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Thanks you



DESIGN APPLICATIONS FOR CHAM SCRIPT CONSERVATION

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1. Introduction

- Language is important in communication, dissemination and cultural preservation.
- Information technologies (IT) is also an important to introduce knowledge, culture and language of a community to others (Sepe, 2001).
- Cham people using their own script. However, **Cham script** today is facing a massive extinction.

1. Introduction (cont.)

Types of Cham script:

- **Ancient Cham script** (ACS) first appeared on the Vo Canh stone stele in the *second century* (Filliozat, 1969).
- **Traditional Cham script** (TCS) appeared on stone stele of Po Rome tower *in the 17th century* (Dharma 2006; Lafont, 2011).
- **Modified Cham script** (MCS) appeared **in 1978** by Cham Textbook Compiling Committee (CTCC) (Ty, 2006).

1. Introduction (cont.)

- Therefore, finding solutions to preserve the Cham script is necessary when most of value document of Champa Kingdom or materials in Cham villages are needed to continue studying before ruining due to old paper.
- In my research, information technology is one of useful solutions to preserve the Cham script.

Research Questions

- What is the choice of Cham script among Cham people?
- How to develop application technology for Cham's script preservation (such as Cham fonts, and Cham script conversion?)
- What is the acceptable level of the product for ease of use, convenience and quality?



2.1 Population and Sample

Total population: 420 included two groups:

- 1) university students, working people;
- 2) religious people.

According to (Krejcie & Morgan, 1970), the sample size representative of two groups is 200.

Group of study	Population	Proportionate sample	(%)
University students working people	315	150	75%
Religious people	105	50	25%
Total	420	200	100%



2.2 Cham Font Design

Typeface based on: Cham-Vietnamese-French dictionary of G. Moussay

The total numbers of Cham script character need to design are 90 characters.

Cham Thrah1

View By: UnicodeHex: 20Keystroke:

Search by text ranges

0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	002A	002B	002C	002D	002E	002F
	၁	"	၃	၄	၅	၆	'	၈	'	၉	၁	,	'	.	၂
0030	0031	0032	0033	0034	0035	0036	0037	0038	0039	003A	003B	003C	003D	003E	003F
၀	၁	၂	၃	၄	၅	၆	၇	၈	၉	:	•	၁	၂	၃	၄
0040	0041	0042	0043	0044	0045	0046	0047	0048	0049	004A	004B	004C	004D	004E	004F
၆	၇	၈	၉	၁	၂	၃	(	၆	၇	,	၈	၉	၁	၂	၃
0050	0051	0052	0053	0054	0055	0056	0057	0058	0059	005A	005B	005C	005D	005E	005F
၆	၇	၈	၉	၁	၂	၃	၄	)	၆	၇	၈	၉	၁	၂	၃
0060	0061	0062	0063	0064	0065	0066	0067	0068	0069	006A	006B	006C	006D	006E	006F
၆	၇	၈	၉	၁	၂	၃	၄	၅	၆	၇	၈	၉	၁	၂	၃
0070	0071	0072	0073	0074	0075	0076	0077	0078	0079	007A	007B	007C	007D	007E	**
၆	၇	၈	၉	၁	၂	၃	၄	၅	၆	၇	၈	၉	၁	၂	၃

