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THE CONTACT BETWEEN SINHALA AND ENGLISH ORTHOGRAPHY IN ONLINE TEXT MESSAGES

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ABSTRACT

At present, using English characters to represent Sinhala words appears to be a common feature in online texting among Sinhala-English bilinguals. This study examines the contact between Sinhala and English orthography in online text messages in which Sinhala words are represented using English letters. Much research has been conducted on the contact between Sinhala and English, features and conventions of Internet language and language contact in digital Internet genres. However, no research has yet examined the linguistic phenomenon of using English characters to represent spoken Sinhala sounds. The data for the study come from a corpus of online text messages sent via mobile messaging applications (hereafter apps) such as Facebook Messenger, WhatsApp and Viber collected from 20 undergraduates in the Faculty of Arts of the University of Colombo. The text messages were collected using the friend of a friend method. The study identifies four main patterns of representing Sinhala vowel sounds and two main patterns of representing Sinhala consonant sounds through English letters. The findings invoke a need to expand the conception of frequential copying showing a potential emergence of a new variety of Sinhala in which the orthographic system is a result of the contact between Sinhala and English orthography. The identified patterns also help develop more user-friendly online Sinhala-English transliteration software than the existing ones such as Google Input Tools, SinGlish Transliterated and SinGlish (Phonetic) Transliterated which are unable to identify certain patterns of representing Sinhala vowel and consonant sounds through English characters or have their own transliteration schemes which the users have to adopt. Thereby, these patterns challenge the conventional idea that no system of transliteration of a (more) phonetic language by an unphonetic one like English can be perfect.

Keywords: *Online texting, contact, English orthography, spoken Sinhala sounds*

INTRODUCTION

Based on a corpus of online text messages[1] sent via mobile messaging applications[2] such as Facebook Messenger, WhatsApp and Viber in which Sinhala words are represented using English characters, this study aims to examine the results of the contact[3] between

Sinhala and English orthography in online text messages. It identifies patterns of representing spoken Sinhala vowel and consonant sounds[4] through English letters[5] in online texting since "electronic discourse is writing that very often reads as if it were being spoken – that is, as if the sender were writing talking" (Crystal, 2004, p. 25). Due to space constraints, the study will not focus on the identification of patterns of representing Sinhala vowel and consonant clusters through English characters.

Research has been conducted on "digital Internet genres" (Mendis, 2006, p. 125) focusing on features and conventions of Internet language (See, for instance, Porter, 1996; Davis & Brewer, 1997; Baron, 2000; Crystal, 2004; Zitzen & Stein, 2004 etc.) and the contact between two languages in digital Internet communication (See, for instance, Su, 2006; van Gass, 2008; Devic, 2008; Huang, 2009; Temur & Vuruş, 2009; Themistocleous, 2010; Tagg & Seargeant, 2012; Rafi, 2013 etc.). The contact between Sinhala and English has also been researched in the study of Ceylon English, Lankan English and/or Sri Lankan English (SLE) (See, for instance, Passé, 1948, 1950, 1955; Halverson, 1966; Chithra Fernando, 1977; Siromi Fernando, n.d., 1985, 2003, 2008a, 2008b, 2011/2012; Gunesekara, 2000, 2008; Herat, 2006; Meyler, 2007; Siromi Fernando, Gunesekera & Parakrama, 2010 etc.). Yet, no research has yet focused on the contact between Sinhala and English orthography in digital Internet genres which leads to the research problem of the present study.

How does Sinhala and English orthography come into contact in the use of English letters to represent Sinhala words in online text messages sent via mobile messaging apps such as Facebook Messenger, WhatsApp, and Viber?

(a) What are the patterns of representing Sinhala vowel sounds in the word initial, medial and final positions in online text messages?
(b) What are the patterns of representing Sinhala consonant sounds in the word initial, medial and final positions in online text messages?

The following are the objectives of the study:

(a) To expand Johanson's conception of "frequential copying" (2002, 2008).
(b) To show the potential emergence of a new variety of Sinhala in which the orthographic system is a result of the contact between Sinhala and English orthography in online texting.
(c) To challenge Gunasékara's (1962) claim about the systems of transliteration of a (more) phonetic language by unphonetic English.
(d) To help develop more user-friendly Sinhala-English transliteration software.

METHDOLOGY AND EXPERIMENTAL DESIGN

The data include online text messages sent through mobile messaging apps namely, Facebook Messenger, WhatsApp and Viber. These were collected from 20 undergraduates in the Faculty of Arts of the University of Colombo over a period of 10 months. A version of Milroy's (1980) "friend of a friend" method was used to collect data protecting the

privacy of the authors of the messages. Two friends of the researcher who had more access to the sample than the researcher were asked to obtain messages from their friends. The sample was selected based on the convenient sampling technique presuming that many individuals would be unwilling to share their messages due to the level of privacy attached to them. The study uses Johanson's (2002, 2008) "code-copying framework" as the principal method of data analysis. It also draws on the claims made by Gunasékara (1962), Vallins (1965), Crystal (2004) and Siromi Fernando (n.d.).

RESULTS

The patterns of representing Sinhala vowel sounds using English letters in the word initial, medial and/or final positions can be categorized as follows:[6]

A. The Representation of Spoken Sinhala Vowel Sounds

(a) The use of (an) English symbol(s) to represent a Sinhala vowel sound in the word initial, medial and/or final positions where the particular symbol(s) is/are used to represent the same or a similar sound in Sri Lankan English. Below are some examples:

Table 1: Long front low vowel 'ඇ' /æ:/

English symbols used to represe -nt the Sinhala vowel sound	Position in Sinhala words	Sinhala words	English words in which the said symbol produces the same or a similar sound	Position in English words
A	initial medial final	***a**thin* /æːt̪in/ ඇතින් *k**a**ma* /kæːmə/ කැම *b**a*** /bæː/ බැ	s**a**nd /sæːnd/	medial

(b) The use of (an) English symbol(s) to represent a Sinhala vowel sound in the word initial, medial and/or final positions where the particular English symbol(s) is/are used to represent (a) different sound(s) in Sri Lankan English. Below are some examples:

Table 2: Long front low vowel 'ඇ' /æ:/

English symbols used to represent the word	Position in Sinhala words	Sinhala words	English words in which the said symbol produc-es the spoken Sinhala vowel sound	The sounds produced by the said symbols in English words
E	initial medial final	***e**thin* /æːt̪in/ ඇතින් *k**e**li* /kæːli/ කැලි *b**e*** /bæː/ බෑ	-	/e/ - g**e**t /get/ /i/ - kiss /kis/ /iː/ - m**e**te /miːt/
Ae	initial final	***ae**thin* /æːt̪in/ ඇතින් *n**ae*** /næː/ නෑ	-	/eː/ - j**ae**ger /dʒeːgəː/
ah	final	*b**ah*** /bæː/ බෑ	-	/aː/ - **ah** /aː/

(c) The reduplication of an English symbol to represent a Sinhala vowel sound in the word initial, medial and/or final positions where the reduplication of the particular symbol represents a different sound in Sri Lankan English. Below are some examples:

Table 3: Long back mid vowel 'ඕ' /oː/

Reduplicated English symbol and spelling pattern	Sinhala words and positions in Sinhala words	English words in which the said symbols produce the spoken Sinhala vowel sound	The sounds produced by the said symbols in English words

Symbol: o Spelling pattern: oo	initial ***oo****lu* */o:lu/* ඕලු final *apoo* /apo:/ අපෝ	-	/u/ g**oo**d /gud/ /u:/ **oo**ze /u:z/ f**oo**l /fu:l/ t**oo** /tu:/

(d) The creation of a new spelling pattern (that is not present in English) to represent a Sinhala vowel sound in the word initial, medial and/or final positions through the reduplication of an English symbol. There are two types. Below are the two types with examples:

The use of the particular symbol twice

Table 4: Spoken Sinhala long front low vowel 'ඇ' /æ:/

Reduplicated English symbol	New spelling pattern created	Position in Sinhala words	Sinhala words
a	aa	initial medial final	***aa****thin* /æ:t̪in/ ඇතින් *k****aa****lla* /kæ:llə/ කැල්ල b**aa** /bæ:/ බෑ

The use of the particular symbol more than twice.

Table 5: Long front low vowel 'ඇ' /æ:/

Reduplicated English symbol	New spelling pattern created	Sinhala words	Position in Sinhala words
a	aaa	*n****aaa*** /næ:/ නෑ	final

The Representation of Spoken Sinhala Consonant Sounds

The patterns of representing Sinhala consonant sounds using English letters in the word initial, medial and/or final can be categorized as follows:

(a) The use of (an) English symbol(s) to represent a Sinhala consonant sound in the word initial, medial and/or final positions where the particular symbol(s) produce(s) the same or a similar sound in Sri Lankan English. Below are some examples.

Table 6: Dental unvoiced stop 'ත' /t̪/

English symbols used	Position in Sinhala words	Sinhala words	English words in which the particular symbol(s) produce(s) the same or a similar sound	Position in English words
Th	initial	***th****ibba* /t̪ibba:/ තිබ්බා	**th**in /t̪in/	initial
	medial	*a****thth****a* /æt̪t̪ə/ ඇත්ත	loa**th**some /lo:t̪səm/	medial
	final	*ba****th*** /bat̪/ බත්	pa**th** /pa:t̪/	final

(b) The use of (an) English symbol(s) to represent a Sinhala consonant sound in the word initial, medial and/or final positions where the particular symbol(s) produce(s) (a) different sound(s) in Sri Lankan English. Below are some examples:

Table 7: Dental unvoiced stop 'ත' /t̪/

English symbol used	Position in Sinhala words	Sinhala words	English words in which the particular symbol(s) produce(s) the Sinhala sound represented	The soundsproduc-ed by the said symbol in English words
T	initial	***t****ibba* /t̪ibba:/ තිබ්බා	-	/t/ - **t**in /tin/
	medial	*a****tt****a* /æt̪t̪ə/ ඇත්ත		
	final	*behe****t***		

		/behet/ බෙහෙත්		

DISCUSSION

In his description of "frequential copying," Johanson (2002) says that "elements which already exist in the basic code…undergo an increase or decrease in frequency of occurrence" in the basic code (p. 292). The first three main patterns of representing Sinhala vowel sounds and two main patterns of representing Sinhala consonant sounds can be considered what Johanson (2002, 2008) refers to as "frequential copies" (p. 292, p. 74) for the frequent spelling patterns in the model code English are copied onto the basic code Sinhala. The first and second sub-patterns under the fourth pattern of representing Sinhala vowel sounds seem to reflect the feature of "Netspeak" which Crystal (2004) talks about – the use of "repeated letters (aaaaahhhhh, hiiiiiii, ooops, soooo) for emphasis" (p. 34). As shown in Crystal's (2004) example, this feature occurs in the use of English on the Internet. Thus, they can also be considered "frequential copies."

The copied English symbols are however, new to the basic code. Therefore, Johanson's (2002, 2008) conception of "frequential copies" needs to be expanded accordingly - frequential copies can be referred to as elements which already exist in the basic code and/or are new to the basic code which may undergo an increase and/or decrease in the frequency of occurrence. In this respect, elements which already exist in the basic code may undergo either an increase or decrease in the frequency of occurrence while the elements that are new to the basic code may undergo an increase in the frequency of occurrence.

The research subjects' intense and regular use of the copied elements can be considered what Johanson calls "habitualization" (2002, p. 298, 2008, p. 65). As "habitualized copies", the patterns of representing Sinhala vowel and consonant sounds through English symbols identified in the study tend to "occur frequently, regularly and normally" among the research subjects (Johanson, 2002, p. 298). This frequent and regular use of the copies reflects a certain degree of "acceptance" of the copies by the bilingual research subjects who seem to constitute a "speech community" (Johanson, 2002 p. 299, 2008 p. 65). However, it is necessary to observe the occurrence of the copies in the basic code over a longer period of time to identify them as "conventionalized code-copies" (Johanson, 2002, p. 299, 2008, p. 65) for "the process of conventionalization is a continuum of changes in sociolinguistic status with gliding transitions between degrees of acceptability for individuals and for speech communities" (Johanson, 2002, p. 300). Thus, the study which focuses on messages sent by informants over a period of 10 months can argue that the copies seem to appear only as "part of a more general bilingual norm" (Johanson, 2002, p. 299) and seem to be undergoing a process of conventionalization.

While Johanson says that "language birth" may be the final result of conventionalization as the "high copying variety becomes the specific code of a whole speech community, including monolinguals" (Johanson, 2002, p. 299), this study suggests that the linguistic phenomenon of using English letters to represent Sinhala vowel and consonant sounds in online text messages has potential to give birth to a new variety of Sinhala in which the orthographic system is a result of the contact between Sinhala and English orthography.

The patterns identified also challenge Gunasékara's (1962) claim that "no system of transliteration of a phonetic language by an unphonetic one, like the English can ever be perfect" (p. 29). Just as there is a "method" in the "madness" or "inconsistencies" of English spelling (Vallins, 1965, p. 12), there is a method in the madness or inconsistencies in representing Sinhala sounds using English letters although they reflect the complexity of the contact between a more phonetic language like Sinhala and a less phonetic language like English (Fernando n.d., p. 10). Some patterns used to represent Sinhala vowel and consonant sounds through English letters reflect how the Sinhala-English bilingual Internet user takes advantage of the "madness" or "inconsistencies" (Vallins, 1965, p. 12) of English spelling to suit his/her own agenda either by using an existing English spelling pattern to represent a different sound or by creating a new spelling pattern. Certain patterns involve a reduplication of an English symbol in the representation of a long Sinhala vowel sound. It is presumably because the particular English symbol is also used to represent the short vowel sound of the particular Sinhala vowel sound. It seems to reflect the Sinhala-English bilingual Internet user's attempt to maintain the orthographic difference between the short and long Sinhala vowel sounds apparent in the Sinhala spelling system.

These complex patterns of representing Sinhala vowel and consonant sounds through English characters are useful to help develop more user-friendly online Sinhala-English transliteration software than the present ones such as 'Google Input Tools' ('Google ආදාන මෙවලම්') 'SinGlish Transliterated' and 'SinGlish (Phonetic) Transliterated' which cannot identify certain patterns of representing Sinhala vowel and consonant sounds through English characters identified in the study or have their own transliteration schemes including capitalized English letters and punctuation marks which the users have to adopt when texting online.

CONCLUSION

As discussed above, the identification of the patterns of representing Sinhala vowel and consonant sounds through English characters that emerge in the contact between Sinhala and English orthography in online text messages manifests the empirical significance of the study. The theoretical significance of the study lies in illustrating the need to expand Johanson's (2002, 2008) conception of "frequential copying" and its challenge on Gunasékara's (1962) claim about the systems of transliteration of a (more) phonetic language by unphonetic English. While the social relevance of the study lies in its contribution to the development of more user-friendly online Sinhala-English transliteration software, its disciplinary relevance comes from its contribution to the

existing body of research on language contact in digital Internet genres and the contact between Sinhala and English.

Further research can be done by expanding the research sample and/or choosing the research sample from a different Sinhala-English bilingual context to see whether more patterns of representing Sinhala vowel and consonant sounds through English letters can be identified in online texting. The research scope can be expanded by focusing on the patterns of representing Sinhala vowel and consonant clusters that were not specifically examined in the study. A longitudinal study can be conducted to see whether the orthographic patterns identified will be conventionalized and a new variety of Sinhala will emerge as a result. How potential sociolinguistic variables such as gender, age, regional background, level of English knowledge of the informants and so forth impact the formation of the patterns can also be studied.

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NOTES

[1] According to Mendis (2006), a "text message" is the popular name for SMS (Short Message Service) which is "a type of digital discourse that has come into being with the developments in mobile telephone technology" (p. 125). This study is on 'online' text messages which belong to "digital Internet genres" (Mendis, 2006, p. 125).

[2] Mobile messaging applications "allow you to send and receive pictures or text messages without paying for SMS" (Holt, Bossler & Seigfried-Spellar, 2015, p. 341).

