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Web News Browser using Map Interface for NIE Programs in Elementary Schools in Japan

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ABSTRACT

In many elementary schools around the world, NIE (Newspaper In Education) programs that use newspapers as study materials have been implemented. However, the contents of newspaper articles are difficult for elementary school children. It is also not easy for children to find interesting articles in the newspapers. In this study, we propose a system to browse Web news using a map interface, in order to provide support for NIE programs in elementary schools in Japan. Children can find, confirm and learn various events which occurred near their own town by using the proposed system. Therefore, NIE programs using both our system and printed newspaper will open a new road of NIE programs. This paper proposes an interface based on maps and support functions of our browsing system, and discusses results of preliminary evaluations of our system. Finally, we improve a method to extract locations from articles and a part of the interface of the proposed system based on the evaluation results.

KEYWORDS

NIE (Newspaper in Education) program, Web News Browser, Interface using Maps, Elementary School Children and Teachers in Japan

1 INTRODUCTION

NIE (Newspaper in Education) programs that use newspapers as study materials were started at the United States of America in the 1930s. After that it was started at Japan in 1985. In recent years, NIE programs have been implemented in educational institutions including elementary schools around the world. Especially, it is being aggressively promoted in the USA, Denmark, Finland, Norway, Netherlands, France, Germany, Brazil, Korea, Colombia, Belgium and Japan. In NIE programs, teachers use newspaper articles to teach a variety of subjects - history, reading, social science, math, economics, composition, and journalism [1].

In the practical report for NIE programs by the Japan Newspaper Publishers & Editors Association [2], it is reported that NIE programs can improve their reading comprehension, grow elementary school children’s interest and motivation in our society by providing study materials relevant to their lives, and heightens teachers’ interest in new teaching techniques. It is also effective to develop communication skills and improve relations with children’s families, because opportunities of conversation related to the contents of news increase between parents and children.

Printed newspapers are generally used in NIE programs. In recent years, the use of Web news is receiving attention in NIE programs, because newspaper publishers provide newspaper articles as Web news on their Web sites. However, these articles are not also written for children. There is a problem that most of elementary school children cannot understand the contents of the articles sufficiently, because the articles contain difficult words and expressions for children. Therefore, it is not easy for children to find interesting articles [3]. From the results of the interview survey with elementary school teachers in Japan [3], it has turned out that elementary school children tend to choose an article only by the title and attached pictures.

In order to improve these problems in NIE programs, we consider that a support system
to choose and browse Web news articles is necessary [4], [5].

On NIE programs in elementary schools in Japan, teachers frequently take up news articles related to children’s own town, or give children a task to find interesting articles in their region and elsewhere. The children can learn various topics, features and events of their region from such articles. Therefore, information about locations is one of important factors for NIE programs in elementary schools in Japan. Furthermore, the children start to learn a map in the curriculum for third or fourth grade of elementary schools.

From the above points, we propose a support system to browse Web news using a map interface in this research. By displaying news articles on the maps, the children can choose and browse interesting articles from the maps, and understand the relationship between the contents of the article and the location easily.

This paper discusses related work, and proposes a system to browse Web news using a map interface for NIE programs in elementary schools in Japan. After that, the usefulness of the proposed system is evaluated, and the proposed system is improved based on the results of evaluations.

2 RELATED WORK – WEB NEWS BROWSER USING A MAP INTERFACE

There are a few systems to browse Web news using a map interface, such as Newsstand [6], [7] for English speakers and Mapnews [8] for Japanese speakers. Figure 1 shows a screenshot of the interface of Newsstand. These systems extract information about the location from each Web news article, and place a marker indicating the article on the maps based on the extracted information. The system using maps as a browsing interface is very useful for finding, choosing, and browsing articles related to geographic locations that readers are interested in, because they can visually recognize the relationship between the contents of the articles and the locations.

However, when these systems are used for NIE programs in elementary schools, there are following problems:

(1) These systems display unnecessary news articles on NIE programs in elementary schools, because these systems do not have a function to filter out the unnecessary articles;
(2) Children cannot use categories for choosing an article on the maps, because Mapnews does not classify markers on the maps;
(3) Children cannot narrow down articles by some conditions such as categories, the date of issue, a period of time;
(4) It is difficult to grasp the outline of an article from information displayed, because only the title or headline of the article is displayed after clicking a marker;
(5) Children cannot understand the contents of news articles because the articles contain difficult terms and phrases;

For the reasons described above, it is difficult to use these systems for NIE programs in elementary schools in Japan.

3 PROPOSED SYSTEM
3.1 Basic Functions

In order to clear the problems (1) to (4), we propose a system to browse Web news using a map interface for NIE programs in elementary schools in Japan. The main target users are teachers and senior children at elementary schools.

We have developed a system which has the following functions:
(1) Filtering unnecessary articles for NIE programs
(2) Color coding of markers based on categories
(3) Narrowing down articles

Figure 2 shows a screenshot of the main interface of our prototype system with the functions (1) to (3) above.

As shown in Figure 2 (b), each marker is given different color according to the category of each article. Articles are classified into eight categories (culture, society, government, economy, environment, education, sports, and science) by a naive Bayes classifier.

The input form to narrow down articles by keywords, a period of time, and categories is arranged on the upper side of the map.

If a marker is clicked, an information window consisting of the title, image, date of issue, publishing company, and hyperlinks to all locations of the article is displayed as shown Figure 3. Below the map, the list of articles placed at the same location is displayed. When a title of an article in the list is clicked, lead sentences of the article are displayed under the title. All locations in the text of each article are linked to maps. Readers can confirm the locations on the maps by clicking the interesting locations in the text or the information window.

As for the problem (5), we are researching a method of text simplification for elementary school children.

Figure 2. A screenshot of the main interface of the proposed system

Figure 3. A screenshot of an information window and a list of articles placed at the same location

3.2 How to Place Markers Indicating News Articles

The process of placing markers indicating news articles consists of the following three steps.
Step 1: Collection of Web news articles and information extraction from the articles

This system collects news articles from Web sites of various newspapers. The articles related to such as drugs and homicides are filtered out from the set of articles, because they are rarely used for NIE programs in elementary schools. This function can be turned off. The system has the option to set black words for filtering articles. Then, the title, body, image, URL, date of issue, and publishing company are extracted from the collected articles.

Step 2: Extraction of locations from the articles

The system extracts information about locations from each article by using Japanese Named Entity Extraction API by goo Lab [10]. By our preliminary experiments [11], we have confirmed that approximately 83.5% of the news articles contain information about locations.

Step 3: Placing markers on the maps

The system gets latitude and longitude of all locations of the article by Google Maps Geocoding APIs. In the news text, a location is abbreviated after the first mention. If the same coordinates are obtained by APIs, the longest name of locations is selected as one of the representative locations of the article. If the coordinates of “Kagawa” and “Kagawa Prefecture” are same, the latter is selected. When locations of the different level in the same prefecture were extracted, both locations are used for markers. If “Kagawa prefecture” and “Takamatsu city” are extracted from an article, both of them are selected as the representative location.

The proposed system places markers indicating the articles at the appropriate position on the maps based on the coordinates. If there are multiple articles in the same locations, the marker of the latest article is set as the representative one.

3.3 Function of Narrowing Down Articles

In order to find interesting articles, the proposed system has the function of narrowing down articles by categories, a period of time, and keywords. Keywords and a period of time are input from the input form. A period of time is set to a week by default.