Code point location of Cham Thrah font



2.3 Cham Script Conversion Method

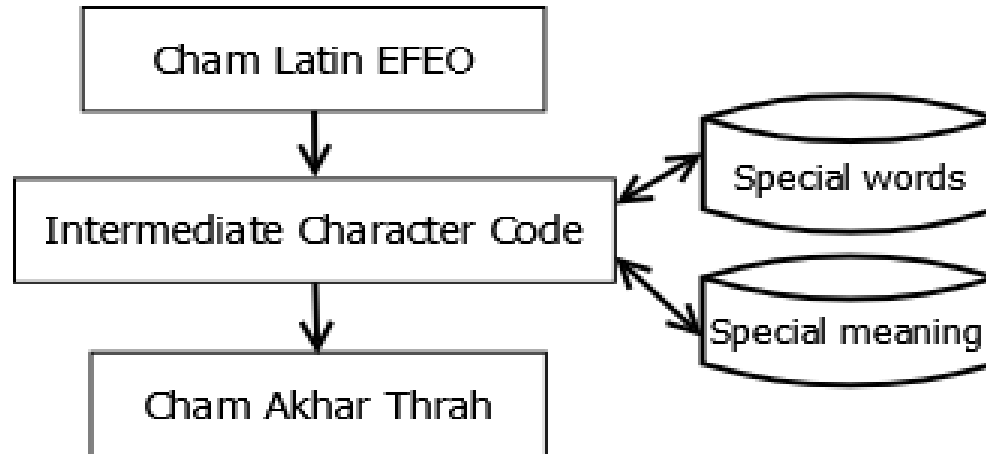
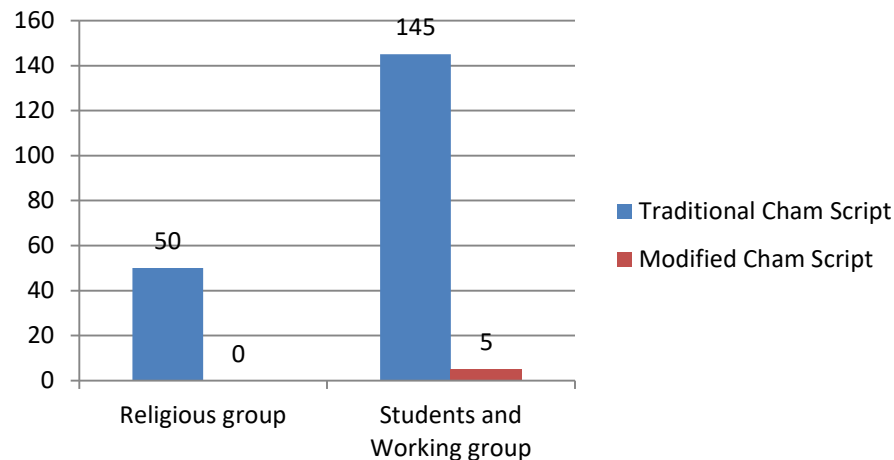


Diagram of converting Cham Latin to Cham script



3. Exploring the Preferable Cham Script

- A survey with 200 samples for two group are Religious group and University student, Working group.