[3] In the simplest definition, "language contact is the use of more than one language in the same place at the same time" (Thomason, 2001, p. 1).

[4] Speech sounds are certain acoustic effects voluntarily produced by the organs of speech; they require that the speech-organs shall be placed in certain definite positions or moved in certain definite ways" (Jones, 1969, p. 1). Rajapaksha says that spoken Sinhala has thirteen vowel sounds (1997, p. 12). Unlike Disanayaka, Rajapaksha does not include the mid central long vowel sound /ə:/ in his classification of vowels but the mid central short vowel sound /ə/ which he refers to as "*schwa*". For a detailed illustration of the distribution of spoken Sinhala vowel and consonant sounds, see Disanayaka, 1991, pp. 65-124.

[5] "Letters provide a means of symbolizing sounds" (Jones, 1956, p. 11). The word 'letters' will be used interchangeably with the words 'symbols' and 'characters' in the study.

[6] Due to space constraints, the paper presents only a few examples of spoken Sinhala vowel and consonant sounds represented through English letters (For more examples, see

Malalasekera, pp.19-116). Most examples of English words included in the tables are taken from Vallins (1965). For more examples, see Vallins, 1965, pp. 48-51. Note that Vallins (1965) uses API phonetic symbols while this study uses Fernando's (1985) SLE phonetic symbols for it represents the Sri Lankan English pronunciation of the words. The phonetic symbols used by Weerasinghe et al. (2004-2007) are used to represent the Sinhala vowel and consonant sounds in the tables.

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THE IMPACT OF ACADEMIC EMOTIONS ON LANGUAGE LEARNING IN THE UNIVERSITY CONTEXT: A NARRATIVE REVIEW

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ABSTRACT

Emotions affect learning in general and language learning (LL) in particular since they contain useful information that guides human cognition, behaviour and motivation. As such, emotions experienced in an academic setting affect the learner in a variety of ways. University students are frequently affected by emotions as a result of the difficulty in adjusting. This condition is observed as having impacted on LL, particularly on English, which has now become a very decisive factor in academic learning and achievement in Sri Lanka. The study aimed at identifying the wide array of emotions that are experienced in academic settings, their properties, the theoretical underpinnings, sources, functions and the impact of positive academic emotions (PAE) and negative academic emotions (NAE) on LL. It was also expected to identify the research trends in emotions and LL over the decades. This article is composed in the form a narrative review for which 30 studies on emotions and learning during the past 16 years were explored. A narrative inductive method was utilized to identify patterns across gathered data and to condense varied secondary data gathered from extensive reading into a summary format. The information found were analysed thematically in relation to the research questions. The findings suggest that, it is very difficult to set clear cut rules to prove positive emotions (PE) foster and negative emotions (NE) hinder LL for they serve different useful purposes. The impact of emotions on LL should therefore be further analyzed theoretically and investigated empirically pertaining to different contexts. There also exists a need to empirically test the existing limited theories on emotion to figure out the range of their validity within diverse contexts. The major implication derived from the study is that, language teaching in Sri Lankan universities, where English is taught as a second language (L2), is quite a mindful undertaking which should be planned and carried out with great care bearing in mind the strong relationship between emotions and learning.

Keywords: Emotions, Academic Emotions, Learning, Foreign & Second Language *Learning*

INTRODUCTION

Individual variables have widely been known and proven to have a major impact on human beings. Among them, affective variables impinge strongly on everything people do and particularly on learning. This study revolves on the idea that, "emotions are fundamental to learning" (Hinton, Miyamoto, & Della-Chiesa, 2008 as cited in Ismail, 2015, p: 30) and contain useful information that can regulate cognition and behaviour (Bless & Fiedler, 2006; Izard, 2002 as cited in Valiente, Swanson & Eisenberg, 2012). Research has demonstrated that emotions play a significant role in the process of learning and academic achievement (Randler, Glaser-Zikuda, Vollmer & Mayring, 2011 as cited in Ismail, 2015). However, research on emotions in learning is still scarce (Imai, 2010; Méndez López, 2011; Pekrun et al., 2002; Stuchlíková et al., 2013). Moreover, the different approaches and empirical studies on the interplay of learning and emotions apparently correspond to each other only to a low extent (Hascher, 2010). Pertaining to LL, the research base on the impact on emotions is even lesser. Scovel (2000) (as cited in Arnold, 2009) notes that emotions might well be the factor that most influences LL, but, are the least understood by researchers in Second Language Acquisition (SLA). This might be due to the fact that affective variables are difficult to measure. Damasio (1999) wrote (as cited in Garrett & Young, 2009) emotion was too subjective, elusive, vague and not trusted in the laboratory. Nonetheless, many scholars including Arnold (2009); Dulay, Burt & Krashen, 1982 as cited in Krashen(1992); Gardner (2010); Gardner & MacIntyre (1993); Goetz & Hall (2013); Henter (2014); Ismail (2015); Méndez López (2011); Méndez López & Aguilar (2013); Pishghadam, Zabetipour, & Aminzade (2016); Siročić (2014); Stuchlíková et al. (2013) have investigated that affect plays a significant role in LL.

The present study was conducted to investigate the impact of academic emotions on LL. Emotions experienced in an academic environment, for instance, enjoyment of learning, pride of success or test-related anxiety, to name a few, can be termed as 'academic emotions' (AE) (Pekrun et al., 2002). The term can precisely be defined as "the emotions that are directly linked to academic learning, classroom instruction, and achievement" (Pekrun et al., 2002, p: 92). As Pekrun et al. (2002) suggested, the sphere of academic emotions may include students' achievement emotions experienced in academic settings, but goes beyond emotions relating to success and failure by also covering other emotions relating to instruction or to the process of studying (see Table 1).

Within the university context, knowing how to regulate emotions properly helps the process of learning in general and Second Language (L2) and Foreign Language (FL) learning in particular. Learning English as a L2 or a FL has presently become a compulsory study area in the universities and knowing how to communicate appropriately in English has become a very decisive factor in academic achievements**.** Besides, it is commonly observed that the university students encounter a lot of difficulties when expressing themselves in English during lectures, presentations, viva voce and in written assignments and examinations as well. This is an effort to identify how these problems are affected by the range of emotions experienced by students.

Méndez López (2011) has claimed FL learners are prone to experience a range of emotions and feelings due to internal and external factors. A major problem encountered by university students is that they are frequently subjected to emotional upheaval due to the difficulty in adjusting (Pancer et al., 2000). This difficulty is caused by various reasons. Significant numbers of first-year students report moderate to high levels of loneliness (Cutrona, 1982 as cited in Pancer et al., 2000) and homesickness (Fisher & Hood, 1988 as cited in Pancer et al., 2000) and many report difficulties keeping up with their academic work (Levitz & Noel, 1989 as cited in Pancer et al., 2000). It can also be observed that students are emotionally affected as a result of personal matters such as; forming new relationships, relationship break-ups, family problems, financial issues and stress.

Hence, the review was composed exploiting the important findings of 30 previous studies on learning and emotion carried out from year 2000 to 2016 in order to explore the impact of AE on LL with a special focus on the university context. To serve this purpose, the study aimed at identifying different emotions and properties of emotions that students experience in academic settings, the theoretical underpinnings, sources, functions and the impact of PAE & NAE on LL. It was also expected to identify the research trends in emotions and LL to present suggestions for future research.

Despite the importance, in Sri Lanka and elsewhere, very limited number of research has been published on the impact of AE on LL. It is believed that this review will be an important effort that would contribute to the existing body of knowledge. It will also provide insights to language teachers in order to better assist the students by understanding and regulating learners' emotions in fostering learner-friendly classrooms to enhance LL.

METHODOLOGY

Emotions in educational settings are said to be context-dependent and subjective responses to a specific situation, object or person (Do & Schallert, 2004; Hascher, 2010). Therefore, it is very unlikely that emotions are easily measurable, the causes of emotions are easily identifiable and the results of a study on emotions are easily generalizable. This nature of emotions made the present study to be based on a qualitative approach which gave new insights into the impact of AE on LL. As Jeon et al. (2010, p:02) defined, qualitative studies are those aiming to "uncover and understand a phenomenon, a process, or perspectives and worldviews of people, with or without a particular theoretical orientation, using typical qualitative methods for sampling, collecting, analysing, and interpreting data". Besides, qualitative research is especially important in the behavioural sciences where the aim is to ascertain the underlying motives of human behaviour through which various factors that stimulate people to behave in a particular manner or that make people like or dislike a particular thing can be analysed (Kothari, 2004).

The present study takes the form of a narrative review which is a qualitative analysis of existing research on a selected topic. "Narrative is suggested as a knowledge-generating method and its underlying hermeneutic approach is defended as providing validity and

theoretical structure" (Jones, 2004, p:95) and according to Pavlenko & Lantolf (2000) (as cited in Garrett & Young, 2009) in recent years narrative genre per se has gained increasing stature in Psychology, Sociology, Sociolinguistics, and Anthropology as legitimate and rich data sources for a variety of investigations including that of narrative construction of selves and realities.

A narrative inductive method was utilized to review research articles where a rigorous process of systematic reading of research articles and coding of the information gathered was done to identify patterns across gathered data. The information found were analysed thematically in relation to the research questions. Thematic approach has been demonstrated by Braun & Clarke (2006) as a flexible approach that can be used across a range of epistemologies and research questions to analyse qualitative data. The purposes for using an inductive approach were to condense extensive and varied secondary data into a summary format and to establish clear links between the research objectives and the findings derived from the data (Thomas, 2006)**.**

Composing a narrative review on the impact of AE on LL enabled the researcher to comprehend more about the topic and to get a deeper understanding of the range of emotions that are common in academic settings. Additionally, it helped identify the methods that had been utilized by researchers to study the impact of emotions over the past years. In connection with the research questions, the study apparently uncovered the vast array of AE experienced by the university students, the theories of emotion, the sources & functions of AE and the effects of PAE & NAE by adapting the said methodology.

RESULTS, DISCUSSION AND CONCLUSION

Though emotions play a major role in learning, the study revealed that, only after the acceptance of the role of affective factors in SLA, the impact of emotions on LL has been identified as an interesting area for research (Mihaljević Djigunović & Legac, 2008 as cited in Siročić, 2014). However, a majority of the recent studies related to the impact of emotions seemed to be largely found on learning a FL than a L2**.** For example, out of 15 studies found on affect in FL and L2 learning, 10 studies were found on FL learning, 04 were found on L2 learning and only 01 found on both**.** Nevertheless, all the studies witnessed that affective variables play a significant role in FL and L2 learning. Hence, it was noted that, whatever the language context it be, the impact of emotions on learning is significant.

This section of the review presents, elaborates and discusses the results of the study based on different themes: properties of emotion, theories of emotion, emotions experienced in academic settings, sources & functions of AE, the impact of PAE & NAE on LL and past research trends. It will also provide concluding remarks and a glimpse of possible areas for future research.

Properties of Emotion

It was found that, the major problems encountered by the researchers of emotion in learning can be attributed to the theories of emotion and the confusion about the definition of 'emotion' (Hascher, 2010) since over 100 different definitions of 'emotion' (Kleinginna & Kleinginna, 1981 as cited in Hascher, 2010)and many similar terms that are often used interchangeably like 'feeling', 'mood', 'affect' or 'affective reaction' exist (Davidson et al., 2003 as cited in Hascher, 2010). However, it is commonly believed that emotions are intense, short-lived affective states to particular stimuli and usually have a cause and clear cognitive content (Do & Schallert, 2004; Hascher, 2010; Imai, 2010). They are portrayed as 'ways of being' and 'holistic episodes' (Schutz et al., 2006, p. 345 as cited in Hascher, 2010), observed, felt in the body, and can be expressed, disguised towards others but rarely towards oneself (Hascher, 2010). It was also observed that many identify the affective component as a subjective and individual experience of a person (Do & Schallert, 2004; Fehr & Russel, 1984 as cited in Imai, 2010; Hascher, 2010), conversely, Imai (2010, p.279) argues that "emotions are not just an individual's private inner workings in response to external stimuli but are socially constructed acts of communication that can mediate one's thinking, behaviour and goals".

It had further been examined that emotions have multiple aspects and contain multiple components. The multiple aspects of emotions: physiological, psychological, behavioural (Schutz et al, 2006 as cited in Hascher, 2010) and social aspects (Imai, 2010) lead emotions to contain multiple components, usually five: the affective, cognitive, motivational and physiological components which are significant in the process of teaching and learning (Scherer, 1987; Izard, 1994 as cited in Hascher, 2010 Stuchlíková et al., 2013). Additionally, there is a strong neurobiological support for the importance of affect for learning (Arnold & Fonseca, 2009). It was found that from the perspective of neuroscience, affect is a part of cognition (Schumann, 1994 as cited in Arnold, 2009) and much of the affect that humans generate is likely to be non-conscious (Davidson, 2003).

Theories of Emotion

The importance of the close association between learning and emotion is not at all new but was already pointed out by the early Greek philosophers, influential psychologists and by innovative educators in the history (Hascher, 2010). In spite of the obvious relationship between learning and emotion, very little is known about it. For decades, learning was mainly analysed in terms of cognitive or motivational aspects to gain a deeper insight into the complex area of learning, consequently, affective processes were ignored when forming learning theories (Hascher, 2010). However, theories and models introduced from recent research on emotions in learning such as, control-value theory of achievement emotions (Pekrun et al., 2007), socio-cognitive model of the development of academic emotions (Goetz et al., 2006), the socio-educational model (Gardner, 2010), expectancy-value theories of emotions (Turner & Schallert, 2001 as cited in Pekrun et al.,2007) bear witness to the emerging attention towards emotions associated in the process of language teaching and learning.

Nevertheless, emotional diversity implies that theory-driven approaches to students' emotions which restrict the range of emotions considered for theoretical reasons may be in danger of missing important parts of students' affective life (Pekrun et al., 2002). Some of those approaches to emotions like "control-value theory of achievement emotions by Pekrun (2000), models addressing the effects of emotions on learning and performance (Fredrickson, 2001; Pekrun, 1992b; Pekrun et al 2002a; Zeidner, 1998, 2007), transactional theories of stress appraisals and related emotions (Folkman & Lazarus, 1985), attributional theories of achievement emotions (Weiner, 1985) and expectancy-value theories of emotions (Pekrun, 1984, 1988, 1992a; Turner & Schallert, 2001) also suggested that they are limited only to particular emotions" (as cited in Pekrun et al.,2007) as opposite to the wide array of emotions experienced by learners in academic settings.

Emotions Experienced in Academic Settings

It was found that, theoretically, students experience a rich diversity of 'self-referenced, task-related, and social' emotions in academic settings (Pekrun et al., 2002) although most of other emotions except anxiety have been neglected in research. According to (Pekrun et al., 2002), emotions that are experienced in academic settings can be summarized into the list of emotions depicted in Table 1.

Table 1: The Domain of Academic Emotions: Examples

Emotions in Academic Settings		
	Positive	**Negative**
Task (caused by task) & Self-related (caused by self) Emotions		
Process of studying (instruction)	Enjoyment Enthusiasm Excitement	Boredom
Prospective (Outcome expectancy)	Anticipatory Joy Hope	Hopelessness Anxiety
Retrospective (when success or failure occurred)	Joy about success Satisfaction Pride Relief Contentment	Sadness Disappointment Shame and guilt Tense Frustration
Social		
	Gratitude Delight	Anger Disgust

	Empathy Admiration Sympathy& love	Jealousy & envy Contempt Antipathy & hate

Source: Pekrun et al. (2002)

Identifying and capturing different types of emotions experienced by students has been a challenging endeavor. Those emotions engendered in educational contexts are said to be a result of the evaluation students make of particular situations while learning (Pekrun, 2000 as cited in (Méndez López, 2011). "These evaluations are influenced by previous experiences, the social context and their personal goals" (Pekrun et al., 2002; Sansone & Thoman, 2005 as cited in Méndez López & Peña Aguilar, 2013, p: 112). This is of particular relevance to the learning of a FL or L2 since students mostly come with previous positive or negative experiences; in this case, the English language learning experiences in schools or private tuition classes, which are sometimes very different from the new learning environment; pertaining to the present study, the English language learning experience in the university and students. The students in a university may also have a diversity of motives for engaging in FL learning. The interplay of all these variables in one emotional event during classroom instruction may have different meanings for individual students and cause diverse effects on their motivation (Do & Schallert, 2004) and LL.

