solutions, ultimately contributing to higher volitional quality. Time management and prioritization is also important. Balancing the responsibilities of being a student cadre alongside academics requires effective time management and prioritization skills. They learn to allocate their time wisely, manage multiple tasks simultaneously, and make efficient use of their resources. These skills are transferable to their academic pursuits, enabling them to manage their study time, meet deadlines, and make productive use of their resources, leading to higher volitional quality. Lastly, student cadres frequently collaborate with diverse groups of individuals, including peers, teachers, and administrators. They develop effective communication, teamwork, and interpersonal skills through these interactions. These skills, including the ability to work collaboratively, negotiate conflicts, and build relationships, positively influence their volitional quality as they navigate their academic journey.

Family type

The finding (table 9) showed that there was no significant difference in students' stress resistance based on family type. However, there were statistically significant differences in the dimension of students' emotional quality and volitional quality

between ordinary family and single parent family. Students from ordinary family had higher level of emotional quality and volitional quality than those from single parent family.

Certain factors associated with ordinary family structures may contribute to the development of emotional quality and volitional quality, including supportive family dynamics, shared responsibilities and role modeling, increased availability of resources. In ordinary families, where both parents are present, there may be more opportunities for emotional support, guidance, and positive role modeling. Having multiple caregivers can offer a wider range of perspectives, emotional nurturing, and support for developing emotional and volitional qualities. Also, in ordinary families, both parents often share responsibilities related to parenting and household management. This can provide a more balanced and structured environment, where children observe and learn effective emotional regulation, decision-making, and self-discipline through the actions and behaviors of both parents. What's more, having two parents in an ordinary family may increase the availability of financial resources, time, and energy to invest in the emotional well-being and personal development of the child. This can provide opportunities for enrichment activities, access to educational resources, and support systems that contribute to the development of emotional and volitional qualities.

The findings were similar to the study by Huang (2016), which found that the emotional quality of junior middle school students was related to family structure and that the level of students' emotional quality was significantly higher in ordinary family than that in single parent family. The findings were also similar to the study conducted by Zheng & Sun (2020) on the influence of the family on students' volitional quality and the mechanisms at play, finding that the number of children in the family, the integrity of the family structure and family relationships are closely related to their level of volitional quality, with students from families with only one child, divorced parents or parents who fight a lot having significantly lower levels of volitional quality. Zhang (2018) in her research also found that there was some variability in volitional quality of students from single and ordinary families. The direct reasons to account for such findings were due to family factors as family factors play an important role in students' level of volitional quality. Children growing up in incomplete families receive an incomplete emotional and educational upbringing and are not emotionally maintained with the corresponding sense of security. Such children are normally

emotionally sensitive and vulnerable, or have low self-esteem, are withdrawn, restrained and reticent, or are willful, rebellious, domineering and violent.

Family financial status

It was found that there is no significant difference in students' stress resistance based on family financial status according to table 9. However, there was a significant difference in cognitive quality of stress resistance between students from rich families and students from average families, as well as between students from rich families and students with better financial status ($P < 0.05$). As to emotional quality dimension, students with better financial status was higher than that of students from poor families ($P < 0.05$). There was a significant difference in volitional quality dimension as the P-value was .01($P < 0.05$), and both students form average families and students with better financial status were significant higher than that of students from poor families.

Families with average or better financial status may increase the availability of financial resources, time, and energy to invest in the emotional well-being and personal development of the children, which can provide opportunities for enrichment activities, access to educational resources, and support systems that contribute to the development of emotional and volitional qualities for the children.

As to emotional quality dimension, the findings were in line with the study conducted by Zhang et al. (2022) about the impact of family economic capital on students' emotional quality, which found that family economic capital was significantly and positively related to students' emotional quality and that parental involvement partially mediates the process by which family economic capital influenced emotional quality. According to Zhang et al. (2022), among the sub-dimensions of parental involvement, parent-child communication, school activities and the provision of a learning environment all played multiple mediating roles between family economic capital and students' emotional competence, with parent-child communication having the largest mediating effect. The possible reasons to account for such findings could be that parents from better-off families have higher expectations of their children's education and are in a better position and have more energy to engage in parent-child communication with their children.