As for categories of news articles used for our system, we adopted eight categories: culture, society, government, economy, environment, education, sports, and science. We adopted these categories which are frequently used in Web news sites of national daily papers in Japan such as Yomiuri, Nikkei, Asahi, Mainichi, and NHK.

3.4 Function of Hyperlinks of Locations

The information window has hyperlinks of all locations of the news article. Readers can move to the related locations of the article on the map freely by using this function.

Figure 4 shows screenshots of moving the related locations by the hyperlinks.

Figure 4. Screenshots of moving the related locations by hyperlinks

4 EVALUATION

4.1. Evaluation of Location Extraction
4.1 Outline of the Evaluation

In the proposed system, it is important that markers indicating the articles are placed at the appropriate position on the map. The proposed system extracts locations from articles by the method mentioned in 3.2. We conduct the experiment to evaluate the performance of the proposed method with 100 articles of local news extracted from NHK WEB NEWS randomly. In this experiment, the proposed method extracts locations from the title and lead sentences of each article. The locations extracted manually are used as the correct locations. The performance of the proposed method is evaluated with each value of the precision, recall, and F-measure.

4.1.2 Evaluation of the Extraction Method

As a result of the experiment, the value of recall was 0.876, the value of the precision was 0.923, and the value of the F-measure was 0.899. Since the values of recall and precision were about 90%, both of them were the high values.

The result of error analysis, it turned out that errors were caused by not the proposed method but outputs of the Japanese Named Entity Extraction API. For example, “Fudo-myo-o (Acala; the God of Fire)” and “Suginoki (cedar)” were extracted as locations, however, these were used as common nouns in the articles. It is difficult to distinguish these words which can be used for both location and common noun by the context. Since “Europe”, “the West”, “the Sikoku region”, and “the Kansai region” which were extracted incorrectly are region, these are not suitable for placing markers. Typical region names can be excluded by registering and using the black lists.

Next, we analyzed location which could not be extracted. As a result, names such as parks, schools, and courthouses were extracted as organizations by the Named Entity Extraction API. The organizations which can be obtained latitude and longitude by Google Maps Geocoding APIs will be used as locations.

4.2 Experiment based on Questionnaire

4.2.1 Outline of the Evaluation

As preliminary experiments of the proposed system, we conduct the experiment to evaluate the usefulness of interfaces and functions. The experimental subjects are 10 students from Kagawa University. We asked the subjects to use the proposed system about 10 minutes as a teacher for NIE programs in an elementary school. In order to compare the existing system and the proposed system, we asked the subjects to use Mapnews under the same situation, and to answer a questionnaire. The questionnaire consists of three major items of “browsing news”, “narrowing down news”, and “comparison with Mapnews” based on 4-point Likert scale (4: Strong agree, 3: Agree, 2: Disagree, 1: Strong disagree), and the column of comments.

4.2.2 Evaluation of the Browsing News

The section 1 in Table 1 shows the evaluation results of “Browsing Function”. All representative values except for the item 1-5 were higher than 3.0. As for the item 1-5, the value of the average is 2.6 which is lower than that of other items. Therefore, we have to improve the design of the news list or supplement the information of the list when readers use this system.

4.2.3 Evaluation of Narrowing Down News

The section 2 in Table 1 shows the evaluation results of “Narrowing Down News”. All representative values except for the item 2-4 were higher than 3.0. From the evaluation result of the item 2-4, we can see that the value of the median is 2.6 and the value of the mode is 2.0. Therefore, we can say that the subjects evaluated that the switch buttons for narrowing down by categories were not intuitive. We have to improve the design of the buttons.

4.2.4 Comparison with Mapnews
The section 3 in Table 1 shows the results of “Comparison with Map Newspaper”. As you can see that all values were higher than 3.0. On NIE programs in elementary schools, we confirmed that our system is more useful than Mapnews.

<table>
<thead>
<tr>
<th></th>
<th>Browsing News</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Items in the information window is appropriate.</td>
<td>3.4</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>1-2</td>
<td>Design of the information window is appropriate.</td>
<td>3.2</td>
<td>3</td>
<td>4, 3</td>
</tr>
<tr>
<td>1-3</td>
<td>Hyperlinks of all locations in the information window are useful.</td>
<td>3.3</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>1-4</td>
<td>Design of the news list under the map is appropriate.</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1-5</td>
<td>News list is intuitive.</td>
<td>2.6</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>1-6</td>
<td>Display of the contents of the article is appropriate.</td>
<td>3.5</td>
<td>3.5</td>
<td>4, 3</td>
</tr>
<tr>
<td>1-7</td>
<td>Hyperlinks of all locations in the article is useful.</td>
<td>3.2</td>
<td>3</td>
<td>4, 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Narrowing Down News</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Function of narrowing down news by keywords is appropriate.</td>
<td>3.3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2-2</td>
<td>Function of narrowing down news by a period of time is appropriate.</td>
<td>3.6</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2-3</td>
<td>Function of narrowing down news by categories is appropriate.</td>
<td>3.2</td>
<td>3</td>
<td>4, 3</td>
</tr>
<tr>
<td>2-4</td>
<td>Design of the function of narrowing down news by categories is appropriate.</td>
<td>2.9</td>
<td>2.5</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Comparison with Mapnews</th>
<th>average</th>
<th>median</th>
<th>mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Categories of news are more useful for browsing than Mapnews.</td>
<td>3.9</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3-2</td>
<td>Hyperlinks of all locations in the article is useful.</td>
<td>3.2</td>
<td>3</td>
<td>4, 3</td>
</tr>
<tr>
<td>3-3</td>
<td>Narrowing down news is easier than that of Mapnews.</td>
<td>3.8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3-4</td>
<td>Narrowing down by a period of time is more useful.</td>
<td>3.9</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3-5</td>
<td>Narrowing down by categories is more useful.</td>
<td>3.7</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Figure 5 and 6 show the representative comments about the interface and the functions of the proposed system. We can easily improve the interface based on the comments in Figure 5.

As for the comments of functions in Figure 6, we can achieve all comments except for the last. In order to achieve the last comment, we have to consider how to collect the information about the principal products and the climate of the distinct area firstly.

- The supplementary explanation of hyperlinks of all locations in the news should be added.
- As for the interface of narrowing down news by categories, the checkbox is more intuitive than the switch button.
- It is not easy to confirm locations where the focus moved on the maps after clicking the hyperlinks of locations in the article.
- The date of issue of news should be displayed in the news list.
- Too many markers for one article were placed.
  One marker in a prefecture per one article should be placed.

- Readers cannot set the maximum number of markers displayed on the maps.
- The function to cancel narrowing down news is necessary.
- The function of full text search is necessary.
- It would be better that the principal products and the climate of the display area are displayed on the maps.

**Figure 5.** Representative comments of the interface

**Figure 6.** Representative comments of the functions

### 5 IMPROVEMENT OF THE PROPOSED SYSTEM

#### 5.1 Improvement of the Extraction Method of Locations

In order to address the last comment in Figure 5, a hierarchical relationship of locations has to be investigated automatically. If “Kagawa
“Kagawa prefecture” and “Takamatsu city” are extracted from an article, the latter should be selected as the representative location because “Takamatsu city” is in “Kagawa prefecture”.