Impact of PAE and NAE on Language Learning

PE have long been perceived and proved as facilitative while NE have been considered imposing negative impact on learning. For example, as cited in Bryan, Mathur & Sullivan (1996, p: 154), "positive affective states have been found to increase memory on various tasks (Potts, Morse, Felleman, & Masters, 1986); mastery of a discrimination task (Masters, Barden, & Ford, 1979); altruism (Isen & Levine, 1972); and child compliance (Lay, Waters, & Park, 1989)" whereas negative affective states, have been found to produce "low-effort processing of information and the use of less complex semantic processing strategies (Ellis, Thomas, & Rodriguez, 1984) and lower cognitive processing effort" (Leight & Ellis, 1981 as cited in Bryan et al., 1996, p: 154). Moreover, with his metaphor of the affective filter, Krashen (1992) warned about the emotional variables that may interfere with the reception and processing of comprehensible input while learning, thereby, highlighting the importance of finding ways to establish a positive affective climate within class rooms.

Recent research findings also manifest that positive affect can provide invaluable support for learning just as negative affect can close down the mind and prevent learning from occurring altogether (Arnold, 2011). As cited in Simonton (2016), enjoyment and performance has a positive association (Chen et al., 2008; Pekrun et al., 2009) and similarly, it has been found that when students learn content that is perceived as controllable and is valued, it is likely to evoke feelings of enjoyment in the learner (Pekrun, 2006). This implies the importance of using content-based learning approach as a strategy for getting students interested in the material. As Chomsky (1988) said, about 99% of teaching has to

do with getting students interested in the material (Arnold, 2009). These findings provide important implications to material developers in the Sri Lankan university context.

It had further been found that, affectively positive environment puts the brain in the optimal state for learning: minimal stress and maximum engagement with the material to be learned (Arnold, 2009). Fredricks et al., 2004; Fredrickson, 2001(as cited in Simonton, 2016, p: 09) have discovered that "experiences of positive emotions such as enjoyment trigger higher levels of student engagement whereas boredom can facilitate feelings of alienation and disengagement**".** However, the findings of a study conducted by Pretz, Totz & Kaufman (2010) did not support the general conviction which was also their hypothesis; implicit learning would be enhanced by positive mood and intuitive cognitive style. Moreover, Méndez López & Peña Aguilar (2013) claim that students embraced NE as learning opportunities because they referred to these negative events in class as a way of understanding what they were doing wrong and how to improve on that particular skill. Therefore, it is very difficult to set clear rules to prove PE foster learning and NE are detrimental (Bless & Fiedler, 1999 as cited in Hascher, 2010).

It is obvious that any classroom situation is influenced by the relationship between learning and affect but with LL this is especially crucial since the learner's self image is more vulnerable when he or she does not have the mastery of language (Arnold, 2011). Therefore, being fully aware of the emotional state of the learner and strategically steering the classroom environment in order to enhance LL should essentially be facilitated by the language teacher. This is very important in the Sri Lankan university context where English is taught as a L2.

Sources and Functions of Emotions

Personality of the learner, day of the week, time of the day, weather, stress, age, sleep, exercise, social activities and gender can be generally identified as sources of emotions (Hume, 2012). However, three major proximal sources of emotions—genetic dispositions, physiological processes and cognitive appraisals, have been identified pertaining to an individual (Pekrun et al., 2002). Since AE are domain-specific variants of emotions in general, these three main sources should be applicable for this class of emotions as well. Although genetic dispositions and physiological processes of students are beyond the control of language teachers, emotionally relevant appraisals of students may be shaped by their instructional and social environments, implying that research on appraisals and their environmental antecedents may help in designing measures of prevention, therapy and optimization (Pekrun et al., 2002). With regards to LL, learning context, situation and materials also carry emotional potential (Hascher, 2010).

Emotions serve many functions in LL. Darwin (1965) argued that emotions developed over time to help humans solve problems and they motivate people to engage in actions important for survival. All emotions, both positive and negative, serve useful purposes (Hume, 2012). PE accelerate assimilation to incorporate new information into existing knowledge whereas NE accelerate accommodation to take in new information with less

regard for what is currently known (Bless & Fiedler, 2006). Emotions assist accuracy and efficiency of thinking processes; help learning and recalling memory, facilitate complex cognitive functions that require flexibility, integration, and utilization of cognitive material; form perceptions and influence people to behave in particular ways (Bryan et al., 1996). Schürer-Necker (1984, 1994) (as cited in (Hascher, 2010), investigated that for persisting with a text, emotions like joy, surprise or even disgust were important, thus, content needs to be emotionally touching to be processed and remembered well, which is a major implication for the curriculum developers and material writers.

Research Trends in Affective Factors

When considering research trends in affective factors, anxiety; particularly test anxiety, is the only emotion that has extensively been researched and continuously attracted the researchers over the years (Hascher, 2010; Goetz & Hall, 2013; Pekrun et al., 2002; Schutz & Pekrun, 2007). It was found that out of 1514 studies conducted on emotions in learning and achievement, during 1974–2000, approximately 80% of studies were related to anxiety (Pekrun et al., 2002) (See Figure1). Apart from test related anxiety, language anxiety has also been researched far more than the other emotions. For example, Pishghadam et al. (2016); Henter, (2014); Siročić, (2014) have investigated on language anxiety which has been found as "negatively affects willingness to communicate and quality of performance" (MacIntyre & Gardner, 1991, 1994; MacIntyre, Noels & Clément, 1997 as cited in Siročić, 2014, p: 07). Investigations on PE were remarkably less and examining NE has thus been more prevalent among researchers (Pekrun et al., 2002).

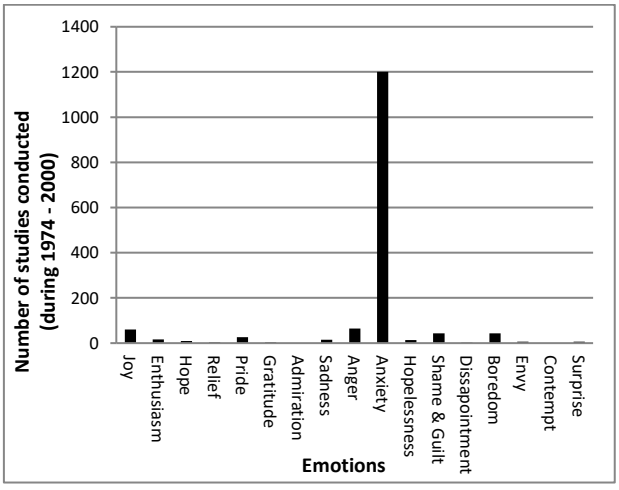

Figure 1: Studies conducted on emotions in learning and achievement during 1974–2000
Source: Pekrun et al. (2002)

The findings further revealed that, at present, there is a tendency among researchers to ascribe phenomena such as individual variables, multiple intelligences, emotional intelligence, collaborative learning and student engagement into research related to emotions, which is a positive sign. Additionally, it was uncovered that both quantitative and qualitative methods were used to study emotions in academic settings. The most

prevalent quantitative methods found were hypotheses testing (Pekrun, et al., 2002) and co-relational studies. Introducing different emotion scales to measure emotions was also observed as common. On the other hand, case studies were popular in qualitative studies. Personal narratives of L2 learners, either in the form of the diary studies or in the more structured form of learner memoirs, also seemed to have recently received increased attention and a trusted source to gather qualitative data on emotional experience (Block, 2003; Kramsch, 2003; McGroarty, 1998; Pavlenko, 2001; Pavlenko &Lantolf, 2000; Schumann, 1998; Young, 1999) (as cited in Garrett & Young, 2009). Laboratory-based experimental research on mood effects also were used to measure emotions (Pekrun et al., 2002).

Grateful to the research findings in the literature, today, interest in affect has taken on even greater importance for language teaching practices. For example, the Common European Framework of Reference for Languages includes 'Existential Competence' which is composed of the elements of the affective domain (Arnold, 2009). Moreover, "the current concept of learner-centered teaching also links with a concern for affect in the classroom" (Arnold, 2009, p. 146).

It has been ascertained from the findings that "supporting students' emotions in language learning classrooms can help students to cope with feelings inherent to language learning experiences and to the development of a positive attitude towards themselves as language learners" (Méndez López, 2011, p:44). Pishghadam et al. (2016) have also emphasized the necessity of helping students manage, regulate, and control their emotions and feelings in language classrooms. As it was observed, "research has neglected when and why emotion is associated with academic success" (Valiente, Swanson & Eisenberg, 2012, p: 07), further research can be carried out to investigate the phenomenon.

In conclusion, it was discovered that emotions are fundamental to learning in general and LL in particular. Findings suggest that studies on emotion and learning were largely found on FL than on L2 and anxiety was the only emotion that was extensively tested while all the other emotions including positive emotions were neglected. Taken all together, there are a handful of limited but interesting theories on emotion which need to be empirically tested to figure out the scope of their validity within different contexts. This implies that it still remains as an open question as to how these theories fit into the realities of the university education. The major implication is that, since university students are frequently subjected to emotional upheaval due to various reasons, language teaching in universities, especially where English is taught as a L2, is a mindful venture which should be planned and executed with great care acknowledging the strong relationship between emotions and learning. It was also found that, it is very difficult to set clear rules to prove PE foster and NE hinder language learning for they serve different useful purposes**.** Therefore, the impact of emotions on LL should further be theoretically analyzed and empirically investigated pertaining to different academic contexts in sri Lanka rather than interpreting them in general terms. For future research, an actual study to assess the impact of emotions in the Sri Lankan university context can be done to see whether the existing theories would be

qualified. Further, conducting more research on the impact of positive emotions may also reveal certain uncovered aspects.

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DETERMINING THE STATISTICAL PROCESS CONTROL LIMITS FOR UNCERTIFIED SRI LANKA STANDARD (SLS) BOXES OF MATCHES IN SRI LANKAN MARKET

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ABSTRACT

Quality control limits through Statistical quality control charts are used to control the quality of the process in product manufacturing. It can be used to determine whether the manufacturing process is operating according to the desired quality standards. Manufacturing boxes of matches should be in appropriate quality as it is considered the safety consuming item. This paper addresses the main objective of determining the statistical quality control limits for uncertified Sri Lanka Standards (SLS), boxes of matches manufactures in Sri Lanka". Sub research objective is "to determine whether SLS Uncertified Boxes of matches are Really safety related to its production process.". 1135 sample units of match sticks were used for the study using 25 samples for the study. Primary data were gathered using direct observation method from uncertified Sri Lanka Standards box of matches manufacturers regarding the considered quality characteristics in both variables and attributes in product. Eight quality dimensions such as the number of matches in a box, ignition and burning, afterglow, length of splint and match head, bending strength, were the considered quality characteristic of the boxes of matches. These quality characteristics were taken from SLS recommendations. Statistical Quality control equations, Statistical quality charts were used to analyse the data. Lower control and upper control levels of the characteristic of the SLS uncertified match boxes are as follows. Length of Splint 30.7 mm -34.8mm, length of the head 3.3mm -3.5mm, Burning time 13.8sec – 17.8 sec, Bending strength 35.1sec-40.7 sec, Afterglow 1.46 sec- 2sec, safety 0 -12.6, adherence

0-4.89, No of match sticks in the box 44-46 sticks. Generated quality control limits prevailed within SLS requirements except the quality dimensions, the Length of Splint and the Burning time. They highlight that these boxes of matches which do not have SLS are unsafe due to the uncontrolled production process based on SLS. Thus, the Sri Lankan manufacturers should draw their attention to produce full quality productions with a high priority to safety.

Keywords: *Quality Control limits, boxes of matches, Quality Control charts.*

INTRODUCTION

Sri Lanka makes an attempt to remain and enhance the position in the world market while marching parallry with the changes in global economy factors. Therefore, to compete and to win the competitions in global market and local market, Sri Lankan industries are drawing attention towards for innovative and cost reduction strategies and making big efforts to overcome the difficulties of them. According to the annual report of Central Bank of Sri Lanka, highlights that the industry sector in Sri Lanka is achieving less presentation in G.D.P Around less than32% in 2015 and this mount as well as components in industry sector shows the positive trend in changes in GDP compared to previous years. Therefore, it is need of the time to draw attention towards the marketing procedures as well as a quality of the Sri Lankan industry products due to the Quality Of the product is considered as a primary indicator of organizational performance and key parameter in order to measure the performance of the product and services. Many researchers identified that Quality of the products resulted the in gaining sustainable competitive advantages (Gronroos 1998). The key of the quality can ability to exceed the expectations of the customers by providing them a required products or services which have low cost on time and very time. (Chinyemba 2008, Wachs 2011). There for its needed to consider about the quality of the products and the procedure of quality control in an organization to meet the customer expectation in developing industry sector in Sri Lanka.

Quality control and Quality Assurance Should be properly maintained in aim of having a proper production system stating from obtaining appropriate materials to deliver a quality product to the customers. Quality control procedures ensure the quality of the specific sample or batch which include the analysis of reference materials (ISO 8402 Quality Vocabulary). Statistical process Control methods are used in manufacturing system in aim of upgrading the system to improve on quality and cost effective. It emphasizes on early detection and prevention of a problem and bring distinct advantages over quality methods such as inspection of end product (Mason 2017). Key tools in Statistical Process control are control charts, continues improvement and design experiments (Franco-Santo et al 2017). Variations of the production process which lead to the poor quality can be detected and corrected. This provides real time analysis to make a controllable baseline and improve process capabilities and focus on the areas which should be needed in a manufacturing process (Tan 2002). Thus, this paper is focus on the determining Statistical Quality Control

for the non-Sri Lanka Standards certified matches in boxes manufacture in Sri Lankan to analyse the quality in the process in safety purpose.

LITERATURE REVIEW

Statistical Process Control is a procedure of statistical method applying for control and monitoring the manufacturing process in aim of producing the quality products through ensuring whether that the production process is out of control. The evaluation of quality control is begun with the inspection (Dooley 2000). Detection of unconformity products and causes arguments regarding how these methods fail to facilitate economical quality procedures, are considered as the basis of inspection mechanism in production. All these considered due to the detection of products defects and variation in production line being considered too late to be solved (Deming 1986). In aim of prevention of problems, a better tool which generate advantages over inspection should be needed.

The systematic mechanism of Statistical quality control is considered as Statistical Process Control. This systematic process control tools in Quality Control technique highlights the excellence in Business performance in different industry spheres (Mann et all 1999). There are seven Statistical Quality Control tools such as Check sheet, Histogram, Pareto Charts, Cause and effect Diagram, Scatter diagram, Control Charts. Among these Statistical Quality Control, Control Charts are the most common tools for determining whether a process is under control or not in manufacturing process. Therefore, in this study Control Charts under Statistical Quality Control are used to determine whether the process of manufacturing Sri Lanka Standards (SLS) uncertified matches in a box are under control or not.

Boxes of matches are usual consumption item in Sri Lankan lifestyle. Boxes of matches are consumption in Sri Lanka for various reasons such as fire for source of energy for cooking in rural areas, complements good for a cigarette etc. The significant contribution made by these boxes of matches are identified as important element in goods in calculating Sri Lankan Colombo Consumer Price Index. According to the Sri Lankan Socio-Economics Data 2016 highlights that 78.5% represented the Firewood as a source of energy for cooking. Gas represented 18.5 % and Kerosene represented 1.9 % from total source of energy. Uva province recorded 95.2% as majority of people use firewood as a source of energy for cooking. North Central Provinces recorded nearly 94.8% of firewood usage and North Western province recorded nearly 92.5% of firewood usage as a source of energy for cooking. It highlights without considering the provinces people consuming boxes of matches to fire the firewood rather than other energy sources. When we look at total expenditure of a household in year 2015 people expenditure nearly 6.8% for fuel and light from their monthly salary. Eastern Proving household recorded the highest rate of 12.3 for fuel and light from their monthly salary (Sri Lankan Socio- Economics Data 2016).