Family parenting style

It was found that there is no significant difference in students' stress resistance based on family parenting style according to table 9. However, there was a significant difference in emotional quality dimension between parenting and shared-parenting.

In a parenting arrangement where one parent has primary custody, children may experience more stability and consistency in their daily routines, living arrangements, and emotional support. Having a primary caregiver who is responsible for their day-to-day needs can provide a sense of security and predictability. Children in a parenting arrangement may develop a strong attachment to the primary caregiver due to the continuous presence and consistent emotional connection. This attachment can contribute to a sense of emotional security and support. In a parenting arrangement, there may be a more coordinated approach to parenting decisions, discipline strategies, and values. Consistency in parenting styles can help children develop a clear understanding of boundaries, expectations, and appropriate emotional expression.

Family parenting style has a significant impact on the development of a child during childhood and even later in life. According to British psychologist Bowlby, attachment is a strong, enduring emotional bond between infants and their caregivers (primarily their mothers), expressing the individual's tendency to seek closeness and access to specific objects. A good attachment not only provides a secure bastion for the infant to interact with others, but also helps the infant to develop self-confidence and self-concept. The parenting style is one in which parents are the primary caregivers, with occasional support from the grandparents, and it is also the one that is widely respected by experts and scholars. This is because young children especially need to develop close parent-child attachments with their parents, which is an important basis for their sense of security and well-being. Both parents and (maternal) grandparents provide care and love for young children, which to a certain extent provides a good guarantee of healthy development and allows them to grow up with more love and care, thus contributing to the development of positive emotions (Li & Li, n.d.). Zhang (2016) conducted a research on comparative study of the psychological theory development of children aged 3-6 years under different parenting styles, finding that the level of development of children's psychological theories directly influences the harmony of interpersonal relationships.

Table 9: Results of ANOVA test

	Grade	n	Mean	SD	F	P-value
Cognitive quality	7	153	3.13	.55	.53	.59
	8	127	3.09	.55		
	9	43	3.04	.64		
Emotional quality	7	153	3.31	.62	2.04	.13
	8	127	3.39	.56		
	9	43	3.18	.54		
Volitional quality	7	153	3.21	.64	.09	.91
	8	127	3.20	.67		
	9	43	3.16	.62		
Level of stress resistance	7	153	3.22	.52	.59	.55
	8	127	3.22	.51		
	9	43	3.13	.53		

	Academic performance	n	Mean	SD	F	P-value	LSD
Cognitive quality	F1	36	3.34	.69	5.10	.007	F1>F2* F2>F3*
	F2	245	3.09	.53			
	F3	42	2.95	.61			
Emotional quality	F1	36	3.44	.61	1.06	.35	
	F2	245	3.32	.59			
	F3	42	3.25	.52			
Volitional quality	F1	36	3.30	.68	.98	.38	
	F2	245	3.20	.65			
	F3	42	3.10	.60			
Level of stress resistance	F1	36	3.36	.56	2.61	.08	
	F2	245	3.20	.52			
	F3	42	3.10	.48			

	Class cadre or not	n	Mean	SD	F	P-value
Cognitive quality	F1	116	3.06	.55	1.31	.27
	F2	98	3.04	.50		
	F3	44	3.17	.57		
	F4	65	3.20	.65		
Emotional quality	F1	116	3.33	.58	.02	.99
	F2	98	3.31	.56		
	F3	44	3.33	.56		
	F4	65	3.32	.66		
Volitional quality	F1	116	3.24	.56	.25	.86
	F2	98	3.17	.68		
	F3	44	3.21	.72		
	F4	65	3.16	.70		
Level of stress resistance	F1	116	3.21	.50	.17	.92
	F2	98	3.18	.52		
	F3	44	3.23	.55		
	F4	65	3.23	.54		

(F1=Never served; F2=Used to serve; F3= Never served before, now serving; F4=Always served)