We improved this problem by developing a new database consisting of information of a hierarchical relationship between prefectures and cities. When locations of the different level in the same prefecture were extracted, more concrete location can be generated as the representative location after investigation based on the information of the hierarchical relationship in the new database. If “Kagawa prefecture” and “Takamatsu city” are extracted from an article, “Takamatsu city, Kagawa prefecture” is generated as the representative location after the investigation of the hierarchical relationship between them.

5.2 Improvement of the interface

We improved the design of the interface of the proposed system based on the evaluation results of Questionnaire. Figure 7 shows the improved interface of the system.

![Figure 7. A screenshot of the improved main interface](image)

We changed the interface of the function of narrowing down articles by categories from the slide box to the checkbox in order to improve the results of the question 2-4 and the comments in Figure 5. Figure 8 shows old design and new design for narrowing down by categories.

![Figure 8. Old and new design for narrowing down articles by categories](image)

In order to address the comment in Figure 6, we developed an input form for changing the number of markers displayed. Figure 9 shows the new input form.

![Figure 9. Input form for changing the number of markers displayed](image)

6 CONCLUSION

In this paper, we proposed the system to browse Web news using a map interface, in order to provide support for NIE programs in elementary schools in Japan. We confirmed the usefulness of our system through the evaluations. Then, we improved the extraction method of locations and a part of the interface of the proposed system based on the evaluation results.

In the future work, we are going to ask elementary school teachers to use our system and answer the questionnaire, in order to evaluate the usefulness of the proposed system. Then, we will improve the proposed system based on the evaluation results. After that, we will integrate the proposed system with our other research for providing support for NIE programs, such as the method of text simplification and the method to search for image contents for supplementing the contents of news articles. Finally, we will make a comprehensive evaluation of the integrated system at elementary schools in Japan.

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REFERENCES


Evaluating the Effectiveness of User’s Interests and User’s Nationality for Cultural Heritage Guidance as Informal Learning

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ABSTRACT
Evaluation is a crucial to determine the feasibility of context-aware mobile learning application in enhancing learning. This study investigates the effect of user’s interests and user’s nationality context in cultural heritage learning escalation. Therefore, we propose an evaluation model based on meaningful learning theory which represented into five characteristics, i.e. constructive, active, authentic, intentional and interactive. The characteristics of the evaluation model are discussed with a special focus on how the contexts can be used for suitable, valuable and enjoyable cultural heritage learning. Then, we conducted an experiment by asking some users to practice with our application namely NaCHL (Nationality-based Cultural Heritage Learning System), follow the learning tasks and write down their feedback after usage. Finally, the result of the analysis shows that the average value of participants who gave agreement with NaCHL is 81.5 percent. It proves the achievement of NaCHL in enhancing learning meaningfully.

KEYWORDS
cultural heritage, context-aware, user’s interests, user’s nationality, meaningful learning.

1 INTRODUCTION
The proliferation of Information and Communication Technology (ICT) opens an opportunity to support visitors to learn cultural heritage objects through mobile devices without time and space limitation. Context-aware mobile learning has been applied in cultural heritage field, especially for informal education [1, 2, 4, 12, 17]. In developing a worthy context-aware mobile learning application, it is necessary to evaluate its effectiveness [7, 8]. The evaluation phase is required to ensure the validity and the value of the application.

Previous works, we built an adaptive cultural heritage learning guidance system by adopting user’s interests [1] and user’s nationality context [2] for serving appropriate information to the users. However, comprehensive and systematic user evaluations were missing, which are crucial to verify the effectiveness of our cultural heritage learning system.

In this study, we developed an evaluation model based on meaningful learning which has five characteristics i.e. constructive, active, authentic, intentional and interactive as measurement instruments. Our assumption, the characteristics are potential to evaluate the effectiveness of our system in enhancing learning.

We then conducted an experiment to assure whether our system, namely Nationality-based Cultural Heritage Learning System (NaCHL) is meaningful in informal education or not and created a questionnaire according to the aforementioned characteristics. Participants are asked to fill out the questionnaire after doing some learning activities via NaCHL mobile application.

The outline of the paper as follows. Section 2 explains what is NaCHL and why NaCHL is needed in heritage tourism as a guidance for enhancing learning in informal education. Some sample scenarios are created to clarify the reason and a UML based model is proposed for further development. Section 3 emphasizes meaningful learning concept as urgent factor to evaluate learning application and introduces five characteristics of NaCHL evaluation model. Section 4 presents the evaluation implementation including the procedure and the results of NaCHL evaluation. Finally, in section 5 we conclude our work and describe the future directions.
2 NATIONALITY-BASED CULTURAL HERITAGE GUIDANCE AS INFORMAL LEARNING

2.1 NaCHL system: Engaging learner through user’s interests and nationality context

Learning is an individual act for acquiring knowledge or skill which may lead to a potential change of attitude or behavior, as a result of the individual’s own experience in his/her interaction with the environment. Informal learning is a type of learning activities which taken outside the curriculum of formal educational institutions and programs and heavily rely on intrinsic motivation [5]. Recently, the marriage between ICT and informal learning in the specific field of cultural heritage is particularly fecund, which means that the institutions of informal education (such as museums and cultural centers) could intensify their ability to attract visitors and involve them in more interesting and meaningful experiences [11].

Cultural heritage is the legacy of tangible, intangible and natural objects from past generations which are considered valuable to be preserved for the future generations. The existence of cultural heritage objects are potential for the development of heritage tourism. Culture has understood as an important marketing tool to attract travelers with special interests in heritage and arts. Heritage tourism is the fastest growing segment of the tourism industry because there is a trend toward an increase specialization among tourists [21]. The trend is triggering a challenge, ‘how to motivate tourists to involve in cultural heritage learning in more interesting and meaningful way according to their special interests by using the support of ICT tools?’.

Context-aware mobile learning seems a promising way to conquer the challenge. It has been applied in the cultural heritage domain to engage user for interesting learning such as serious games [12] and augmented reality [17]. However, due to a wide variety of tourist profiles, considering a personalized experience is important. Facilitating users based on their needs (interests, knowledge, and other personal characteristics) will support for having valuable cultural heritage experience [3]. Cultural heritage categorization i.e. tangible, intangible and natural heritage may become a new invention for attracting tourist’s attention. The categorization could be a reasonable input model that can feed an adaptive system for cultural heritage learning. Tourist as a user/a learner can select heritage objects according to his/her interests.

Other considerations, visitors of the cultural heritage object are local and international visitors. Poria et al. found the link between tourist and heritage object, namely tourist’ perception [20]. It is the perception that the visitors are motivated to visit the cultural object because of emotional reason (feeling of belonging as a part of the heritage). Indirectly, we can assume that local tourists have an emotional relationship to the local heritages. This fact encouraged us to find out how to evoke emotional relationship between international tourists with the local heritages. The idea comes up by involving nationality, a part of tourist perception to attract international visitors for cultural heritage learning. The assumption is people tend to be interested in the objects which have a relationship with their own personality such nationality.

Based on this point of views, we developed an adaptive context-awareness model for providing cultural heritage information based on user’s profile, interests and current location in GPS [1] and extended our work by involving nationality context to engage international visitors to learn the visited cultural object [2]. The interactive learning interfaces were built to facilitate the user to explore deep cultural heritage experiences. The system also is equipped with Multiple Choice Questions (MCQ) as summative assessment which is accessible by learners if they want to know their learning achievement. Our approach opens a new paradigm that the visitor will able to informally learning other country’s cultures in terms of their relationship with visitor’s nationality.