Thus, above central bank reports highlights that the consumption behaviour of the people regarding the energy sources and expenditure patterns of the Sri Lankans which recorded

significant value leads to the consumption of Boxes of matches as essential element in daily household products. This highlights that the quality of the boxes of matches should be drawn attention in order to ensure the safety of the consumers. When we look at the quality consideration of boxes of matches in India, Indian Government has revised their standard of Indian Standard Specification for safety matches in boxes as IS 2653:2004 replacing IS 2653: 1993. According to the Central Market Department 11 in India 2004 highlights that the requirements of quality control in boxes of matches should be in the form of Contents, match of boxes, envelopment, easy of opening, Match splints, Unserviceable sticks. In Sri Lanka, there is a standard introduced and issued by the Sri Lanka Standard Institute for the manufacture of boxes of matches under SLS (Sri Lanka Standard) 11, "Safety Matches in Boxes". It is imposed to follow in safety procedures under SLS 11 to manufacture, distribute, transport, store and sell or display for sale of safety matches in boxes under the consumer Affairs Authority Act No 09 of 2003. (Extraordinary Gazette 2012). But in Sri Lankan market we can find boxes of matches under company names which do not certified SLS for the safety matches of boxes. Therefore, this paper Address the quality control limits in control charts to ensure the process quality in SLS uncertified Boxes of matches in Sri Lankan market.

RESEARCH QUESTION AND OBJECTIVE

Main research question is "What are the Statistical quality control limits for the uncertified Sri Lanka Standards (SLS), boxes of matches in Sri Lankan market?". And sub research question is "Are SLS Uncertified Boxes of matches manufactured in Sri Lanka are Really safety to consume?" Based on research questions following research objectives are derived. Main research Objective of the study is "To determine the Statistical quality control limits for uncertified Sri Lanka Standards (SLS), boxes of matches in Sri Lankan market". Sub research objective is "To determine whether SLS Uncertified Box of matches are Really safety to consume."

METHODOLOGY

This is a quantitative research in nature. Primary data are collected for the study. Basically, sample is considered by number of match sticks. 1135 sample units of match sticks are used for the study. These sample units are drawn under 25 samples and each sample is consisted with 3 boxes of matches.1135 match sticks are taken from 75 boxes. For Analysis purpose number of box of matches also considered for quality dimension. Sample size is decided by 25% from an hourly production. Direct observations activities are carried out to get generated the quality characteristics under 08 quality dimensions. These dimensions are considered based on Sri Lanka Standards (SLS) and other quality standard related to manufacture of boxes of matches. The eight (08) quality dimensions considered for the study related to manufacturing process of boxes of matches are highlighted in this table no 02

Inclusive criteria of selecting samples are 1. Only wax boxes of matches are considered.2. Non-Sri Lanka Standards (SLS) certified boxes of matches are considered. Exclusive

criterias are non-wax manufacture boxes of matches are not considered. Statistical Quality control equations and process control charts for variables and attributes are used to analyses the data. X bar charts and Range charts, np charts are used for the analysis purpose.

ANALYSIS

To analyses the Quality dimension number 1,2,3,4,5,8 in table no 01, Statistical quality control charts such as x bar charts and Range charts are used under variable control charts. To analyses the Quality Dimension Number 6,7 Statistical quality control charts such as np charts are used. x bar charts are used to determine the variation between the samples and R charts used to determine the variation inside the sample. Control line figures calculations relevant to the x bar charts are shown in table no 03.and control lines figure calculations related to range charts are highlights in table no 04.

Table 1: Considered Quality dimensions

Quality dimension no	Quality Dimension	Feature
1	Length of Splint (the match stick) with head	Total length of the match stick
2	length of the head	Length of chemical head
3	Burning time	Burning up to the half of the match length and consider the time
4	Bending strength.	The time to bear 300g weight by each stick
5	After glow	After burning first quarter of the stick time taken to extinguish.
6	Safety	Each stick hope to strike the match against a suitable surface (sand paper)
7.	Adherence	Check whether the stick can be separable from the match stick
8	No of match sticks in the box.	Check the number of sticks in the box.

Table 2: Control level calculations for x bar charts

Quality dimension no	Upper control level	Central level	Lover control level
1	$\overline{\overline{x}} + A_2 \times \overline{R}$ 32.76+(1.023*2) = 34.8	$\overline{\overline{x}}$ =32.76	$\overline{\overline{x}} - A_2 \times \overline{R}$ 32.76-(1.023*2)= 30.7

2	$\bar{\bar{x}} + A_2 \times \bar{R}$ 32.76+(1.023*2) =3.5	$\bar{\bar{x}}$ =3.4	$\bar{\bar{x}} - A_2 \times \bar{R}$ 32.76-(1.023*2)=3.3
3	$\bar{\bar{x}} + A_2 \times \bar{R}$ 15.8+(1.023*1.96) = 17.8	$\bar{\bar{x}}$ =15.8	$\bar{\bar{x}} - A_2 \times \bar{R}$ 15.8-(1.023*1.96)=13.8
4	$\bar{\bar{x}} + A_2 \times \bar{R}$ 37.9+(1.023*2.72) =40.7	$\bar{\bar{x}}$ = 37.9	$\bar{\bar{x}} - A_2 \times \bar{R}$ 37.9-(1.023*2.72)=35.1
5	$\bar{\bar{x}} + A_2 \times \bar{R}$ 1.68+(1.023*0.212)= 2	$\bar{\bar{x}}$ =1.68	$\bar{\bar{x}} - A_2 \times \bar{R}$ 1.68-(1.023*0.212)=1.46
6	$n\bar{p} + 3 \times \sqrt{n\bar{p}(1-\bar{p})}$ 12.6	$n\bar{p}$=5.7	$n\bar{p} - 3 \times \sqrt{n\bar{p}(1-\bar{p})}$ 0
7.	$n\bar{p} + 3 \times \sqrt{n\bar{p}(1-\bar{p})}$ 1.38+3.51=4.89	$n\bar{p}$=1.38	$n\bar{p} - 3 \times \sqrt{n\bar{p}(1-\bar{p})}$ 1.38-3.51=0
8	$\bar{\bar{x}} + A_2 \times \bar{R}$ 45.32+(1.023*1.08)=46.4	$\bar{\bar{x}}$ =45.32	$\bar{\bar{x}} - A_2 \times \bar{R}$ 45.32-(1.023*1.08)=44.2

Table 3: Control level calculations for Range charts

Quality dimension no (according to table 1)	Upper control level	Central level	Lover control level
1	$D_4\bar{R}$=2.574*2=5.1	$\bar{R}$=2	$D_3\bar{R}$=0*2=0
2	$D_4\bar{R}$= =(2.574*0.144)= 0.37	$\bar{R}$ =0.144	$D_3\bar{R}$ =0*0.144=0
3	$D_4\bar{R}$=2.574*1.96=5	$\bar{R}$=1.96	$D_3\bar{R}$=0*1.96=0
4	$D_4\bar{R}$= 2.574*2.72 =7	$\bar{R}$=2.7	$D_3\bar{R}$=0*2.72=0
5	$D_4\bar{R}$= 2.574*0.2=0.55	$\bar{R}$=0.2	$D_3\bar{R}$=0*0.2=0
8	$D_4\bar{R}$= 2.574*1.08	$\bar{R}$=1.08	$D_3\bar{R}$=0*1.08=0

Length of Splint (the match stick) with head

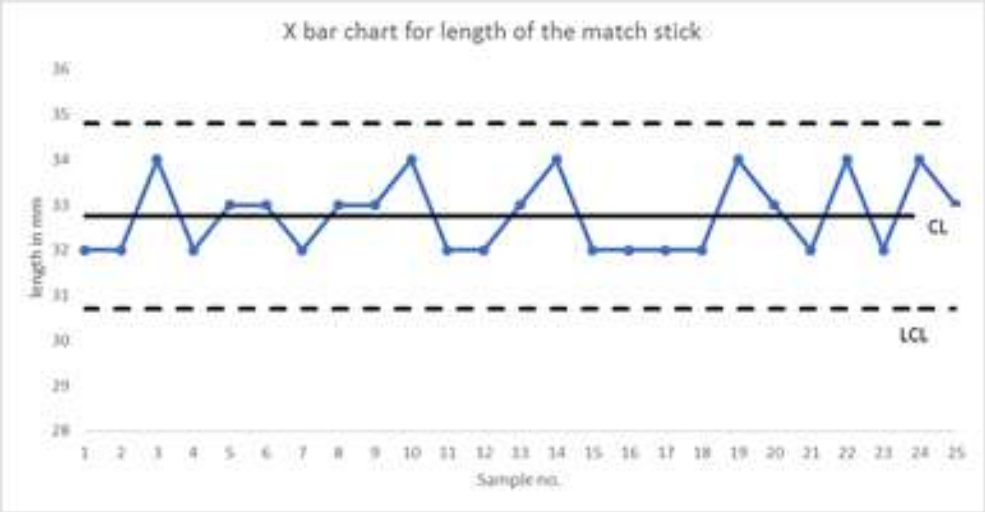


Figure 1: X bar chart for length of splint

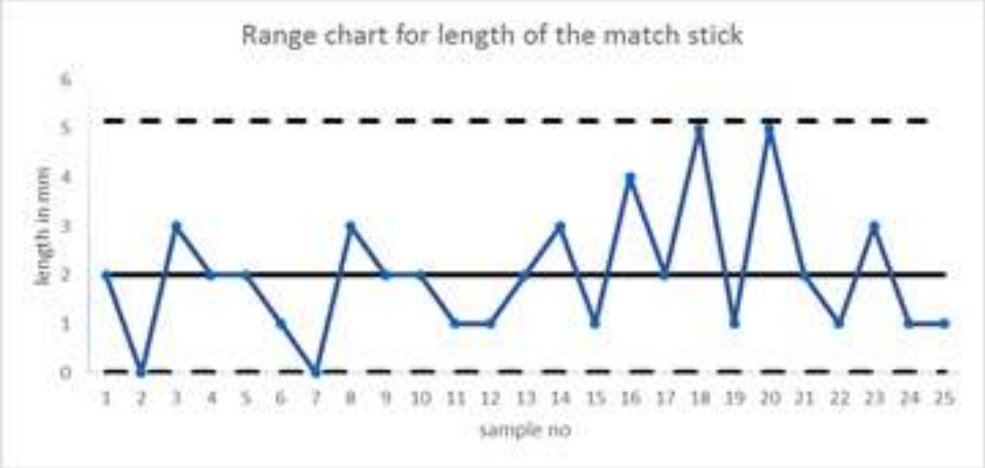


Figure 2: Range chart for length of splint

All sample points are prevailed between the control lines in both xbar chart and Range chart. Therefore, process of Length of Splint (the match stick) with head is under control.

Length of the head

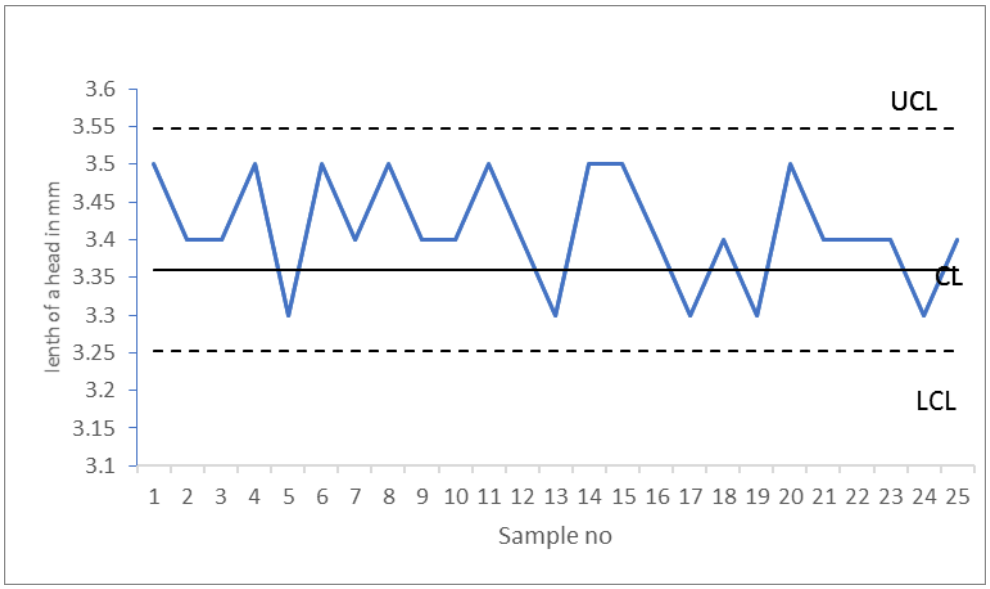


Figure 3: X bar chart for length of the head

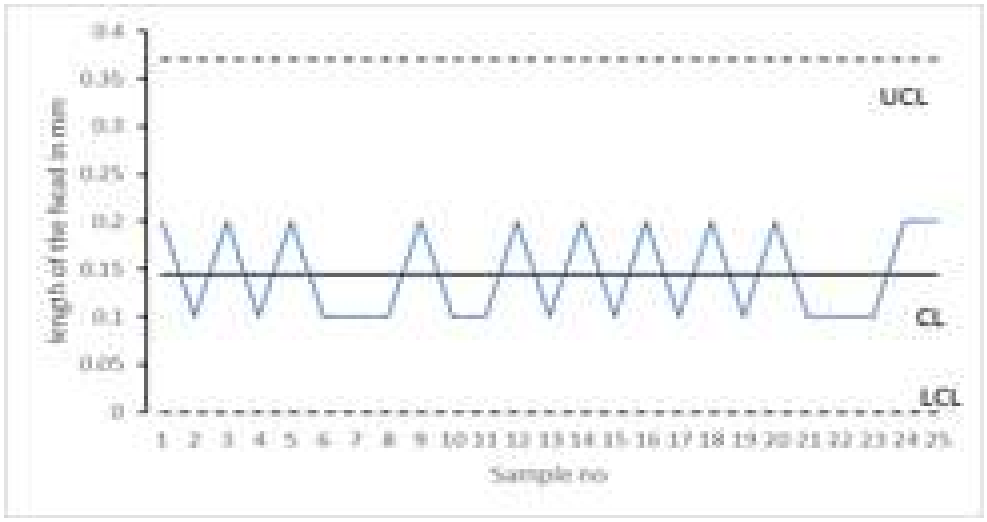


Figure 4: Range chart for length of the head

All sample points are prevailed between the control lines in both xbar chart and Range chart. Therefore, process of manufacturing length of the head is under control