	Family type	n	mean	SD	F	P-value	LSD
Cognitive quality	F1	287	3.10	.55	.05	.95	
	F2	22	3.14	.50			
	F3	14	3.09	.86			
Emotional quality	F1	287	3.35	.58	3.55	.03	F1>F2*
	F2	22	3.02	.56			
	F3	14	3.23	.67			
Volitional quality	F1	287	3.23	.65	3.60	.03	F1>F2*
	F2	22	2.89	.49			
	F3	14	3.01	.59			
Level of stress resistance	F1	287	3.23	.52	1.99	.14	
	F2	22	3.01	.44			
	F3	14	3.11	.64			

(F1=Ordinary family; F2=Single parent family; F3=Reconstituted family;

	Family financial status	n	mean	SD	F	P-value	LSD
Cognitive quality	F1	13	3.25	.58	2.50	.06	
	F2	256	3.07	.55			
	F3	50	3.15	.59			
	F4	4	3.75	.85			
Emotional quality	F1	13	3.04	.74	1.45	.23	
	F2	256	3.32	.59			
	F3	50	3.41	.55			
	F4	4	3.20	.37			
Volitional quality	F1	13	2.74	.76	3.80	.01	F2>F1* F3>F1*
	F2	256	3.19	.62			
	F3	50	3.38	.69			
	F4	4	2.93	.17			
Level of stress resistance	F1	13	3.01	.56	1.41	.24	
	F2	256	3.19	.52			
	F3	50	3.31	.50			
	F4	4	3.29	.41			

(F1=poor; F2=average; F3=better; F4=rich;

	Family parenting style	n	Mean	S.D.	F	P-value
Cognitive quality	F1	17	3.19	.52	.88	.42
	F2	70	3.03	.50		
	F3	236	3.12	.59		
Emotional quality	F1	17	3.39	.49	2.08	.13
	F2	70	3.20	.49		
	F3	236	3.36	.62		
Volitional quality	F1	17	3.14	.64	.08	.92
	F2	70	3.20	.64		
	F3	236	3.20	.65		
Level of stress resistance	F1	17	3.24	.46	.71	.49
	F2	70	3.14	.48		
	F3	236	3.22	.52		

(F1=Inter-generational; F2=Shared parenting; F3=Parenting;

*. The mean difference is significant at the 0.05 level.

Analysis of the correlation between factors and students' stress resistance

Table 10: Correlations between factors and stress resistance

Research Variables	Academic performance	Family financial status	Level of stress resistance
Academic performance	1		
Family financial status	.117*	1	
Level of stress resistance	.124*	.108	1
*. Correlation is significant at the 0.05 level (2-tailed).			

Pearson coefficient was used to analyze the relationship between family financial status, academic performance and students' stress resistance. The result showed that there was no correlation between family financial status and students' stress resistance and that there was a positive correlation between academic performance and students' stress resistance ($p<0.05$), with $r=.124$. Though no correlation could be found between family financial status and students' stress resistance, a positive correlation was found between family financial status and academic performance ($p<0.05$), with $r=.117$.

The finding about positive correlation between family financial status and academic performance was in line with the study conducted by Qiao et al. (2013) about the effects of family socioeconomic status and parental involvement on the academic performance of junior high school students: the moderating role of teacher support, finding that family socioeconomic status positively predicted junior middle school students' academic performance and that parental involvement played a mediating role in the prediction of junior high school students' academic performance by family socioeconomic status. Similar results were also found in the research done by Zhang et al. (2015) about the impact of family socio-economic status and parental investment in education on the academic achievement of mobile children, finding that family income and parental education level directly predict academic achievement of mobile children.

As per the findings that academic performance had a positive correlation with students' stress resistance, a positive correlation was also found between cognitive quality and academic performance. The findings were in line with the research conducted by Liang et al. (2020), who found that cognitive quality, social support and motivation were all positively associated with academic performance. Cognitive quality is a significant predictor

of academic performance. The findings were also in line with the study conducted by Li & Zhao (2017) on the influence of family background and cultural capital on cognitive and non-cognitive quality, finding that both cognitive and non-cognitive quality had a significant positive effect on academic performance. As one of the aspect of stress resistance, attention should be paid on students' cognitive quality.