For detail explanation let us see the scenario in figure 1. In scenario 1, a visitor comes to an area X. According to the location, there are 8 heritages are detected. However, based on the input transactions such interests, nationality and visiting purpose, the system selects and presents...
4 heritages which are relevant to the input transactions. In this study, the heritage interests are divided into 3 categories, i.e. tangible, intangible and natural heritage. Tangible heritage is divided into four subcategories, i.e. artifacts and monuments, buildings, shrine and work of arts. Intangible heritage is divided into three subcategories; folklore, traditions, language, and knowledge. Natural heritage is divided into two subcategories, i.e. landscapes, and biodiversity.

Scenario 1: A learner is visiting area ‘X’

Suppose the visitor chooses heritage Y from 4 available heritages like figure 2 shows, the system will provide information according to the visiting purpose which has been input before. There are two kinds of visiting purpose, i.e. the visiting & learning purpose which serves the detail information and just visiting purpose which provides the summary information of the selected heritage.

Scenario 2: A learner is choosing cultural object ‘Y’

2.2 Summative assessment through Multiple Choice Question (MCQ)

Assessment is a process of describing, collecting and interpreting information about learning, usually in measurable terms. The goal of the assessment is to determine whether the learner has learning improvement or not. The assessment is distinguished into two, i.e. formative and summative assessment. MCQ is one the several methods of summative assessment. It is suitable for large groups of people and can provide quick feedback. This work, we adopted a summative approach by presenting MCQ as the assessment’s tool. A carefully designated MCQ test will lead to assess learning even at the highest level of Bloom’s Taxonomy of Educational Objectives [15].

Scenario 3: A learner is evaluating his experience

Figure 3 shows the scenario of NaCHL assessment activity. This activity only available if the learner choose ‘Visiting & Learning’ as his/her visiting purpose. As we informed earlier, there are two options to support learner in visiting purpose function i.e. Visiting & Learning and Just Visiting. A bank database of questions will automatically select in randomly by the system according to the related context. The assessment will not become a binding rule. It is optional preference. However, we keep trying to engage user in the assessment activity by involving a variety of interactive questions such images, texts, and their combinations. At the end of the assessment, our system presents the score and the amount number of correct
answer. The learner also obtains feedback on incorrect answers.

2.3 Unified Modeling Language (UML) diagrams of NaCHL

UML is a common language to help developers in describing, specifying and designing software systems by using graphical notations. We describe NaCHL model with UML based approach and present three diagrams i.e. use case diagram, activity diagram and class diagram as it representation.

**Figure 4. Use Case Diagrams of NaCHL**

Figure 4 describes the interaction between actors and use case. Use case diagram is used to determine the function inside NaCHL and who is entitled to use the function. It contains 3 actors and 12 use cases. The actors are Visitor, Admin, and Google Maps. The functions are Detect Location, User’s Nationality & Interests, Nationality of User, Categories of Cultural Heritage, Visiting & Learning, Just Visiting, Multiple Choice Questions, Result of Cultural Heritage, Manage of Cultural Heritage, Add Cultural Heritage, Update Cultural Heritage, and Remove Cultural Heritage. 'Detect Location' is useful for detecting the position of visitor based on Google Maps; 'User’s Nationality & Interests’ is useful for providing user friendly interface which concern in 'Nationality of User’ and 'Categories of Cultural Heritage'; 'Visiting & Learning’ is useful for learning heritage including taking quiz from 'Multiple Choice Questions'; 'Just Visiting’ is useful only for learning heritage without quiz; 'Result of Cultural Heritage’ is useful for providing information in accordance with the cultural heritage location that has been detected and presented the output in the form of text, images and maps; 'Manage of Cultural Heritage’ is useful for managing cultural heritage data and it is a generalization of parts of 'Add Cultural Heritage’, 'Update Cultural Heritage’ and 'Remove Cultural Heritage’.

**Figure 5. Activity Diagrams of NaCHL**

Figure 5 presents the logic procedure of NaCHL from one action to another action. An action is a node on the activity diagram, whereas activity refers to a series of action.

We described our activity diagram as follows: starting from initial state (a black circle notation), the system detect visitor’s location in action node 'Get Location' (rounded rectangle notation). Then, visitor performs an activity 'User’s Nationality, Interests & Visiting Purpose’ to input his/her nationality and heritage categories as his/her interests, and visiting
purpose. The action 'Result of Cultural Heritage' displays text, images, and maps information based on location, nationality, and interests of the user. Furthermore, based on visiting purpose which has been selected before, visitor who select 'Visiting & Learning' action can follow the Multiple Choice Questions quiz activity. Otherwise, 'Just Visiting' action will return to the action of 'Result of Cultural Heritage'. Finally, action 'Close NaCHL' denotes the end state of the activity (The black circle that looks like a selected radio button).

'ManageCH' class with 'CulturalHeritage' class. Third, association of 1 to 1 means one instance associated with exactly one instance like association of 'User' class with 'Location' class.

3 MEANINGFUL LEARNING-BASED EVALUATION

3.1 Principle of Meaningful Learning

Meaningful learning concept is pioneered by David Ausabel which pointed out two necessary things, i.e. (1) the content must be potentially meaningful, and (2) the learner must relate it in a meaningful way to his or her prior knowledge [22].

In other words, meaningful learning is a process of linking a new information that learners acquired which relevant to their own cognitive structures. Not only possess relevant information, learners also can utilize the information to solve problems or understand new concept. It means, the learners can transfer their idea to new idea and new learning situation from their previous information.

There are several studies of the characteristics of meaningful learning such table 1 shows and from those characteristics, we select five characteristics to evaluate NaCHL application as shown in figure 7.

We assume that these characteristics are determinant factors for assessing the effectiveness of NaCHL in enhancing learning. In the following section, the evaluation model is described with a special focus on learning cultural heritage with mobile application as informal education.

3.2 NaCHL Evaluation Method

3.2.1 Constructive

Meaningful learning can occur when learners integrate their new information with their previous knowledge or they set goals for what they need to learn in order to understand what they are observing [9].

This definition is broadened up by Karppinen [16]. He embedded individual concept in constructivist learning and argued that learners have their individual style and strategies for learning. Learning is always influenced by the
Table 1. Studies of Elements of Meaningful Learning

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<td>Active</td>
<td>Active</td>
<td>Active</td>
<td>Engaging</td>
<td>Active</td>
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<tr>
<td>Constructive and Individual</td>
<td>Authentic</td>
<td>Authentic</td>
<td>Authentic</td>
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<tr>
<td>Collaborative and Conversational</td>
<td>Constructive</td>
<td>Constructive</td>
<td>Informal Learning</td>
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<tr>
<td>Contextual</td>
<td>Cooperative</td>
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<td>Cooperative</td>
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<tr>
<td>Guided</td>
<td>Personalized</td>
<td>Intentional</td>
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<td>Interactive</td>
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<tr>
<td>Emotionally Involving and Motivating</td>
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3.2.2 Active

Meaningful learning requires learners who are actively engaged in a meaningful task, where they can manipulate objects and parameters of the environment they are working in and observing the results of their manipulations [9]. Getting the learner’s attention is necessary to engage learning. Martin et al. [10] stated that engaging learners in the context can cause meaningful learning. Emotional context in the learning process able to engage learners [16]. NaCHL is a context-aware mobile learning application. Learner’s interests and perception as part of emotional context become our contexts to motivate learner to play an active role in cultural heritage learning activities. Hence, we choose active as the second element of NaCHL evaluation.