Burning time

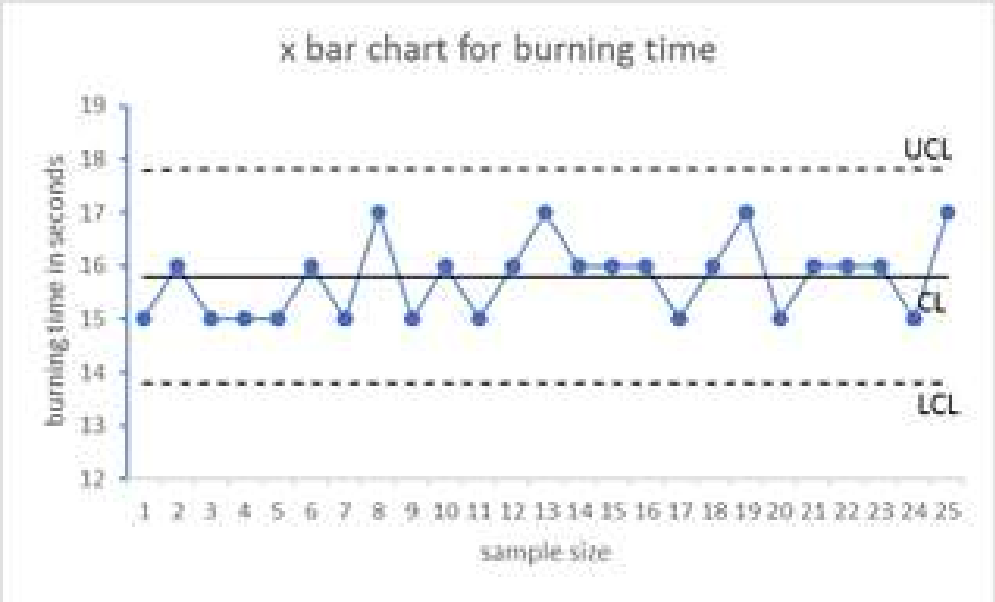


Figure 5: X bar chart for burning time

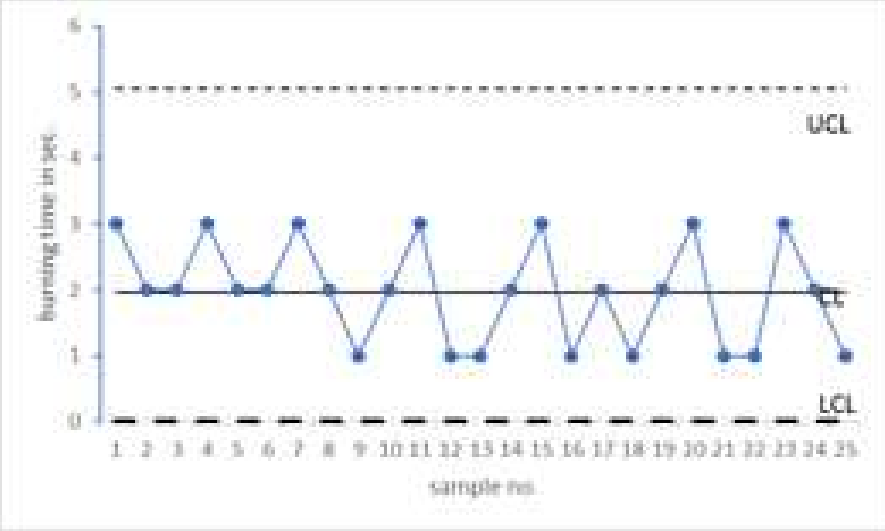


Figure 6: Range chart for burning time

All sample points are prevailed between the control lines in both xbar chart and Range chart. Therefore, process of manufacturing matches with good burning time is under control

Bending strength

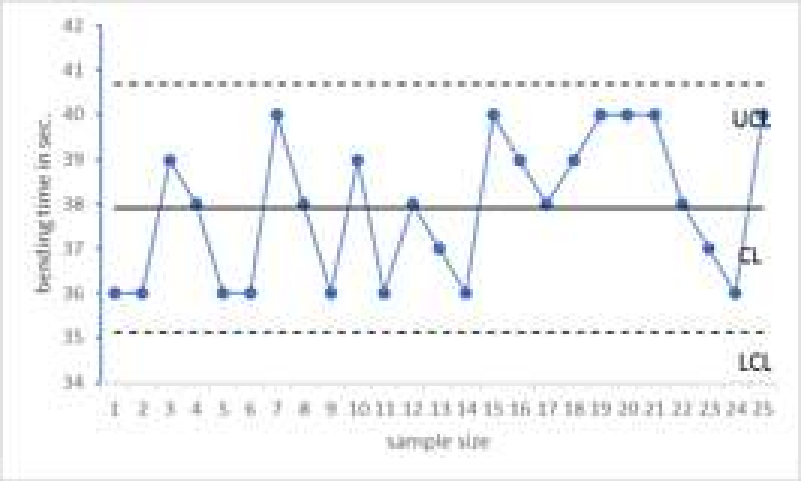


Figure 7: X bar chart for bending strength

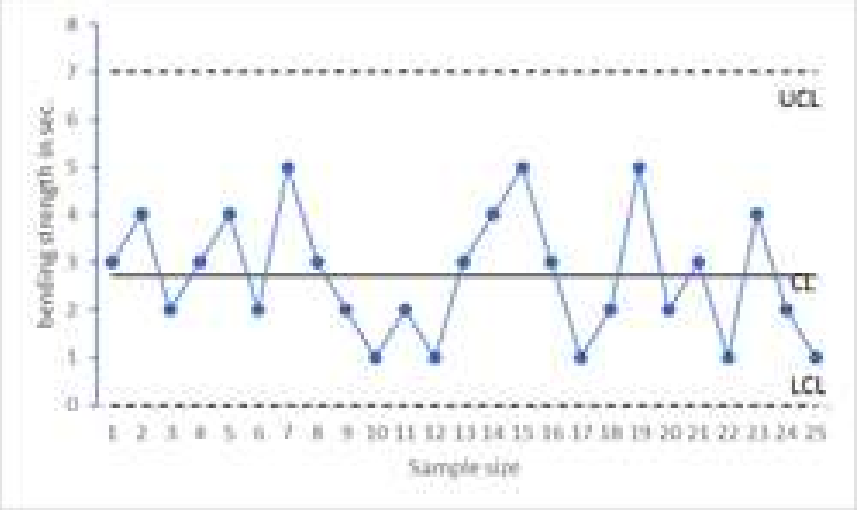
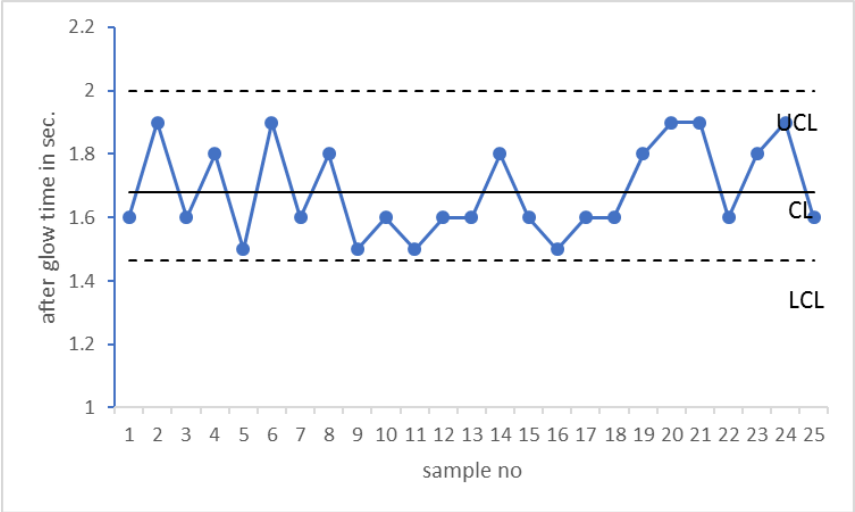


Figure 8: Range chart for bending strength

All sample points are prevailed between the control lines in both xbar chart and Range chart. Therefore, process of manufacturing matches with good bending strength is under control.

After glow



Ffigure 9: X bar chart for After glow

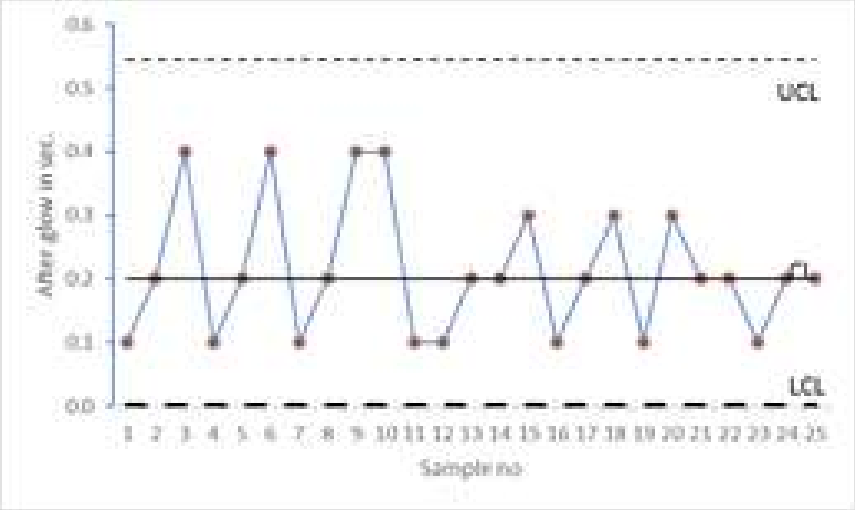


Figure 10: Range chart for after glow

All sample points are prevailed between the control lines in both xbar chart and Range chart. Therefore, process of manufacturing matches with good afterglow is under control

Safety

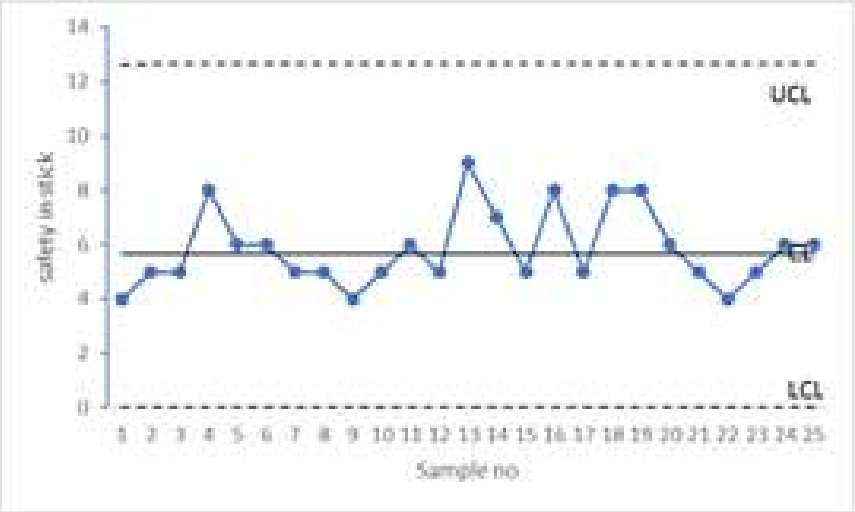


Figure 11: np chart for safety

All sample points are prevailed between the control lines in np chart. Therefore, process of manufacturing matches with good Ignite is under control.

Adherence

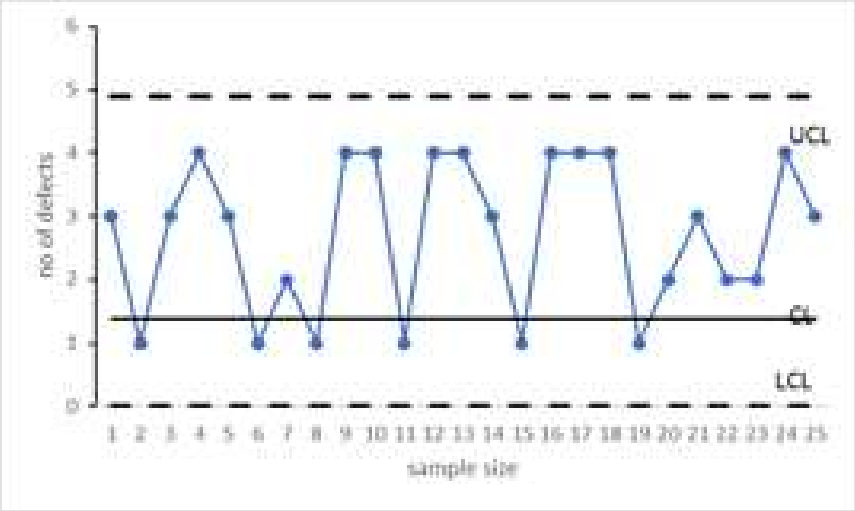


Figure 12: np chart for adherence

All sample points are prevailed between the control lines in np chart. Therefore, process of manufacturing matches with Adherence is under control.

No of match sticks in the box

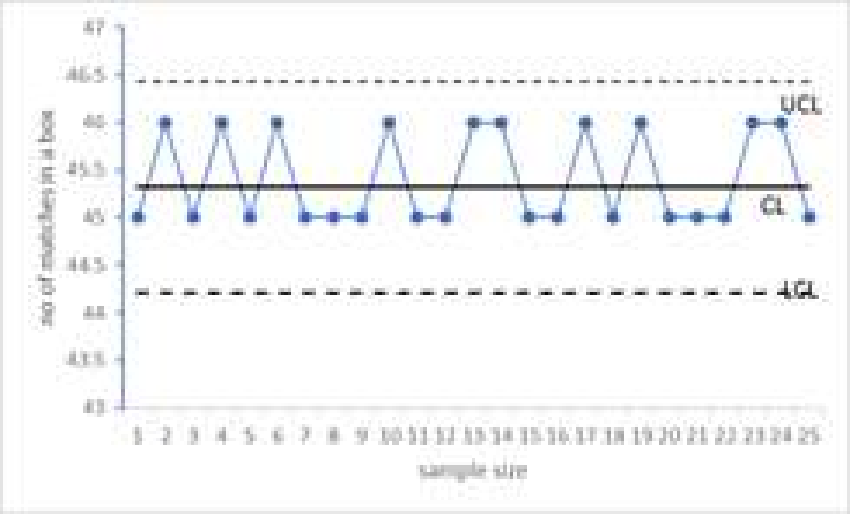


Figure 13: X bar for No of match sticks in the box

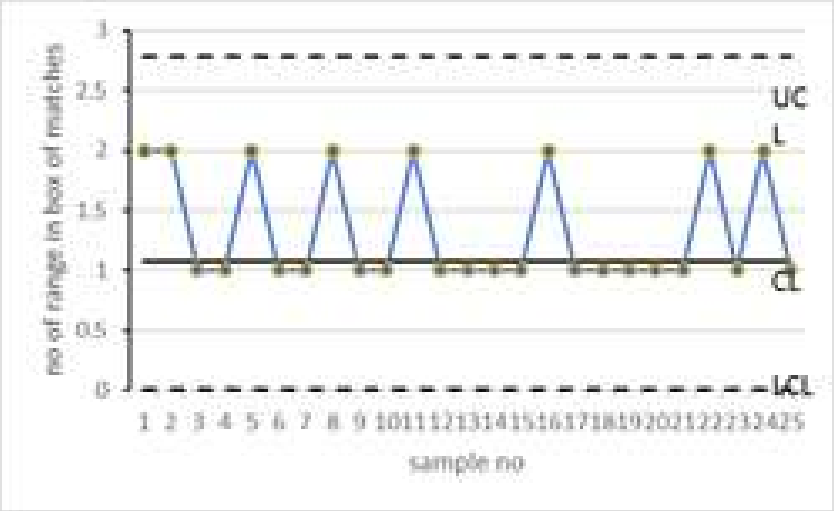


Figure 13: X bar for No of match sticks in the box

All sample points are prevailed between the control lines in both X bar chart and Range chart. Therefore, process of manufacturing matches with appropriate No of match sticks in the box under control

CONCLUSION

According to the analysis data quality control limits for the selected quality dimensions for the uncertified SLS boxes of matches are identified as an objective of the study in the Table 4.

Table 4: Quality control limits compared with SLS

Quality dimension	Quality control limits for SLS uncertified boxes of matches	SLS limit
Length of splint (the match stick) with head	30.7mm -34.8mm	32-35 mm
length of the head	3.3mm-3.5mm	$3.5mm >$
Burning time	13.8- 17.8	15s -18 s
Bending strength	35.1- 40.7 sec.	30s -40s
After glow	1.46s-2s	$3sc<$
Safety	$10>$	$10>$
Adherence	Unremovable	Unremovable
Number of match sticks in the box	Appropriate	Appropriate

According to the table no 10 it is revealed that generated quality control limits are prevail within SLS except the quality dimensions Length of Splint and Burning time. That highlights that these boxes of matches which do not have SLS are unsafety due to the uncontrol production process based on SLS.

RECOMMENDATIONS

The manufactures those who are not having SLS to produce boxes of matches should have ability to make changes and open a path to obtain the SLS to create win-win situation for both parties.