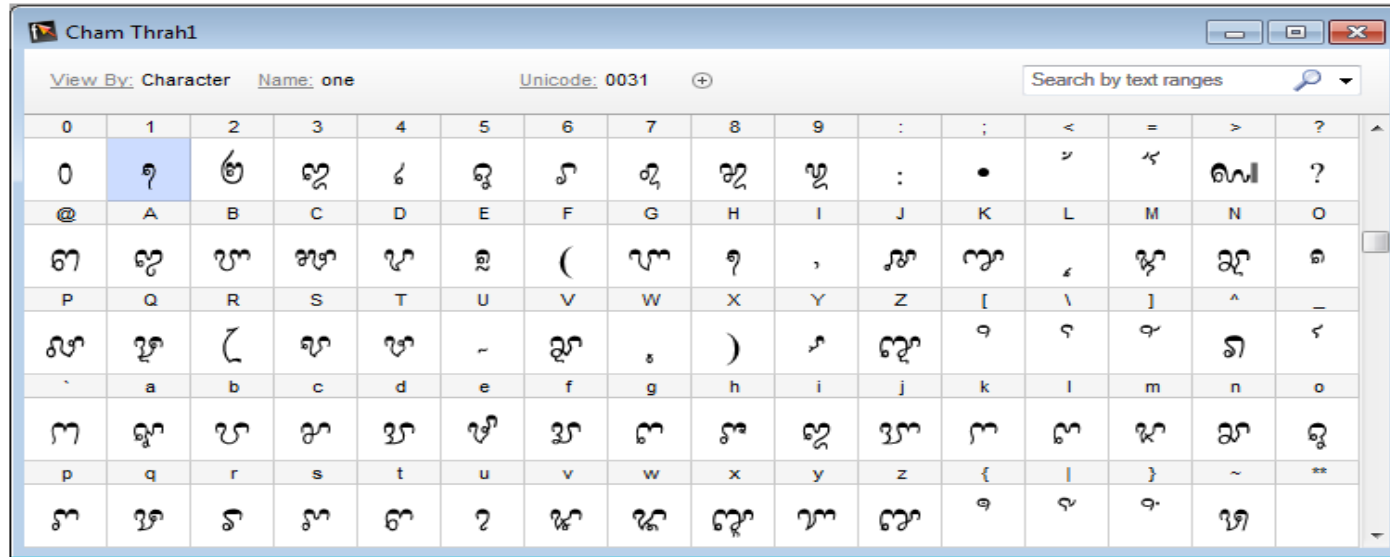


Traditional Cham script: 97,50% supports by two groups whereas only 2,50% supports for using the **Modified Cham script.**



Creating Cham Font

- Fontographer was use for design Cham font
- Cham font designed for two keyboards: Macintosh and Windows.
- *Cham Thrah* font typeface is based on Cham - Vietnamese - French dictionary.



Cham Keyboard

`	1	2	3	4	5	6	7	8	9	0	-	=	del.
၇ ၈	၁ ၂	၃ ၄	၅ ၆	၇ ၈	၉ ၀	၁ ၂	၃ ၄	၅ ၆	၇ ၈	၉ ၀	၁ ၂	၃ ၄	
tab	Q	W	E	R	T	Y	U	I	O	P	{	}	|
	၇ ၈	၁ ၂	၃ ၄	၅ ၆	၇ ၈	၉ ၀	၁ ၂	၃ ၄	၅ ၆	၇ ၈	၉ ၀	၁ ၂	၃ ၄
c.lock	A	S	D	F	G	H	J	K	L	:	“	return	
	၇ ၈	၁ ၂	၃ ၄	(	၇ ၈	၉ ၀	၁ ၂	၃ ၄	၅ ၆	:	“		
shift	Z	X	C	V	B	N	M	<	>	?	shift		
	၇ ၈	၁ ၂	၃ ၄	၅ ၆	၇ ၈	၉ ၀	၁ ၂	၃ ၄	၅ ၆	၇ ၈			
control	command								command				



Cham Script Conversion Interface



EFEO Cham Latin - Akhar Thrah Cam Conversion

☒ English ☐ Việt

1: Nai mai mang Makah,
 blaoh takai nai deh, Harek Kah Harek Dhei,,
 2: nai nao tel Pajai,
 mang lamngâ Pajai, nai jaoh akaok seng,,

၇ : ခိခိ ခိခိ ခိခိ ,
 ခိခိ ခိခိ ခိခိ ခိခိ , ခိခိ ခိခိ ခိခိ ခိခိ ,,
 ၆ : ခိခိ ခိခိ ခိခိ ခိခိ ,
 ခိခိ ခိခိ ခိခိ ခိခိ , ခိခိ ခိခိ ခိခိ ခိခိ ,,

OK

Size 13 ▼

Help[?]