3.2.3 Authentic

Most contemporary research on learning has shown that learning tasks which are situated in some meaningful real-world task or simulated in some case-based or problem-based learning environment are not only better understood but also are more consistently transferred to new situations [9].

Information and communication technology can support meaningful learning through mobile devices. The mobile devices are available to be used in any context, and can draw on those contexts to enhance the learning experience [10]. Visitor who visit a place can acquire a lot of cultural heritage information. NaCHL mobile

Figure 7. NaCHL Evaluation Framework
application allows visitors (learners) to maintain their attention according to the interests and nationality contexts as a guidance in cultural heritage learning environment. We emphasis authentic for the evaluation model as the third element.

3.2.4 Intentional

Human acts to fulfill some goals. When learners are actively and willfully trying to achieve a cognitive goal, they think and learn more because they are fulfilling an intention [9]. NaCHL is designated for enjoyable cultural heritage learning which applicable outside the curriculum. Hence, it is categorized as informal learning. Informal learning refers to learning that takes place naturally and without directed effort [10]. Mobile technology is able to work within specific context and learning environment. Hence, it has the ability to increase the ease of informal learning.

There are three forms of informal learning which proposed by [6] i.e. self-directed learning, incidental learning and socialization learning. Self-directed is occurring when the learner intentionally wants to involve in the learning process even before the process begins, and the learner is aware that he/she has learned something. Thus, it intentional and conscious. Rather incidental and socialization learning are unintentional.

When learners use technologies to doing some tasks or to find out the solution of a problem, they are intentional and learning meaningfully [9]. Intentional is chosen as the fourth element of NaCHL evaluation.

3.2.5 Interactive

One way to attract learner’s attention is creating and maintaining interactive interface. Interactive interface can allow learner to direct their own pace of learning, input their own views and ideas [16]. It means that learners has visual and physical interaction through the interface [7].

By using a constructivist development approach when developing educational interactive interface will guide for learning, where the learner is guided towards building his or her own structured knowledge of the content. Interactive allow learners to control what elements are to be delivered and when they are to be delivered through the interface [14]. Hence, providing the effective and easy-to-follow interface in to assist the learner for a deep cultural experience is highly needed. Interactive is selected as the fifth element of NaCHL evaluation.

4 EVALUATION IMPLEMENTATION

4.1 Participants and Procedures

The participants have consisted of 15 adult people with different nationalities; Indonesian (7), Chinese (5), Korean (2), and Japanese (1). The evaluation experiment is conducted within two weeks in the middle of July 2017 at Fukuoka. The participants were invited to do some learning activities via NaCHL mobile application with 5-10 minutes briefly explanation for all the functions in the software. After learning, the participants were asked to fill out a questionnaire to know their perceptions regarding of the feasibility of the system in providing meaningful learning. A participant spent 20-30 minutes to practice the learning application and to fill out the questionnaire. The questionnaire has 13 questions as seen in table 2. The questions are the representation of five elements of the evaluation framework.

<table>
<thead>
<tr>
<th>Table 2. Questions of evaluation</th>
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<tbody>
<tr>
<td>Constructive</td>
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<tr>
<td>(A1) I can conduct learning based on my interests</td>
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<tr>
<td>(A2) I can learn objects related to my nationality</td>
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<tr>
<td>(A3) The app serves adaptive learning for individual person</td>
</tr>
<tr>
<td>Active</td>
</tr>
<tr>
<td>(B1) I can play an active role in the learning activity</td>
</tr>
<tr>
<td>(B2) I can choose my learning type</td>
</tr>
<tr>
<td>Authentic</td>
</tr>
<tr>
<td>(C1) I can conduct learning with authentic environment</td>
</tr>
<tr>
<td>(C2) I can learn related objects in authentic environment</td>
</tr>
<tr>
<td>(C3) The content is presented in understandable way</td>
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<tr>
<td>Intentional</td>
</tr>
<tr>
<td>(D1) I can check my learning achievement via quiz</td>
</tr>
<tr>
<td>(D2) I understand what I have learned</td>
</tr>
<tr>
<td>(D3) The learning served meaningful information</td>
</tr>
<tr>
<td>Interactive</td>
</tr>
<tr>
<td>(E1) The app is using interactive interfaces</td>
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<tr>
<td>(E2) I enjoyed using the app</td>
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In this experiment, NaCHL system provides cultural heritage information around Dazaifû area. It is a famous city and has dozens of heritage places in Fukuoka prefecture. Figure 8
is showing the sample layouts of NaCHL application.

Figure 8. The layout of NaCHL

4.2 Results and Discussion

The questionnaire is presented into the Likert scales from 1 to 5, i.e. 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree.

The values are indicating the degree of user application acceptance in meaningful learning related to their perceptions.

4.2.1 Constructive Element

Figure 9 exhibits three charts which are the representation of perceptions for constructive element.

Question A1: 100% participants approve they have learned objects appropriate with their interests. Question A2: 60% participants agree that they are able to learn objects related to their nationality, 26.7% are skepticism and 13.3% are disagree. Question A3: 80% participants admit that NaCHL serves them with adaptive individual learning system.

Even though there are skepticism and disagree opinions, in general participants have positive perceptions which convince that NaCHL is able to satisfy users in the constructive element.

4.2.2 Active Element

Figure 10 shows that NaCHL satisfies users in active perception. It is proven from the graph of question B1 and B2, 80% participants admit that they are playing an active role in NaCHL system.

4.2.3 Authentic Element

Figure 11 describes participants perception related to the authentic element. Question C1: 80.6% participants approve that they conducted learning in the authentic environment, 6.7% are skepticism and 6.7% are disagree. Question C2: 73.3% participants agree that they are able to learn objects related in the authentic environment. Question C3: 60% participants agree that the content in NaCHL is understandable, 20% are skepticism and 20% are disagree.
4.2.4 Intentional Element

Figure 12 presents graphs of participants perception about the intentional element. More than 70% of participants agree that they understand what they learned, they can check their learning achievement and the system serves meaningful information.

4.2.5 Interactive Element

Figure 13 shows that according to question E1 and E2, 93.3% participants have a confession that they enjoyed using NaCHL. It means NaCHL satisfies users in interactive perception.

In summary, according to the chart results of all characteristics, the goal of meaningful learning is achieved. The average calculation of NaCHL evaluation for the agreement perceptions is equal to 81.5%, average disagreement is equal to 3.1% and average skepticism is equal to 15.4%.

Even though the average percentage of disagreement and skepticism can be categorized as lower percentage, we investigate further why the participants conveyed disagree and skepticism perceptions especially for constructive and authentic elements. The reasonable arguments are; the explanation of software functions are too briefly, there is no heritage object related to participant interests and
nationality, misunderstood with the authentic definition.

5 CONCLUSION AND FUTURE WORKS

5.1 Conclusion

This study presents the feasibility of NaCHL to help learners improve their cultural heritage knowledge in terms of its historical relationship between learner’s country and the visited country. We proposed an evaluation framework which consists of five elements; constructive, active, authentic, intentional, interactive and used these elements to measure the learning effect whether is meaningfully or not. Based on evaluation results, NaCHL is proven feasible for meaningful learning application.

5.2 Future Works

This study provides some future works which have not been covered due to the time limitation. The most important and interesting issues are pointed out as follows:

1. NaCHL application shall be implemented in another country which has rich cultural histories such Indonesia. According to the data from Ministry of Education and Culture of Indonesia in 2015, there are 6238 intangible objects, 434 museums, 979 cultural heritage, 5754 arts, and 7894 belief and traditions [18].