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Thank you all those who extended their helping hand when we were engaging in this study especially to the “Shakthi” box of matches manufactures in Kandy Providing us all equipment and tools and their tremendous support.

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A STUDY ON THE FACTORS INFLUENCING THE USE OF E-COMMERCE BY CUSTOMERS IN COLOMBO WITH RESPECT TO B2C MARKET

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ABSTRACT

This study explores the factors influencing the use of e-commerce by the customers in Colombo district with regard to the B2C market. The conceptual framework was designed based on the Theory of Planned Behaviour (TPB) and 24 potentially influential factors were explored throughout the study. Primary data were collected by means of a questionnaire given in internet based and printed formats where the respondents were received from both users and non-users of online purchasing in the Colombo district of Sri Lanka. 354 valid questionnaires were used in the analysis and the Cronbach's Alpha was 0.719 in the reliability test. A proper and well explained descriptive analysis of the variables followed by the KMO and Bartlett's test, Hypothesis testing, Factor analysis and an advanced model fitting was carried out. Analysis revealed that there is a very positive opinion towards online purchasing and people do have the willingness towards it. In view of the above and the model developed, it was found that attitudinal factors have a profound effect while subjective norm and perceived behavioural control shows a superficial effect on the online purchasing intention. Based on the inferences from research findings, recommendations and strategic and managerial suggestions were also made.

Keywords: Online purchase intention, Theory of Planned Behaviour, Decomposed Theory of Planned Behaviour, e-commerce

INTRODUCTION

With the advancement of technology, people have been able to fulfil most of their activities just away from a click of a button. Any field of work or industry you name, technology has played, is playing and, will play its part in order to facilitate the corresponding field or industry a user friendly, simplified and a value adding service in every aspect possible. Agriculture, Health & Safety, Finance, Education, Security, Construction, Communication and, Supply Chain can be identified as some of the industries significantly expedited with technology. In order to sustain, people have to fulfil their needs and wants. To achieve

these, they will have to find the sources of supply of these requirements. With the passing of time and the development of trade, different suppliers and manufacturers immerged where people could accomplish their purchasing requirement of goods and services from them. In a typical scenario, a customer will reach a retail outlet or a store proximate and purchase the product/s he/she wants. The aforesaid technology has made a turning point in purchasing where at present a lot of online platforms have come to stage which has made these activities far more easy, simple and efficient in the meantime. With the help of these ecommerce platforms, the customers have been able to do their purchasing online via internet without purchasing in-person. This has made drastic changes in supply chain where at some point it could be perceived as an advantage whereas at some point it is not.

Electronic Commerce also referred to e-commerce is one aspect that has emerged with the aid of technology where it can be identified as a business module or as a part of a large business entity which empowers a firm or an individual to carryout business activities over an electronic network; internet. Simply, e-commerce is the use of internet to carry out business or rather commercial activities such as online purchasing and subsequent functions. The Operation of ecommerce can be identified in major market segments/business model namely, Business to Business (B2B), Business to Consumer (B2C), Consumer to Consumer (C2C) and, Consumer to Business (C2B). Business to consumer (B2C) is a business or transactions conducted directly between a company and consumers who are the end-users of its products or services. However, the rise of the internet has created an entire new B2C business channel in the form of e-commerce or selling goods and services over the internet.

METHODOLOGY AND EXPERIMENTAL DESIGN

A collection of literature are refereed in order to identify the experimental design for the study. Reliability test, descriptive statistics, chi-square test for independences, Factor analysis, KMO & Bartlett's test and Regression Linear Models are used for the analytical purposes.

Technology Acceptance Model

As per Davis, (1989) a theoretical model was developed to explain and predict the user behaviour of information technology where the researcher has built a relationship between two main determinants of technology acceptance identified as, Perceived Usefulness (PU) and perceived Ease of Use (EOU).

Perceived Usefulness (PU)

As defined by Davis, (1989) PU is "the degree to which a person believes that using a particular system would enhance his or her job performance". This can be simply identified as the aspects where people tend to use or not use an application to the extent that they believe that it will help them to perform their work better. This follows from the definition of the word useful: "capable of being used advantageously".

Perceived Ease of Use (PEU)

In contrast with perceived usefulness, perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort". This follows from the definition of the word ease: "freedom of difficulty or great effort".

Theory of Planned Behaviour

The researchers Teo, (2001); Vijayasarathy, (2003); Wu, (2003); Chang, (2008); Laohapensang, (2009) and Chiu, (2005) has used the Theory of Planned Behaviour (TPB) in order to explain and predict consumer online shopping attitude, intention and behaviour. Chang M. K., (2005) had observed six studies of attitude toward online shopping and all of these studies has shown that attitude toward online shopping shows a significant positive impact on online shopping intention and behaviour.

Decomposed Theory of Planned Behaviour

Taylor, (1995) introduced the idea that TPB beliefs can be decomposed into multidimensional constructs where attitude, subjective norm and perceived control behavioural beliefs are decomposed as illustrated below.

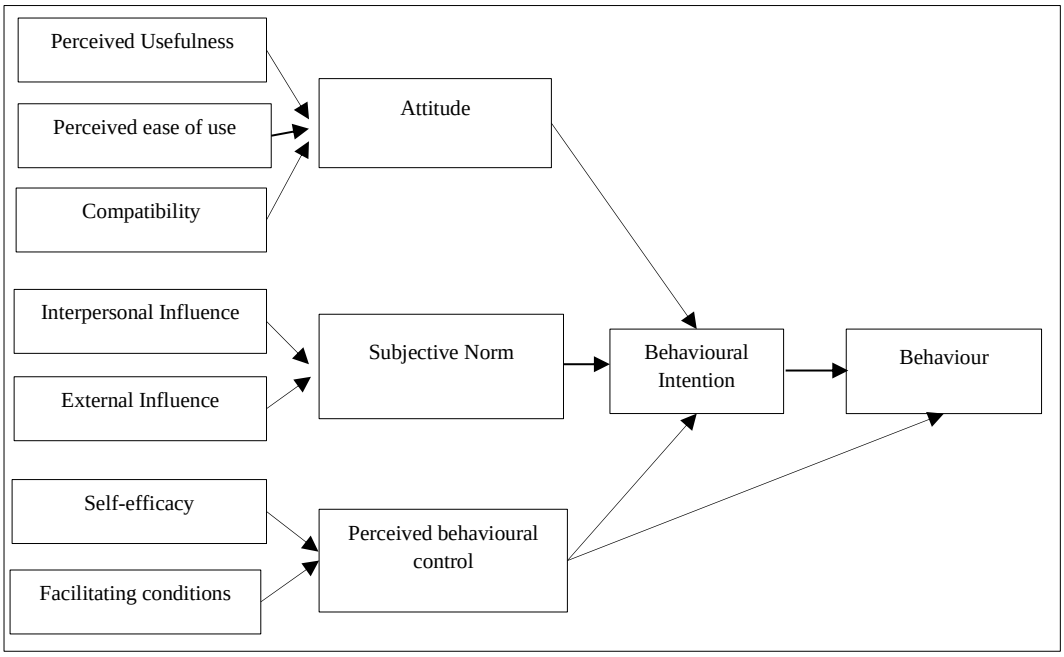

Figure 1: Decomposed Theory of Planned Behaviour
Source: Taylor (1995)

Sampling

Simple random sampling method is used as the sampling method of the research. Simple random sampling is a randomized process without any favoured treatment where each element in the population has got an equal probability of being selected to the sample (Sample of n from N population). Simple random sampling is accepted due to this characteristic, as well as, it is suitable to a population which is very much larger than the sample. Colombo district is selected based on the fact that Colombo province comprises the highest population (2012) among all districts (Economic and Social Statistics of Sri

Lanka., 2014) and that people in the Colombo district represents a homogenous group with similar lifestyles where given that, Department of Census and Statistics states that Colombo district has the highest population of internet users and a high literacy rate of 27.6% and 47.1% respectively.

Data Collection

A combination of a physical paper-based questionnaire and an internet-based questionnaire were used in data collection. Internet-based questionnaire was developed using Google Forms and mailed to accessible e-mail addresses. Social network sites were also utilized to distribute the questionnaire via the internet. The questionnaire was distributed to 420 in total, concerning the time constraint of the study. Considering both modes, a total of 362 responses were received out of which eight respondents were rejected due to partial completion of the questionnaire. Hence the number of complete respondents were 354 which accounted for a complete response rate of 84.28%.

Conceptual Framework

The conceptual framework is built primarily on the theories of planned behaviour and the decomposed theory of planned behaviour. Accordingly, the independent variables which are Attitude, Subjective Norm and Perceived Behaviour Control will be further divided with reference to the decomposed theory of planned behaviour along with the demographic factors. The dependent variable is identified as the Online Purchase Intention (OPI).

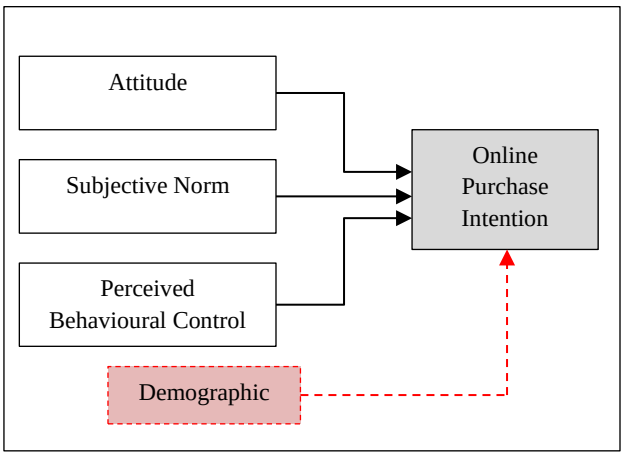

Figure 2: Conceptual Framework

ANALYSIS

A Cronbach Alpha value of 0.719 for 35 items was achieved and it interprets the reliability of the questionnaire used in data collection. A descriptive analysis is done on the demographic variables including age, gender, education, sector of employment, income level, etc. It is identified through the feedback that there exists a high overall online purchasing intention of 81% or 286 respondents out of 354 respondent sample whereas,

19% or 68 respondents have a low overall online purchasing intention. This implies the overall willingness of the respondents to engage in online purchasing.

Bivariate Analysis

The bivariate analysis has delivered a variation of measures in a two-way table as interpreted by an example below.

Table 1: Online purchasing intention vs. Save time

		Save time			Total
		Neutral	Agree	Strongly agree	
Online purchasing intention	Low	14	43	11	68
		20.6%	63.2%	16.2%	100.0%
	High	39	169	78	286
		13.6%	59.1%	27.3%	100.0%
Total		53	212	89	354
		15.0%	59.9%	25.1%	100.0%

Out of the respondents who have a low overall online purchasing intention, 63.2% have agreed to that online purchasing saves time while 20.6% and 16.2% hold neutral and strong agree upon the fact. On the other hand, it is evident that, 59.1% of the respondents who claims to be having a high online purchase intention have agree on the fact that online purchasing saves time. Therefore collectively, a total of 86.4% of the respondents with a high overall willingness to purchase online have positive views towards the fact that online purchasing saves time.

Chi-Square Test

With the results of cross tabulation (bivariate analysis), hypothesis testing has been carried out using Chi-square test to check the relationship between the online purchasing intention and other variables concerned.

The Hypothesis testing is as follows,

H0: Online purchasing intention is independent from the i^{th} variable

H1: Online purchasing intention is dependent on the i^{th} variable

Table 2: Chi-Square Test for the i^{th} variable

Variable (i^{th}) Name	**Test statistic**	**P value**	**Significance**
Influence of family	96.781	0.000	Significant
Cheaper	82.221	0.000	Significant
Like online purchasing than stores	77.108	0.000	Significant
Influence of friends	69.653	0.000	Significant
Can wait till delivered	53.954	0.000	Significant
Different payment terms	44.82	0.000	Significant
Have time	44.609	0.000	Significant
Not seeing the product	43.438	0.000	Significant
Influence of mass media	34.911	0.000	Significant
Can purchase online on own	33.288	0.000	Significant
Willing to pay online	32.694	0.000	Significant
Ease of getting skilled	29.587	0.000	Significant
Have money	25.519	0.000	Significant
Delivery fee	18.987	0.001	Significant
Reliable delivery	15.394	0.002	Significant
Delivery time	15.212	0.004	Significant
Save time	4.621	0.099	Insignificant
Comparison shopping	2.912	0.405	Insignificant
Positive views	1.865	0.000	Significant
Fits the lifestyle	1.422	0.000	Significant
Feel comfortable	1.394	0.000	Significant
Ease of learning to operate	1.275	0.000	Significant
Fits the purchasing need	1.124	0.000	Significant

Factor Analysis

***KMO and Bartlett's Test*:**

Table 3: KMO and Bartlett's Test:

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.679
Bartlett's Test of Sphericity	Approx. Chi-Square	4.166E3
	Df	276
	Sig.	.000

As KMO test statistic is 0.679 which is greater than 0.6, it can be concluded that sample size is adequate for a factor analysis to be proceed. The two hypothesis which are tested in the KMO and Bartlett's test are as follows.

Ho: There does not exist any correlations among the variables
H1: There exists correlations among the variables

As p-value of the Bartlett's test is 0.000, null hypothesis is rejected. Hence, it can be concluded that, correlation matrix is not an identity matrix which further supports the strength of the relationship among variables used in factor analysis**.**

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.990	24.957	24.957	5.990	24.957	24.957	3.298	13.740	13.740
2	2.276	9.484	34.441	2.276	9.484	34.441	3.238	13.490	27.231
3	2.167	9.028	43.469	2.167	9.028	43.469	2.204	9.184	36.415
4	1.920	8.000	51.469	1.920	8.000	51.469	1.843	7.680	44.095
5	1.339	5.580	57.048	1.339	5.580	57.048	1.810	7.540	51.635
6	1.310	5.457	62.506	1.310	5.457	62.506	1.700	7.084	58.719
7	1.167	4.861	67.367	1.167	4.861	67.367	1.633	6.805	65.524
8	1.085	4.520	71.887	1.085	4.520	71.887	1.527	6.363	71.887
9	.904	3.766	75.653						
10	.832	3.465	79.118						
11	.761	3.171	82.289						
12	.695	2.898	85.187						
13	.574	2.393	87.580						
14	.536	2.235	89.815						
15	.410	1.708	91.523						

Figure 3: Total Variance Explained

As per the Figure 3 shown above, we can observe the initial Eigen values which are greater than one. It can be observed that the first eight components carry Eigen values which are greater than one where we can select these eight components. In addition to that, the first component identified above, accounts for 24.957% of the variance while the second, third and the fourth components accounts for 9.484%, 9.028% and 8.000% respectively. The eight factors identified above has explained 72% of the total variance explained collectively.

Scree Plot

The scree plot helps to determine how many factors to be retain. It can be seen that the curve begins to flatten between the component eight and component nine. Therefore, it further elaborates that only eight components can be retained.