Back

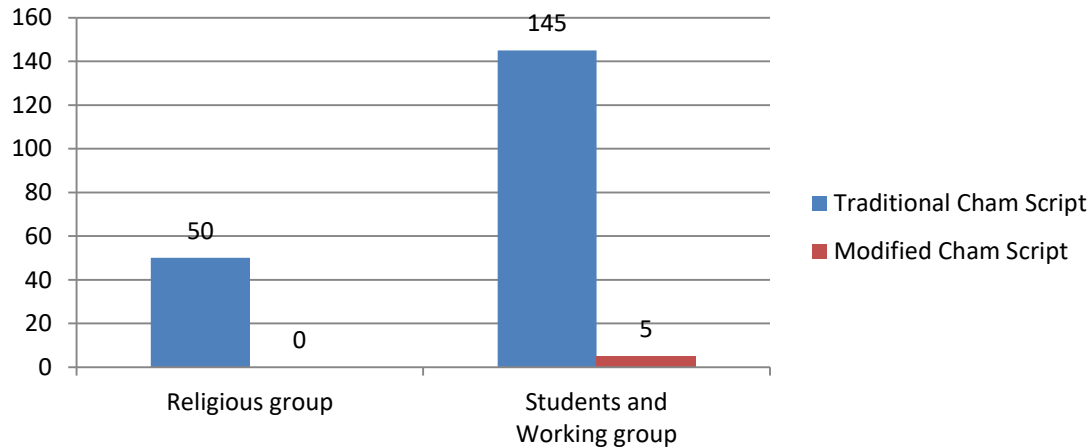
4. Discussion

- What is the choice of Cham script among Cham people?

Traditional Cham script: 97,50%

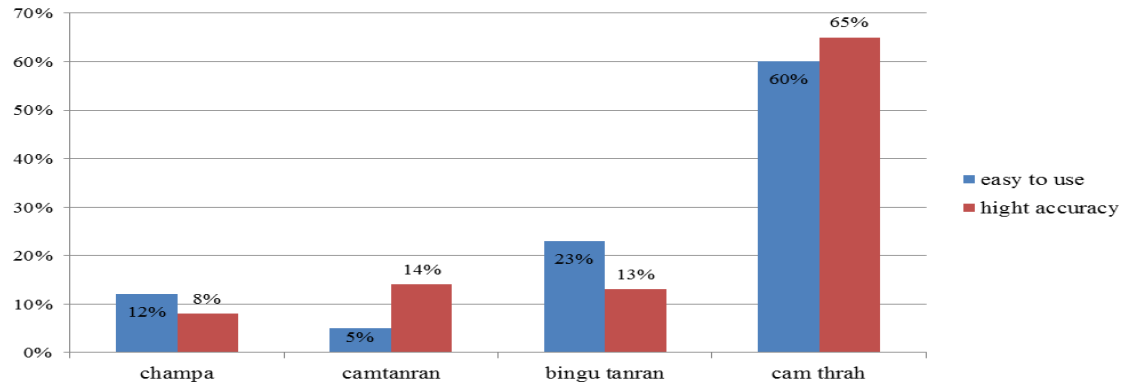
Modified Cham script: 2,50%

There is 100% concern the Religious group supported the Traditional Cham script.



Cham Font

- Compared with *camtanran.ttf*, *champa.ttf*, *bingudi tanran.ttf*, it is so that *cham Thrah* fonts have outperformed with high accuracy and easy to use.
- The cham thrah font can use for both Windows and Macintosh keyboard,
- Specifically, the acceptable level is 60% of usability and 65% of high accuracy. On the other hand, the acceptable level for *champa* font only is (12%, 8%), *camtanran* is (5%, 14%) and *bingu tanran* (23%, 13%).



Cham Script Conversion

The accuracy percentage of four Cham Poems:

Ariya Gleng anak (99,88%);

Nai mai mang Makah (99,92%);

Ariya Cam Bini (100%);

Ariya Po Ceng (99,91%).

Cham font conversion application will be used in schools, institutions as well as

Cham Poem	Number of words	Checks (%)	Error (%)
Ariya Gleng anak	2459	99,88	0,12
Nai mai mang Makah	2523	99,92	0,08
Ariya Cam Bini	1823	100	0
Ariya Po Ceng	2202	99,91	0,09

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5. CONCLUSIONS

- This study has been conducted to identify the choice of Cham script among Cham people about traditional Cham script and modified Cham script
- Cham fonts have been design based on Unicode and using for both Macintosh and Windows keyboard. Hence, Cham script character and Times New Roman characters have the same size
- Applications of Cham font conversion from EFEO Cham Latin to traditional Cham script were highly accurate.

Information technology applications is very useful (Cham font and Cham Script conversion) and has an important role in Cham language conservation.

Cảm ơn Quý vị quan tâm
Thanks for listening

ကျေးဇူးတင်ပါတယ်

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