2. Adding more user’s perception context such religion. According to UNWTO (United Nations World Tourism Organization), 300 to 330 million tourists visit the world’s key religious sites every year, with approximately 600 million national and international religious voyages in the world, 40 percent of which take place in Europe [19]. Being key tourism destinations, religious heritage sites not only drive international tourism and economic growth but also provide important meeting grounds for visitors and host communities, making vital contributions to tolerance, respect and mutual understanding between different cultures.

3. NaCHL evaluation is using five characteristics: constructive, active, authentic, intentional, and interactive. However, the other kind of meaningful learning characteristics i.e. cooperative is still uncovered due our focus is personal learning achievement. In the future, we intend to explore this characteristic further.

4. NaCHL application was built on Android platform. It means the application is accessible by the mobile device with Android OS. However, this application might be developed to run on a different platform such iOS and Windows Mobile by using codeshare facilities.

ACKNOWLEDGMENTS

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7. Y.M. Huang and P.S. Chiu.: The Effectiveness of a Meaningful Learning-Based Evaluation Model for


E-Learning Technology Adoption in the Philippines: An Investigation of Factors Affecting Filipino College Students' Acceptance of Learning Management Systems

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ABSTRACT
When combined, education and technology can build dynamic teaching and learning experiences that are tailored to developing and transforming the educators and learners needed to power the digital economy. For some reasons, however, there is still a big chunk of people especially students who aren’t ready yet to embrace the technological change in the field of education. This study aims to determine the factors affecting students’ e-learning technology acceptance particularly on Learning Management Systems (LMS) in the Filipino context. A conceptual model was proposed based on the Technology Acceptance Model (TAM) which was extended through the inclusion of Internet Connectivity Experience (ICE), Social Media Influence (SMI), Integrated Multimedia Instruction (IMI), System Interactivity (SI) and Perceived Quality Work of Life (PQWL) as additional predictor values. The constructs were determined according to the three-tier use model (3-TUM) which was characterized to explore users’ attitudes towards IT at three levels. The target population in this research was Filipino students from colleges that are considered as promoters of e-learning integration in the educational sphere in the Philippines. The collected data from 629 Filipino college students were analyzed using structural equation modeling (SEM) technique based on AMOS methods. Finally, a path model was created to examine the relationships between the factors to explain students’ adoption of e-learning technology from the information systems acceptance point of view. As a result, it provided practical and technical implications applicable for local and global school environments that could help educational leaders, educational technologists, educators and learners in their development, implementation, and acceptance of e-learning technology like LMS.

KEYWORDS
Structural Equation Modeling, Filipino College Students, Technology Acceptance Model, E-Learning

INTRODUCTION
The education sphere in the Philippines has been beleaguered with the same issues and difficulties particularly on its logistics from the deficiency of instructional resources, facilities and even schools to underpaid but overworked teachers. Nevertheless, Filipino culture still places a high value on education; in fact, it is generally viewed as the great equalizer of opportunities. The rapid progression of information and communications technology (ICT) brought significant changes in the field of education from empowering new ways for people to learn and work together (e-learning technology for instance) to transforming teaching and learning processes. While e-learning environment in the Philippines is still in its embryonic stage, it has already adopted and still spearheaded by prominent universities such as University of the Philippines for their UP Open University (UPOU), University of Sto. Tomas for their e-Learning Access Program (e-LeAP), De La Salle University for their integration of Sakai educational software platform and other academic institutions that offer some form of online courses. By proliferating and integrating e-learning technology in the Philippine education system, the transformation of teaching and learning process increases the academic achievements of Filipino college students [1].

NOMENCLATURE

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>LMS</td>
<td>Learning Management System</td>
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<tr>
<td>TAM</td>
<td>Technology Acceptance Model</td>
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<td>3-TUM</td>
<td>Three-Tier Use Model</td>
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<td>SEM</td>
<td>Structural Equation Modeling</td>
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<td>IMI</td>
<td>Integrated Multimedia Instruction</td>
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<td>PQWL</td>
<td>Perceived Quality Work of Life</td>
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<td>PEOU</td>
<td>Perceived Ease of Use</td>
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<tr>
<td>ICE</td>
<td>Internet Connectivity Experience</td>
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<td>SI</td>
<td>System Interactivity</td>
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<tr>
<td>PU</td>
<td>Perceived Usefulness</td>
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<td>BI</td>
<td>Behavioral Intention</td>
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<td>SMI</td>
<td>Social Media Influence</td>
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In view of all this, the global education sector has been attempting to gather more and more information on aspects that persuade students not just to incorporate e-learning into their educational journey but also confidently warrant consideration in shaping future e-learning developments [2-4]. With the Internet getting more powerful day by day and along with it are the e-learning environments as one of the direct beneficiaries, researchers and academicians have been extending their studies into advanced courses and fields such as Engineering [5], Mathematics [6], Economics [7], Physics [8], Medicine [9] and many more just to dive deeper into students’ perceptions. Apart from these, there are also a lot of research papers that extensively studied factors that affect e-learning technology readiness and acceptance in different setting from neighboring countries such as Malaysia [10-11], Thailand [12-13], Indonesia [14-15] to a not so much outside Asia like Turkey [16] and Sri Lanka [17] up to other continents like Africa [18] and America [19].

Everything considered, this paper aimed to examine the factors of the Filipino college students’ behavioral intention to use LMS as part of their education journey from the constructs of integrated multimedia instruction, perceived quality work of life, system interactivity, internet...
connectivity experience, perceived ease of use, perceived usefulness, and social media influence. With the help of this study, researchers and software vendors could have a targeted and comprehensive understanding about Filipino students’ perceptions on the use of LMS that can result to a better system delivery. As little research has been done in the Philippine setting, this study intends to contribute to the literature and provide a baseline for researchers who will conduct similar research in the future.

THEORETICAL FRAMEWORK

This paper proposes a conceptual model of e-learning technology adoption particularly Learning Management Systems (LMS) in the Filipino context based on the Technology Acceptance Model (TAM) which adopted the belief–attitude–intention–behavior relationship to prototypical one’s aptitude to embrace technology in an online environment [20-21] as well as a basis for tracing the influence of external factors on attitudes, intentions and internal beliefs [22]. The researcher extended the TAM through the inclusion of Internet Connectivity Experience (ICE), Social Media Influence (SMI), Integrated Multimedia Instruction (IMI), System Interactivity (SI) and Perceived Quality Work of Life (PQWL) as additional predictor values drawing from various literature that used TAM in an educational context both in Philippines and in other countries. The constructs were then arranged according to the three-tier use model (3-TUM) proposed by [23] which was characterized to investigate users’ attitudes towards IT at three levels: (a) individual experiences and system quality; (b) affective and cognitive reactions; and (c) behavioral intentions.

A. Internet Connectivity Experience (ICE)

In this paper, ICE was described by the researcher as “the performance of the internet connection in terms of its speed and reliability that affects user’s experience”. ICE was considered as a determinant of BI instead of internet access since the Philippines has now over 60 million Filipinos - from 47 million internet users on 2016 - who have access to the internet [24]. However, ICE has not been previously considered in any aforementioned literature mainly because internet speed is not an issue in their respective countries. According to Akamai’s State of the Internet report [25], Philippines has the slowest internet speed in the world with an average internet connection speed of 4.5 Mbps during the fourth quarter of 2016. Therefore, if the internet is the lifeblood of e-applications then its speed is the heart that makes the blood flows. In a study conducted by [26], the adoption of e-activities is directly linked to the speed of the internet as people are more likely to undertake such technology acceptance when the connection speed is fast. For this reason, the following hypotheses are proposed:

H1: Internet connectivity experience will have a significant effect on the perceived ease of use in the perspective of Filipino college students in using learning management system.