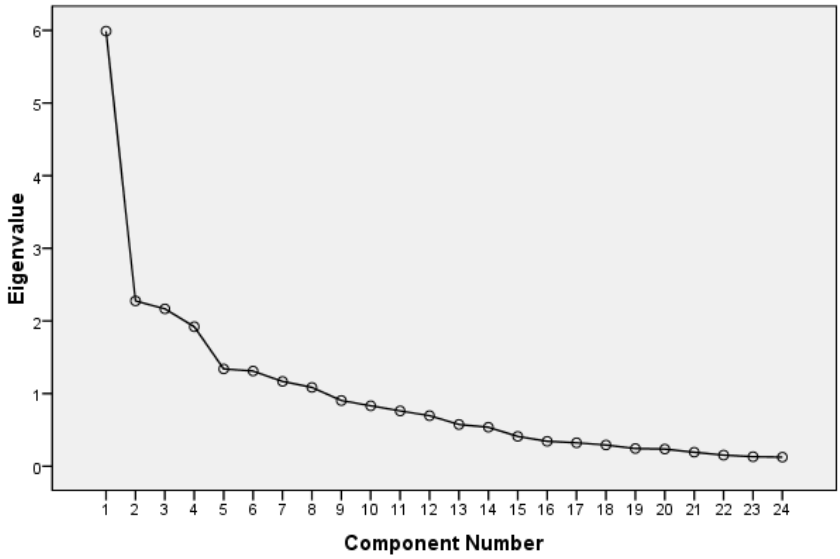

Figure 4: Scree plot for the variables

Rotated Component Matrix

Table 4: Rotated Component Matrix of variable

	Component							
	1	2	3	4	5	6	7	8
Save time	.150	.432	-.588	.089	.065	.185	-.040	-.374
Allows comparison shopping	-.340	.543	-.032	.526	-.064	-.234	.128	-.014
Purchasing online is cheaper	.147	.189	.232	.820	.100	.082	-.066	.020
Can enjoy different payment terms	.123	.108	-.065	.057	.003	.292	.648	.332
Ease of learning to operate	.681	.298	.073	-.358	.120	.095	.045	.115
Ease of getting skilled	.368	.440	.166	-.608	.126	.061	-.051	-.066
Fits the purchasing need	.482	.528	-.057	.022	.395	-.041	.215	-.111
Fits the lifestyle	.759	.281	-.076	.051	.265	.134	.103	.054
Reasonable delivery time	-.086	.469	.346	-.255	.123	.436	-.070	-.355
Low delivery fee	.178	-.031	.744	.123	.004	.016	-.249	.083
Like online purchasing than in stores	.297	.259	.255	-.257	.316	.431	.358	-.249
Can wait till delivered	.196	.005	.005	.015	.145	.877	-.106	-.019
Reliable delivery	-.066	.070	-.088	.033	.813	.157	.200	.035

Not seeing the product is not a risk	.007	-.037	-.015	-.020	.110	-.287	.804	-.158
Willing to pay online	.392	.286	.121	-.047	.682	.004	-.206	-.049
Influence of family	.160	.199	.792	.063	-.034	.104	.168	-.005
Influence of friends	.632	.130	.416	-.127	.073	.195	-.068	.052
Have seen/read positive views on online purchasing	.793	.023	.223	.155	-.204	.094	.071	-.115
Influence of mass media	.273	.405	.103	.271	-.244	.389	.156	.160
Feel comfortable in purchasing online	.242	.703	.314	.075	.217	.138	.031	-.034
Can purchase online on own	.115	.628	-.043	.085	.108	.008	.053	.292
Have time to purchase online	.227	.725	-.037	-.080	.032	.066	-.038	.126
Have money to purchase online	-.061	.224	.181	.067	.043	-.016	-.044	.808
Have equipment to purchase online	.369	.088	-.023	-.300	-.300	-.038	.353	.473
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.								
a. Rotation converged in 15 iterations.								

The main purpose of factor rotation is to minimize number of factors on which the variables under investigation have high loadings. Meaningful factors can be obtained by rotating factors. Specially, Varimax Rotation method is used in this study. As shown in the Rotated Component Matrix table shown in Table 4.30 above, rotation has reduced the number of factors on which the variables under investigation have high loadings which makes the interpretation of the analysis easier. According to the rotated factor loadings, 24 variables can be categorized for extracting eight factors. The eight factors are identified as below.

Factor 01 – Influence and Convenience
Factor 02 – Ability and Advantageousness
Factor 03 – Delivery and Influence
Factor 04 – Cheap
Factor 05 – Reliability
Factor 06 – Preference
Factor 07 – Risk Freeness
Factor 08 - Availability

Reliability of the factors are tested for and the first two factors are found to be reliable with 0.800 and 0.758 values of Cronbach Alpha.

Factor 01: Influence and Convenience

Under factor 01, which is "Influence and reliability", the following key areas are taken into discussion.

(a) Reliability
(b) Correlation
(c) Advanced Model Fitting

Reliability: The reliability of the variables affecting to influence, and convenience (Factor 01) were checked and a Cronbach's alpha value of 0.800 was obtained. Hence this factor is used for further analysis.

Correlation:

H0: Influence and convenience (Factor 01) is independent from the i^{th} variable

H1: Influence and convenience (Factor 01) is dependent on the i^{th} variable

Influence and convenience (Factor 01) is dependent on the below mentioned variables under five percent level.

(a) Age
(b) Gender
(c) Education
(d) Employment
(e) Income
(f) How often purchased online
(g) What is mostly purchased online

Advanced Model Fitting

Omnibus Test for Factor 01 is tested and a significance value of 0.000 is obtained which is less than 0.05. Hence the current model outperforms the null model.

The parameter estimates of "Influence and Convenience" were identified and the below mentioned fitted model was built up in conclusion.

Influence and convenience = 18.709 + 0.255(age_1) + 2.033(age_2) + 3.069(age_3) + 1.346(age_4) + 1.304(age_5) – 1.824(sex_2) + 11.836(edu_1) + 9.808(edu_2) + 8.660(edu_3) + 3.473(edu_4) – 9.165(emp_1) – 9.290(emp_2) - 6.979(emp_3) – 11.209(emp_4) – 7.743(emp_5) – 3.158(income_1) – 4.291(income_2) – 5.280(income_3) – 9.765(income_4) – 6.811(income_5) – 0.083(how.often_1) +1.673(how.often_2) + 2.926(how.often_3) + 4.861(how.often_4) – 5.322(what_1) – 2.591(what_2) - 2.486(what_3) – 2.625(what_4)

The variables used above in the model are identified as bellow.

Table 5: Interpretation of the variables

age_1	Below 18	emp_5	Retired
age_2	18 – 25	income_1	Below 20,000
age_3	26 – 35	income_2	20,001 – 40,000
age_4	36 – 45	income_3	40,001 – 60,000
age_5	46 – 55	income_4	60,001 – 80,000
sex_2	Female	income_5	80,001 – 100,000
edu_1	O/L	how.often_1	Never
edu_2	A/L	how.often_2	A couple times a year
edu_3	Degree	how.often_3	Monthly
edu_4	Masters	how.often_4	Weekly
emp_1	Student	what_1	Books
emp_2	Private Sector	what_2	Clothing/Footwear
emp_3	Public Sector	what_3	Jewellery/Accessories
emp_4	Business	what_4	Electrical Appliances

As per the above developed model, compared to a person whose age is above 55 years,

(a) A person in the age category of 46 – 55 years makes the person 1.304 times more likely to be influenced and convenient in using online shopping.

(b) A person who is in the age category of 36 – 45 years makes that person 1.346 times more likely to be influenced and convenient on using online shopping.

(c)A person in the age category of 26 - 35 is 3.069 times more likely to be influenced and convenient towards the use of online shopping.

(d) A person in the age category of 18 – 25 years makes the person 2.033 times more likely to be influenced and convenient in using online shopping.

(e)A person in the age category below 18 is 0.255 times more likely to be influenced and convenient to engage in online shopping than of the person above 55 years of age.

Similarly, the parameter estimates of "Ability and Advantageousness" were identified and the subsequent fitted model was built.

DISCUSSION AND CONCLUSION

Discussion on the demographic profile and preferences:

It is observed that 81% of the respondents have a high overall willingness towards the use of e-commerce or rather engage in online purchasing where only 19% has a low overall willingness. 354 valid questionnaires were used in the analysis with a Cronbach's Alpha value of 0.719 in the reliability test. This suggests that the internal uniformity of the

research instrument is good and has succeeded the required thresholds. The demographic attributes in respect of the overall intention for online purchasing is stated below.

Age can be considered as an important parameter in studying the willingness for online purchasing. As per the analysis carried out in chapter four, respondents in the age group of 18 – 25 accounts for a 47.2% of the respondents. It was observed that 86.7% of the respondents in this age category have a high online purchasing intention. The second highest age group below the age of 18 and 100% of the respondents below the age group of 18 have a high online purchasing intention. Next comes the age categories above 55, 36 – 45, 26 – 35 and 45 – 55 where the overall online purchasing intentions of these age categories being high were identified to be 15.2%, 80.8%, 76.0% and 53.8%. Hence it implies that population below the age of 45 is more likely to have a high overall online purchasing willingness/intention.

When the gender is taken into consideration, out of the total male respondents, 78.1% have a high online purchasing intention while for females, it is 85.4% of the total female respondents. Therefore, it shows a slight tendency of the females to have a higher online purchasing intention than the males.

The level of education can be also be considered here, where 100% of the respondents having done the O/Ls have a high online purchasing intention and so were the 93.5% of the respondents with the A/L qualification. It was evident that 78.2% of the respondents with a degree level education qualification, possess a high online purchasing intention. Respondents with masters and doctorates are less likely to be engaged in online purchasing.

The area of employment cannot be identified as a significant factor where unless retired, all the respondents do have a tendency towards online purchasing.

Once the type of goods most purchased online by the customers is concerned, it was identified by the study that expect for books, a majority of the respondents have an interest in buying footwear/clothing, jewellery/accessories, electrical appliances and electronic items online. This implies that the online store service providers have a great opportunity in a variety of goods.

As per the above findings, discussions and recommendations can be done in two perspectives which are from the perspective of the customer and the service provider.

Service Providers'/ Business Perspective

(a) Service providers could consider focussing more on the age category below 45 years of age since this age category in the sample consists respondents with high online purchasing intention.
(b) There is a sight tendency of the females to be more influenced towards the use of online purchasing than men.

(c) E-commerce or rather online purchasing is more commonly influenced with the level of income an individual received. Higher the salary, higher the overall willingness towards the use of online purchasing.
(d) A majority of the sample with high online purchasing intention agree to that online purchasing allows comparison shopping. Hence, it would be ideal for the service providers to study the online market and have a strategic pricing policy to have competitive advantage.
(e) 39.5% of the respondents with high online purchasing intention have neutral views on the fitness of online purchasing to the customer needs. Therefore, the service provider could consider doing a market research and a study on the customers to improve the fitness of the online goods available as per the customer requirement.
(f) Both respondents with high and low online purchasing intention have a neutral perception on the fact that the delivery fees of online purchased items are low. Hence, the online purchasing service providers could consider taking this as an opportunity to convert this population to active users of online purchasing.
(g) It was evident that the sample respondents have a negative perception towards the reliability of the delivery once purchased online. Therefore, the service providers could try to change this perception in the customers' mind and convert this population to a target market.

Customers' Perspective

(a) Through the findings of the research, it was observed that attitudinal variables have a profound effect while subjective norm and perceived behavioural control do not show a superficial effect on the online purchasing intention.
(b) Attitudinal variables which were found to have significant impact include the below mentioned,
    i. Save time
    ii. Comparison shopping
    iii. Ease of getting skilled to engage in online purchasing
    iv. Fitness for the purchasing need
    v. Reasonable delivery time
    vi. Ease of learning to engage in online shopping
    vii. Fitness for the purchasing need
(c) A majority of the respondents/customers have said that they mostly purchase clothing and footwear items online where, as the second highest comes jewelry and accessories.

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THE IMPACT OF PARENTAL INVOLVEMENT ON STUDENTS' ATTITUDE AND PERFORMANCE IN SCIENCE IN BATTICALOA EDUCATIONAL ZONE, SRI LANKA

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ABSTRACT

This study was carried out to find the impact of parental involvement on student's attitude and their performance in science subject. A sample survey design was adopted for this study. The study was directed at the population of senior secondary students in the Batticaloa educational zone, in the Batticaloa district of Eastern Province in Sri Lanka. The sample was 400 students who studied in grade 12 and 13 science and mathematics streams and offering the physics and chemistry subjects. Ten 1AB schools from this research area were selected for the study. The 1 AB schools in Kalmunai zone were stratified into urban and semi-urban schools. 40 male and female students from the grade 12 and 13 were randomly selected with (late adolescent. To make the total of 400 respondents, 40 were selected from all 10 schools to constitute the sample for this study. The schools consist of 4 semi- urban and 6 urban schools was selected for this study. The students' questionnaire, consists of section A which is made up of 24 questions, measuring the attitude of the students while the section B contain 18 questions for measuring the parental involvement (home influences) items. They were Likert scale item type questions, in which respondents choose from 5point scores such as strongly, agree to strongly disagree. Thirdly, information concerning the individual performance (in percentages) of students was obtained from their continuous assessment records of the school subjects concerning (physics and chemistry. Three null hypotheses were postulated and tested at 0.05 level of significance to the impact of parental involvement on student's attitude and their performance in the science subject. Data collected on the study were analysed using inferential statistics which include; student analysis of variance (ANOVA) and Pearson product Moment correlation coefficient. The result of the study showed that there is a significant relationship between students' attitude towards performance of physics and chemistry and their parental involvement (p=0.012 and 0.026 respectively). And there is a significant relationship between performance of physics and chemistry and their parental

involvement (p=0.019 and 0.031 respectively). The correlation of coefficient between attitude and performance (physics and chemistry) are positively and significant (r=0.66, p=0.013 and r=0.53 and p=0.019 respectively). The phenomena observed were discussed in the light of prevailing conditions in most of the developing countries. Conclusively, home influence can be a tool to enhance school learning.

***Keywords**: Attitude, performance, parental involvement, Secondary 1 AB school, and late adolescent.*

INTRODUCTION

Home influence can be identified as very important variable that have potential for promoting directly or indirectly student academic achievements (Fehrmann et.al, 1987). The term parental involvement has been given different meanings. It has been used to mean parental expectation of school performances,(Seginer, 1983); deliberate effort by the home to reinforce improved academic performance (Fehrmann et.al, 1987 ; Fontana, 1981) ; general academic guidance and support (Seginer, 1983) ; students perceptions of the degree to which their parents influence their plan for high school and monitor their daily activities and school progress(Ogunniyi,1996), parental influence as determinant of attitude towards learning, (Oguntelure, 1987), contribution to children's activities (homework, encouraging children to read), and promoting school and school based activities(attending parent teachers' association meetings, parent teachers conference and participating in fundraising activities (Olatoye and Ogunkola, 2008).Ogunniyi(1996) identified four major factors responsible for poor performance in science subject. These factors are;

(a) Teacher related(e.g. bad teaching, unpleasantness) Fehrmann et.al.,(1987) emphasizes that better learning achievement of students is ultimately determined ion the classroom by motivated teachers who have the skills and resources to respond effectively to students' learning needs.
(b) Pupil related (e. g. socio cultural background that is indifferent to the learning of science. (Ogunniyi, 1996), attitudes, interest, and learner related influences etc.). According to Olatoye and Ogunkola (2008) the cooperation of students, their parents and teachers can be very valuable.
(c) Authority related (e.g. poor management, wrong priority, vision, standards, incentives, curriculum etc.)
(d) Subject content related (e.g. difficult concepts)

The major concern of this research is to looks into parental influence on the attitude and academic performance among secondary school (senior secondary students – grade 12 and 13 science streams) students. In spite of the fact that observable attitude of the student have been produced by combination of variables, as earlier mentioned, it is possible to identify the effect of "home influence" on attitude, enrolment and performance in science. If this psychological construct called attitude, having been mentioned as one of the three main factors affecting performance in science (Aghanta, 1982); it is important to find out if there is any relationship between it and parental influence. Can positive influence from parents and interested members of the public help to produce enough science-oriented students to

read science based course and provide manpower in the new science areas of science based occupations?

REVIEW OF THE LITERATURE

Attitude

Attitude is a concept, which arises from the attempt to account for the observed regularities in the behaviour of individual persons, the quality of which is judged from the observed evaluate responses one tends to make. An individual can show positive or negative attitude towards a particular object, subject or idea. Kind et. al. (2007) viewedattitude as having different components which include cognitive (knowledge, belief and ideas); affective (feeling, like, dislike) and behavioural (tendency towards an action). The attitude that one has towards an object makes one to make judgment as to whether the object is good or bad harmful or beneficial, pleasant or unpleasant important or unimportant, Crano and Prislin (2006), Epsteinet.al., (1997) identified six areas of parental involvement in their children's academic activities. These are parenting, communicating, volunteering, learning at home, decision making and collaborating with the school. According to him, if they are actively involved in all these areas, no doubt it will stimulate in school and influence academic achievement. Due to the great influence of attitude on educational pursuits, it is worthwhile to identify the determinants of attitude towards a particular object, subject or idea, the chief of which are hereditary factors, body, state, direct experience and communication. Hereditary factors (that is, inheritance from parents) from the basis of all human activities including developing of attitude as well as learning. Sometimes unconsciously parents and guidance through non-verbal communications transfer their, likes and dislikes to children via bodily movements and facial expression.