Though the study here haven't investigated the relationship between students' family parenting style and their academic performance, parenting is found to play an important role in students' academic performance. A study conducted by Tang et al. (2022) found that parenting had a significant positive effect on children's academic performance, with a significant mediating effect using cognitive quality as the mediating variable and that parenting influenced children's academic performance by affecting their cognitive quality and thus their academic performance, with a mediating effect of around 15%. The possible reasons to account for could be due to parents' educational support, setting expectations and goals, discipline and structure, communication and collaboration with schools and role modeling. Parents who actively engage in their child's education and provide support at home create a positive learning environment. They can help with homework, provide resources, and encourage good study habits. This involvement shows the child that education is valued and important, motivating them to perform well academically. Besides, a nurturing and supportive home environment is crucial for a child's overall well-being, including their academic performance. When parents provide emotional support, they create a sense of security and confidence in their child, allowing them to focus better on their studies and deal with challenges effectively. As to expectations and goals, parents who set high expectations for their children's academic achievements and communicate them clearly help instill a sense of responsibility and motivation. Children are more likely to strive for success when they understand what is expected of them and have goals to work towards. As for discipline and structure, parents who establish routines and provide structure in their child's life contribute to better academic performance. Having consistent bedtimes, study schedules, and balanced routines help children develop self-discipline, time management skills, and a sense of responsibility towards their studies. Also parents' communication and collaboration with schools is also very important. Active communication between parents and teachers is essential to monitor a child's progress, address any concerns, and provide additional support if needed. Parents who maintain a positive relationship with their child's school can work together with teachers to identify

areas of improvement and develop strategies to enhance academic performance. Last is about role modeling. Parents serve as important role models for their children. When parents demonstrate a positive attitude towards learning, engage in their own educational pursuits, and emphasize the value of education, children are more likely to internalize these beliefs and attitudes, leading to improved academic performance.

Analysis of the predictors that affect students' stress resistance

Table 11: The Predictive Factors of students' stress resistance

Independent variable	β	t	R	R^2	R^2 Change	Sig.
gender	-.134	-2.437	.128[a]	.016	.013	.015*
academic performance	.130	2.361	.182[b]	.033	.027	.019*

As per the result of step-wise multiple regression analysis, two independent variables were identified as predictive factors that affect students' stress resistance in Chongzuo City, China. The two predictive factors are gender and academic performance with coefficient determination =0.033, which means all the two predictors, gender and academic performance could predict 3.3% of variance in students' stress resistance at significance level 0.05. Therefore, the results indicated that these two variables were the significant variables which can predict higher level of students' stress resistance among junior middle school students.

Analysis of gender as the predictor for students' stress resistance

From the two predictive factors, gender has lesser effect on students' stress resistance with the coefficient value (β = -.133) at significance level 0.05, which could predict 1.6% of variance on students' stress resistance.

As per the findings, male students had higher level of stress resistance than female students. The possible reasons to account for this could be due to different levels of stress faced by male students and female students. The study conducted by Al Ghadban & Hamdan-Mansour (2019) exploring the relationship between academic stress, gender, and

academic achievement among undergraduate students found that female students experienced higher levels of academic stress compared to males. Similar findings were found in the research done by Zeng et al. (2016) examining gender differences in stress and coping strategies among Chinese college students and finding that females reported higher levels of stress compared to males and tended to use more emotion-focused coping strategies.

The possible reasons for this findings could be due to biological factors, different coping strategies between male students and female students and gender norm. Some studies have suggested potential biological differences in stress response between males and females. For example, hormones like testosterone may play a role in regulating stress responses and influencing coping strategies. Coping strategies between male students and female students could be another reason. Research suggests that males and females may employ different coping strategies when faced with stress. Males may be more inclined to use problem-focused coping strategies, which involve actively addressing and solving stressors. This approach can contribute to a perception of higher stress resistance. On the other hand, females may be more inclined to use emotion-focused coping strategies, such as seeking social support or expressing emotions, which may be perceived as lower stress resistance but are effective in managing stress (Shao et al., 2021). What's more, gender norms can also influence how individuals perceive and cope with stress. Traditional gender roles often emphasize male stoicism and self-reliance, which may contribute to a perception of higher stress resistance. Males may be socialized to downplay or suppress their emotional distress, leading to the perception of being more resistance in stressful situations.