Parental Involvement

Children who are academically successful hold positive attitude school and are well adjusted emotionally and socially (Jeynes, 2005). The academic success is due to the children's innate abilities and reflect the advantage of being in the socio-economic level (Crano and Prislin, 2006). Childrenwho are economically advantaged receive enough stimulation at home thereby enhancing their academic achievement (Olatoye and Ogunkola, 2008). Parents' high aspiration does have additional benefit over and above the advantages children enjoy from being capable and receiving adequate stimulation and resources. One study found that higher level of parental aspiration lowered the likelihood of academic failure during secondary school by 48% compared with equally poor but low aspiring parents (Oguntelure, 1987; Aghanta, 1982; Epstein et.al., 1997).

Jeynes(2005) identified five dimension of parental involvement, there are;

(a) Non-participation – Parents are not involved in their children's learning. These active non-participant parents are may have decided not to be involved. They may either be satisfied with what the school is offering, or are too busy at work, or wants time away from their children. Some of the parents passive simply because they lack confidence or may be unhappy with the form of partnership the school offers.

(b) Support – This dimension of parental involvement s only when parents are invited to attend events, e.g. parent/teachers' meeting, contributing to developing school policies, or by providing money for learning resources. This is a form of direct involvement.
(c) Participation – Parents may wish to participate as helpers providing assistance on outing, running a toy library, supporting children's learning in the setting and providing indirect support at home that is, keeping informed about what happens toothier children at school, monitoring their academic progress, reading to them and providing intellectual activities for them at home and within the community.
(d) Partnership – This dimension of parental involvement is a wide scope comes inform of partnership with practitioners. As a result of equal access to information and records some parents may share in the diagnosis and assessment of their children, or involve in the selection of practitioners, or become parishioners.
(e) Control – In this case, parents determine and implement decisions.

Direct experience by learners is one of the most important determinants of attitude. Parents/guardians need to influence their children by increasing familiarity in the science subject, taking interest in their school work, enrol them for extra lesions, ensuring that home work is done, acquire film and other electronic material that can stimulate their interest in science based careers and enable the children to develop friendly attitude towards the science subject. These experiences are effective in removing hostility towards school work. The effectiveness with which parents are able to motivate their children to learn science by way of enhancing their home and school learning environments is a function of their socio-economic status. The fact that there is a positive relationship between parental influence, which is a indices of socio-economic status pf parents and the academic progress of their children is established byAghanta, 1982; Willms (1986); and Oluwatelure (2009).

Our modern society is faster paced, globally networked, technologically oriented and requires workers who can solve problems and think critically. The Americans believed that poor ability in science, mathematics and technology will certainly hamper their leading role in the global village Knuth et.al., (1991). Hence the initiative that lead to the creation of a community based collaborative approach, involving the family-school-community partnership, to establish "after school programme", which was meant to improve the whole the child. The negative attitude of students which is confirmed by poor performance in science ; (Olatoye, 2004 ; Ogunniyi, 1996) ; needs to be reinforced through collaborative efforts of parent/guardians, communities and the school. Parent, irrespective of their economic status, are important stakeholders in the education sector and can actually challenge the incompetent nature of science teacher, lack of commitment as well as the slow national approach to science education reform.Stelioset.al., 2007 were found that literate parents will actively support the education of their children. There is an emphasis on the culture of quality as the only avenue through which schools in Africa can develop and survive. There is the belief that centralization should give way to parental and civil society participation. It was reported that in the exploration of nine countries in Africa, little

parental or civic involvement was found. Parents and community participation in the African schools, is seen as a key element of success (Ogunniyi, 1996).

Statement of the problems

Vast majority of parents arefinding it more and more difficult to make a living, especially in developing and undeveloped countries ; scarcity of food especially due to its diversion to the production chemicals, drugs and ornaments present enough reason to be distracted from the expected monitoring in various aspects of children's life. The challenges of single parenthood, family crises and the ever increasing involvement of women in various areas of community and national development makes one to ask questions as to whether parents are still able to be committed to their wards ; or whether they are putting enough efforts towards effective learning of science among children. This research work therefore seeks to find out the extent to which parents have been able to objectively use their position to enhance academic progress in their children.

Purpose of the study

If parental influence becomes exerted on pupil through inheritance and communication and by providing right and stimulating environment, the main focus of this research is therefore to find out if there is home/social class advantage. In other words, this study was geared towards finding out if positive attitude as well as academic progress of students from parents with high involvement will be better than their counterparts from parents with low involvement. The researcher also seeks information as to whether there will be any relationship between attitude to and performance in science.

Research hypotheses

The following hypotheses were raised to guide the study.

H_1 - There is no significant relationship between students' attitude (towards their physics and chemistry) and their parental involvement.

H_2- There is no significant relationship between students' performance in science (physics and chemistry) and their parental involvement.

H_3 - There is no significant relationship between students' attitude and academic performance in science.

METHODOLOGY

Population and Sample

A sample survey design was adopted for this study. The study was directed at the population of senior secondary students in the Kalmunai educational zone, in Ampara district of Eastern Province in Sri Lanka. The sample was 400 students who were studied in grade 12 and 13 science and mathematics stream and offering the physics and chemistry subjects. The selected ten 1AB schools from this research area. This zone is one of the 5zone in Ampara district. It has cultural and educational similarities with the other zone in the Eastern Province. These schools were situated in the urban and semi-urban area, and there is no 1AB schools in the rural area. The 1 AB schools in Kalmunai zone were stratified

into urban and semi-urban schools. The selected ten 1AB secondary school consist of four educational division in Kalmunai zone. The 40 students were randomly selected with male and female among the grade 12 and 13 (late adolescent) and to make a total of 400 respondents from 10 schools that constituted the sample for this study. The schools consist of 4 semi- urban and 6 urban schools was selected for this study.

Instrumentation

The following research instruments were selected and used in the study. The main instrument for collecting data, was a questionnaire. The questionnaire was selected as the chief method because of its many advantages. It gives maximum coverage of the field of study, in comparison with other tools of student's motivational aspects. The students' questionnaire was divided into two parts. It consists of section A, which is made up of 24 questions, measuring the attitude of the students while the section B contain 18 questions for measuring the parental involvement (home influences) items. It was scale of likert type question format (five point scale) with response ranged from strongly agree(SA)-4, agree(A)-3, undecided(U)-0, disagree(D)-2 and strongly disagree(SD)-1 to strongly disagree 1. To ascertain the reliability of the instrument after modification, it was administered on 25 respondents who were science and mathematics stream students selected from another two secondary 1 AB schools which were not part of the study sample. The attitude questionnaire designed and standardized by the researcher (split half reliability coefficient 0.62 and 0.69 for physics and chemistry respectively) was administered to determine the attitude of senior secondary school student towards two of the science subjects namely; Physics and Chemistry.

Section A exploring this attitudinal construct, items were drawn relating to concept which are important components of the attitudinal measures considered in this research. They were Likert scale item type questions, in which respondents choose from 5 point scores such as strongly agree to strongly disagree. The following items were contained the 24 questions;

(a) Interest or enjoyment of the subject.
(b) Perception of the subject.
(c) Perception of value of subject (that is, usefulness)
(d) Assessment and performance (that is, ability)
(e) Attitude towards teachers teaching the subject.
(f) Attitude towards content of the subject.
(g) Outside pressure (that is, home influence)
(h) Attitude towards self (that is, positive or negative relation to subject)
(i) Fear and anxiety.

Section B exploring the 18 questions which were responded to under home influence (parental involvement) were related items. These questions were focus on following items;

(a) Extra lesion/homework.
(b) Occupational/status of parents.
(c) Educational attainment level of the parents.
(d) Materials possession in the home.

(e) Cultural level of the home.
(f) Parents attitude to the education
(g) Leisure.
(h) Time spent on domestic and commercial affairs.

The total number of items in the questionnaire 42 and they all measured the same construct. Thirdly, information concerning the individual performance (in percentages) of students was obtained from their continuous assessment records of the school subjects concerned (physics and chemistry). Copies of the questionnaire were administered to the students by the researcher and collected from them immediately after completion of the questionnaire.

Scoring procedure

The questionnaire was scored using the Likert system. For positive statements, responses were assigned 4,3,0,2, and 1 as the scores for choosing SA, A, U, D or SD respectively, while negative statements were scored in the reversed order, and the summed scores obtained for each respondent. The items under home influence were scored separately and converted into percentage.

Data Analysis and Results

Data collected on the study were analysed using inferential statistics which includes; student analysis of variance (ANOVA) and Pearson product Moment correlation coefficient. The data obtained were analysed using ANOVA for hypothesis 1 and 2 and Pearson product Moment correlation coefficient for hypothesis 3. Specially, the study provided answers to three research hypotheses. The sequence of the presentation of the results is in accordance with that of the hypotheses. In this study, three null hypotheses were tested for significance level at 0.05 margin of error. The results of the study were presented in tables below.

Table 1: ANOVA in which the attitude of respondents towards Physics against the involvement of their parents.

Variable Entered	SS	Df	MS	F	Significant <0.05
Between Group	24784.975	2	13768.756	268.876	***0.012**
Within Group	22679.545	377	39.745		
Total	50464.520	399			

**Significant*

In order to ascertain contributing factors of each of the independent variable to dependent variable, analysis of variance was computed. The results that are presented in the table 1 shows that there is a significant relationship between student's attitude towards performance of physics and their parental involvement (p=0.012). So, the student's attitude

towards performance of physics have impact on their parental involvement. Therefore, the null hypothesis is rejected while alternate hypothesis is accepted.

Table 2: ANOVA in which the attitude of respondents towards Chemistry against the involvement of their parents.

Variable Entered	SS	df	MS	F	Significant <0.05
Between Group	39456.378	2	18647.673	236.942	*0.026
Within Group	41397.951	377	81.785		
Total	80854.329	399			

*Significant

In order to ascertain the contributing factors of each of the independent variables to the dependent variables, coefficient of correlation was computed. Evidence from the table 2 above shows that, there is a significant relationship between student's attitude towards performance of chemistry and their parental involvement (p=0.026).So, the student's attitude towards performance of chemistry have impact on their parental involvement. Therefore, the null hypothesis is rejected while alternate hypothesis is accepted.

Table 3: ANOVA in which the performance of Physics against the involvement of their parents

Variable Entered	SS	df	MS	F	Significant <0.05
Between Group	10376.412	2	6526.752	39.758	***0.019**
Within Group	19847.219	377	152.856		
Total	30223.631	399			

* Significant

In order to ascertain the contributing factors of each of the independent variable to the dependent variables, analysis of variance was computed. Evidence from the table 3 shows that there is a significant relationship between performance of physics and their parental involvement (p=0.019). So, the student's performances of physics have impact on their parental involvement. Therefore, the null hypothesis is rejected while alternate hypothesis is accepted.

Table 4: ANOVA in which the performance of Chemistry against the involvement of their parents

Variable Entered	SS	Df	MS	F	Significant <0.05
Between Group	18312.874	2	9756.825	121.747	***0.031**
Within Group	37421.371	377	71.743		
Total	55734.245	399			

* Not Significant.

In order to ascertain the contributing factors of each of the independent variable to the dependent variables, analysis of variance was computed. Evidence from the table 4 shows that there is a significant relationship between performance of chemistry and their parental involvement (p=0.031). So, the student's performance of chemistry has impact on their parental involvement. Therefore, the null hypothesis is rejected while alternate hypothesis is accepted.

Table 5: Inter-correlation test between students' attitude and their academic performance in Physics and Chemistry, $p < 0.05$, r =Co-efficient of Correlation, R^2 = Coefficient of Determination

Variable	Correlation of Co-efficient Matrix (r)					
	Performance of Physics			Performance of Chemistry		
	r	R^2	Significant < 0.05	r	R^2	Significant < 0.05
Student's Attitude	0.664	0.440	0.013	0.537	0.288	0.019

Table 5 shows that, test done to see the relationship between attitude and performance of the two subjects. The correlation of coefficient between attitude and performance (physics and chemistry) are 0.66 and 0.53 respectively. By this, though there is a strong positively correlation between attitude of the students and two science subjects. But also, the significant relationship with these two variables (p=0.013 and 0.019 respectively). So, the hypotheses H_3 was rejected while alternate hypothesis is accepted. The deciding factor levels for the correlation between attitude and two subjects are 44.0% (R^2=0.440), and 28.8% (R^2=0.288) respectively. Accordingly, the external factors that do not decide the correlation are 66.0%, and 71.2% respectively.

DISCUSSION AND CONCLUSION

The phenomena as revealed the tables of results are discussed below. In table 1 and 2 there was a significant relationship between in the attitude of students towards physics and chemistry with respect to their parental involvement. This is in line with findings ofAghanta, 1982 ; Willms, (1986) ; Oluwatelure, (2009) who believe that an effective collaboration between parent teachers and the community will effectively remove hostility towards schoolwork, motivate children to learn science by way of enhancing their home and school learning environments. Olatoye and Ogunkola, (2008) was also in support of the fact influence of parental involvement enhances achievement in science.

In table 3 and 4, it was also observed that, there was a significant relationship between in the performance of students in the two subjects with respect to their parental involvement. In other words, the null hypothesis was rejected, at 0.05 level of significance. The fact that there is a significant relationship between in the attitude and performance of students due to parental involvement is supported by Sukon and Jawahir who (2005) who observed that home related factors affects numeracy performance. They also confirmed that level of education of parents, availability of reading materials at home, home possession, parental support in education, familiarity with English at home are major factors causing variation in students' achievement.

In addition, there was a high level of dependence between attitude and performance among the learners. This was supported by Stelios et.al., 2007who found out in their study that there was a meaningful relationship between students' attitudes towards science and their science achievement. Parents, irrespectiveof their economic status would want their children to succeed in school learning and want their children to take up career that will enhance their placement in the future. The outcome of this research work revealed that this expectation might not materialize.

The impact of parental involvement on attitude and performance was observed that students with high parental involvement had the highest means in both attitude and performance scores for both physics and chemistry. The next highest set out mean scores belong to those students with average parental involvement except chemistry performance in which the mean score for the average group was slightly than the mean for the high parental involvement group. The lowest set of means score belong to the students from parents with low involvement. This pattern of results implies that the higher the involvement of parents the better the attitude of students towards science and the higher the academic success of such students in science. This research outcome is corroborated by Olatoye and Ogunkola, (2008).

In conclusion, a greater academic progress can be achieved by students if their parents become conscious of the fact that there is a lot, they can do to bring to reality their goals and aspiration for their children. Indeed, the type attitude and performance in science subjects is a function of the level of parental involvement.

RECOMMENDATION

In view of the importance of parental involvement to academic progress, it is important that school authorities should seek for means of ensuring that the attitude of parent and guidance are influenced positively towards assisting the students, so that they in turn can put in their best into their school work. Also, parents and teachers should be made to realize the importance of science learning to the individual (that is, scientific literacy) and to the society (technological advancement). School authorities need to organize programs that will bring about parents, teachers and student interaction. This will create a forum for discussion. In this manner, parent will know what they are expected to do to complement teachers' efforts. Schools also need to make such programmes attractive to parents.

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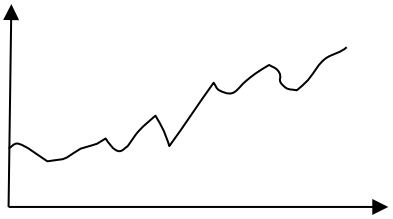

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