Analysis of academic performance as the predictor for students' stress resistance

Academic performance was another predictor which affects students' stress resistance with a higher coefficient value (β= .131) at significance level 0.05. Academic performance had a positive correlation with cognitive quality based on previous analysis.

The findings was similar to the research conducted by McDonough et al. (2018) on the importance of academic resilience in managing chronic stress among undergraduate students, finding that students who perform well academically may have better stress management skills and higher levels of resistance as they may possess effective coping strategies, time management abilities, and organizational skills that contribute to their

stress resistance. Similar findings can be found in the research conducted by Ayers et al. (2017) investigating the role of resistance in the relationship between academic stress and student performance, which found that higher levels of resilience were associated with better academic performance despite experiencing high levels of stress. Kumar & Samad (2018) also found similar findings that students with higher academic performance and self-esteem demonstrated better stress resistance in their research exploring the relationship between academic performance, self-esteem, and stress among university students.

Students who perform well academically often develop a sense of confidence in their abilities. They have demonstrated their competence in handling academic challenges and achieving success, which can boost their self-efficacy. This belief in their ability to manage tasks and overcome obstacles contributes to their resistance in the face of stress. Besides, they may have developed effective coping strategies to manage academic demands and pressure and they may possess strong problem-solving skills, time management techniques, and organizational abilities, which help them navigate stressful situations more efficiently. What's more, high-achieving students are typically motivated by their goals and have a strong drive to succeed academically. Their intrinsic motivation and focus on achieving their goals can provide them with a sense of purpose and determination, which helps them handle stressors more effectively.

Development of guidelines to enhance students' stress resistance

As there were three antecedents used in this study, the researcher would like to develop the guideline to enhance students' stress resistance from three aspects: family aspect, school aspect and students themselves aspect. The findings from the in-depth interview helped to develop the guideline to enhance students' stress resistance, which was demonstrated in the figure 1.

As to family aspect, three guidelines were developed. 1. Take real responsibility as a parent. 2. Create a good family environment and establish a good parent-child relationship. 3. Active learning to build the right perceptions and develop child's stress resistance.

For school aspect, four guidelines were developed. 1. Reinforcing quality education; 2. Developing a positive and optimistic character in students; 3. Setting an example for students; 4. Developing students' problem-solving skills.

As for students themselves aspect, five guidelines were developed. 1. Learn to face stress with humour. 2.Reduce stress by relaxing. 3.Take part in physical exercise to relieve stress. 4. Keep learning to improve yourself and self-motivate. 5. Learn to manage your personal emotions.

Conclusion

This study was conducted to investigate the level of stress resistance among junior middle school students in Chongzuo City, China, to find out the differences and relationship between nine demographic variables: gender, only child or not, grade, academic performance, class cadre or not, place of origin, family type, family financial status, family parenting style and stress resistance and to develop guidelines to enhance students' stress resistance. The study used a mix-method research. For quantitative research, 323 students from 12 junior middle schools in Jiangzhou District were included in the survey. As to qualitative research, in-depth interview was used to interview 15 informants.

The level of stress resistance among junior middle school students in Chongzuo City, China, was measured by mean and standard deviation through three dimensions: cognitive quality, emotional quality and volitional quality. The overall level of students' stress resistance was perceived as moderate with mean score of 3.21. The t-test and ANOVA F-test were used to examine the differences of students' stress resistance based on nine demographic variables in Chongzuo City, China. There were statistically significant differences on students' stress resistance based on gender. Pearson's correlation coefficient was used to analyze the relationship between family financial status, academic performance and students' stress resistance. There was a positive correlation between academic performance and students' stress resistance ($p<0.05$), with $r=.124$. Step wise multiple regression was adopted to analyze the predictive factors of students' stress resistance. Gender and academic performance were recognized as predictive factors which affected students' stress resistance in Chongzuo City, China ((β=-.134 & .130 respectively). Guidelines for enhancing students'

stress resistance were developed, focusing on three factors: family factor, school factor and students themselves factor.

The future study is suggested to conduct a comparative study with more sample population on similar topic and eliminate less relevant factors and add new ones such as peer relationship, attitude of students towards learning, parents' educational background to get more different findings.

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