H2: Internet connectivity experience will have a significant effect on the behavioral intention towards learning management system acceptance of Filipino college students.

B. Perceived Usefulness (PU)

According to Davis [27], PU can be defined as “the degree to which a person believes that using a particular system will enhance his or her job performance.” and is considered as one of the key determinants of IT usage. A study conducted by Subramanian [28] revealed that PU had significant correlation towards behavioral intention of users particularly in adopting e-learning technology which was later confirmed by other researchers such as Fu, Farn & Chao [29], Norazah, Ramayah & Norbayah [30], Tarhini, Hone & Liu [31] and Cigdem & Ozturk [16] whereas their studies, conducted in different educational settings and programs, shown that BI was largely driven by PU. Another case in Nigeria that used PU to model Learning Information System (LIS) students’ intention to adopt e-learning technology revealed that PU is one of the strongest predictors with empirical support in determining whether a student will accept the e-learning technology or not [32]. Since PU is clearly a determinant of BI as proven by an extensive body of literature in the IS community, it is hypothesized that:
H3: Perceived usefulness will have a significant effect on the behavioral intention towards learning management system acceptance of Filipino college students.

C. Social Media Influence (SMI)

In this paper, SMI was described by the researcher as “the degree to which social networking sites (SNS) influence the use of other internet technologies”. In the Philippines alone, there are an estimated 40 million social network users this year [33] and another survey revealed that Filipinos spend more time on social media than anyone else in the world with an average 4.17 hours daily making the Philippines as one of the top users of SNS [34]. Just like ICE, SMI hasn’t been considered in other literature perhaps because the number of SNS users in their respective countries isn’t high enough to make a noticeable effect in the e-learning adoption. However, there is still a lot of debate whether SNS could act as a formal e-learning platform as an alternative to LMS which convinced the researcher to consider SMI as a determinant of BI. Another reason is the fact that the usage of social media website like Facebook can cause a shift in student’s attention [35] which made them spend time in SNS rather than in LMS. Apart from this, SMI is considered to have an effect on PU as well since there are features of LMS specifically in terms of building social connections among learners and educators that are based on SNS. Therefore, the following hypotheses are proposed:

H4: Social media influence will have a significant effect on the perceived usefulness in the perspective of Filipino college students in using learning management system.

H5: Social media influence will have a significant effect on the behavioral intention towards learning management system acceptance of Filipino college students.

D. Perceived Ease of Use (PEOU)

According to Davis [27], PEOU can be defined as “the degree to which a person believes that using a particular system would be free from effort.” Just like PU, PEOU also takes a big and important part in shaping the user behaviour in using e-learning technology [36]. A study conducted by Koufaris [37] exposed that PEOU has a direct and positive influence towards the intention to use the system which was later supported by Chang & Tung [38] and Amoako-Gyampah [39] in their respective studies. Reviewing various literature, several studies are in concert when it comes to the fact that when users perceive an e-learning tool to be easy to use (PEOU), they would also perceive the tool to be useful (PU). Therefore, the following hypotheses are proposed:

H6: Perceived ease of use will have a significant effect on the perceived usefulness in the perspective of Filipino college students in using learning management system.

H7: Perceived ease of use will have a significant effect on the behavioral intention towards learning management system acceptance of Filipino college students.

E. System Interactivity (SI)

According to Abbad, Morris, & Nahlik [40], SI refers to students’ perceptions of the system’s ability to provide interactive communication between instructor and students and among students. Interactivity is not simply a function of a computer-based transaction but a fundamental success factor for teaching and learning in an online environment as well [41]. The interactivity between LMS users within the realm of its system enables learners to explore and play with the course materials [42] and therefore becomes as a decisive element for improving students’ positive feelings such as perceived satisfaction [43] and perceived usefulness [23]. A well-designed LMS that has an interactive bridge between and among instructors, the learners, and the instructional contents (learner-instructor, learner-learner, and learner-content) is believed to have a positive effect to its users and the possibility of online learning adoption. Albeit the result of the study conducted by Abbad, Morris, & Nahlik [40] revealed that there is no evidence to which system interactivity affects students’ adoption of e-learning technology, the researcher would like
to have a follow-up using this construct to verify and test it in the Philippine setting. For this reason, the following hypotheses are proposed:

**H8:** System interactivity will have a significant effect on the perceived usefulness in the perspective of Filipino college students in using learning management system.

**H9:** System interactivity will have a significant effect on the perceived quality work of life in the perspective of Filipino college students in using learning management system.

### F. Perceived Quality Work of Life (PQWL)

In this paper, PQWL was described by the researcher as “the degree to which a system enables its users to participate more actively while enhancing the productivity.” While PQWL has not been considered within an educational context, various researchers such as Srite & Karahanna [44], Zakour [45] and Kripanont [46] have used this construct in their respective empirical studies. The importance attributed to PQWL in determining and predicting work condition varies across individual’s environment, culture and even country. This extension of TAM enables a better apprehension of the cultural influence on the acceptance of IT. Therefore, it is hypothesized that:

**H10:** Perceived quality work of life will have a significant effect on the behavioral intention towards learning management system acceptance of Filipino college students.

### G. Integrated Multimedia Instruction (IMI)

In this paper, IMI was described by the researcher as “the degree to which the presentation of course materials is modeled based on multimedia-based learning”. There has been an extensive review of literature that integrated multimedia instruction in the development of e-learning. Al Saiyd and Al Sayed [47] examined how users perceive the effectiveness of online course when the system integrates the multimedia contents of the study material. There was also an experiment by

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Definition</th>
<th>Items</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Connectivity Experience (ICE)</td>
<td>The performance of the internet connection in terms of its speed and reliability that affects user’s experience (UX).</td>
<td>5 Items [ICE1, ICE2, ICE3, ICE4, ICE5]</td>
<td>[26]</td>
</tr>
<tr>
<td>Perceived Usefulness (PU)</td>
<td>The degree to which a person believes that using a particular system would enhance his or her job performance.</td>
<td>4 Items [PU1, PU2, PU3, PU4]</td>
<td>[22], [51], [52], [68]</td>
</tr>
<tr>
<td>Social Media Influence (SMI)</td>
<td>The degree to which social networking sites (SNS) influence the usage of other internet technologies.</td>
<td>5 Items [SMI1, SMI2, SMI3, SMI4, SMI5]</td>
<td>[31], [51]</td>
</tr>
<tr>
<td>Perceived Ease of Use (PEOU)</td>
<td>The degree to which a person believes that using a particular system would be free from effort.</td>
<td>4 Items [PEOU1, PEOU2, PEOU3, PEOU4]</td>
<td>[22], [51], [52], [68]</td>
</tr>
<tr>
<td>System Interactivity (SI)</td>
<td>Users’ perceptions of the system’s ability to provide interactive communication between its users.</td>
<td>3 Items [SI1, SI2, SI3]</td>
<td>[27], [40]</td>
</tr>
<tr>
<td>Perceived Quality Work of Life (PQWL)</td>
<td>The degree to which a system enables its users to participate more actively while enhancing the productivity.</td>
<td>4 Items [PQWL1, PQWL2, PQWL3, PQWL4]</td>
<td>[31], [44], [46], [51]</td>
</tr>
<tr>
<td>Integrated Multimedia Instruction (IMI)</td>
<td>The degree to which the presentation of course materials are modeled based from multimedia-based learning.</td>
<td>4 Items [IMI1, IMI2, IMI3, IMI4]</td>
<td>[47], [48], [69]</td>
</tr>
<tr>
<td>Behavioral Intention (BI)</td>
<td>The degree to which a user accepts and uses the e-learning technology as part of the learning process.</td>
<td>3 Items [BI1, BI2, BI3]</td>
<td>[32], [64], [70]</td>
</tr>
</tbody>
</table>
Zhang [48] that compared the effectiveness of multimedia-based e-learning and a less interactive e-learning environment. Overall, the integration of multimedia component in the delivery of the system gave a positive result in the users’ educational experience. For this reason, the following hypotheses are proposed:

**H11:** Integrated multimedia instruction will have a significant effect on the perceived ease of use in the perspective of Filipino college students in using learning management system.

**H12:** Integrated multimedia instruction will have a significant effect on the perceived quality work of life in the perspective of Filipino college students in using learning management system.

**RESEARCH METHODOLOGY**

The study used quantitative research design. It followed the same three-stage approach used by Abbad, Morris, and Nahlik [40] to identify the major factors affecting students’ adoption of an e-learning system in a university in Jordan. The first step was to build an initial model based on the combination of the extended TAM and 3-TUM. The connection of the constructs was formed based from the literature review presented in the previous section. Secondly, a survey consisting of seven sections (ICE, PU, SMI, PEOU, SI, PQWL, IMI & BI; see Table 1) was created to provide measures of the identified factors followed by a confirmatory factor analysis (CFA) to further develop the said measures. The CFA was used by the researcher as the first step of the two-step sequence of the identification of the measurement model. Based on the general guidelines suggested by MacCallum [49] and Anderson and Gerbing [50], revisions to the model were made whereas the modifications were done individually to avoid unnecessary effects on the solution. The CFA was then conducted using AMOS.

It is very important to mention that the baseline used for the survey instrument was based on various researchers like the e-learning readiness assessment tool [51] specifically created for Philippine higher education institutions, influence of system characteristics on e-learning use [52] and other similar papers under the education field from other countries. Lastly, a structural model was estimated using structural equation modeling (SEM) techniques which have been widely used in determining user’s technology acceptance [53], [40], [31].

**Sampling and Data Collection**

The target population in this research was college students from the Philippines who use Learning Management System (LMS) as part of their education. The researcher focused on colleges that are considered as promoters of e-learning integration in the educational sphere in the Philippines. The questionnaires were administered through the learning management system used by the schools whereas only registered Filipino college students chosen using non-probability convenience sampling technique could answer the online questionnaire. With the help of teachers in their respective schools, a total of 800 students were invited to the LMS group where the questionnaire could be answered. The questionnaire was available on the LMS from November 6 to 10, 2017. The number of answered questionnaires during the time frame given was 629 indicating 78.6% response rate. Since all of the questions are required to be answered, there is no incomplete questionnaire, hence, all 629 answers are considered as valid preliminary data.

**Profile of the Schools**

There were 10 colleges containing 100 students per each invited to participate in the survey. These schools are considered as valid adopters of e-learning technology due to the fact that the use of LMS both inside and outside of the school is part of their curriculum. With the help of the professors of each college, the information has been disseminated to the students easily.

**Data Analysis**

The statistical tools used in this research are SPSS 22 and AMOS 18. Both software helps the researcher in their own way to determine the characteristics of the respondents, information about the goodness-of-fit model and relationship among the hypothesis, variable reliability, factor analysis, path model creation, etc.
RESULTS AND DISCUSSIONS

The research was conducted to determine the factors that affect the acceptance of e-learning technology specifically LMS as a reinforcement of the teaching and learning process by college students in the Philippine setting. Presented in the Table 3 are the descriptive statistics which indicate that the majority of the Filipino college students showed positive responses to the constructs and the Cronbach’s alpha which showed that the alpha for the subscales ranged from .73 to .88 indicating that all the constructs revealed reasonable levels of reliability (.70 or higher, according to Hair et al., [54]) which makes all the constructs suitable to measure the concepts employed in the study. On a side note, it is very worth mentioning that SMI and ICE got the first and second highest mean which are additional constructs purposely added in the

<table>
<thead>
<tr>
<th>Variables</th>
<th>Category</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>439</td>
<td>69.8</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>190</td>
<td>30.2</td>
</tr>
<tr>
<td>Age</td>
<td>Younger &lt; 18</td>
<td>341</td>
<td>54.2</td>
</tr>
<tr>
<td></td>
<td>Older &gt;= 18</td>
<td>288</td>
<td>45.8</td>
</tr>
<tr>
<td>Year Level</td>
<td>1st Year</td>
<td>111</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>2nd Year</td>
<td>194</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td>3rd Year</td>
<td>252</td>
<td>40.1</td>
</tr>
<tr>
<td></td>
<td>4th Year</td>
<td>72</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>5th Year</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Program</td>
<td>Bachelor of Science in Information Technology</td>
<td>259</td>
<td>41.2</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Tourism Management</td>
<td>85</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Hotel and Restaurant Management</td>
<td>129</td>
<td>20.5</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Accounting Technology</td>
<td>24</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Computer Science</td>
<td>43</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Computer Engineering</td>
<td>60</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Science in Business Management</td>
<td>29</td>
<td>4.6</td>
</tr>
<tr>
<td>Availability of Computer at Home</td>
<td>Yes</td>
<td>412</td>
<td>65.5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>217</td>
<td>34.5</td>
</tr>
<tr>
<td>Internet Access at Home</td>
<td>Yes</td>
<td>528</td>
<td>83.9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>101</td>
<td>16.1</td>
</tr>
<tr>
<td>Computer Skill</td>
<td>Novice</td>
<td>120</td>
<td>19.1</td>
</tr>
<tr>
<td></td>
<td>Intermediate</td>
<td>344</td>
<td>54.7</td>
</tr>
<tr>
<td></td>
<td>Expert</td>
<td>165</td>
<td>26.2</td>
</tr>
<tr>
<td>Internet Function</td>
<td>Academic</td>
<td>69</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
<td>32</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>Entertainment</td>
<td>120</td>
<td>19.1</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>385</td>
<td>61.2</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>23</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Table 2. Summary of Demographic Characteristics of Research Participants.

Table 3. Reliability Coefficient and Descriptive Statistics of the Constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>No. of Items</th>
<th>Item Deleted</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Cronbach α</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICE</td>
<td>5</td>
<td>ICE3</td>
<td>4.65</td>
<td>0.764</td>
<td>0.867</td>
</tr>
<tr>
<td>PU</td>
<td>4</td>
<td>-</td>
<td>4.18</td>
<td>0.621</td>
<td>0.843</td>
</tr>
<tr>
<td>SMI</td>
<td>5</td>
<td>SMI2, SMI5</td>
<td>4.97</td>
<td>0.726</td>
<td>0.882</td>
</tr>
<tr>
<td>PEOU</td>
<td>4</td>
<td>-</td>
<td>4.02</td>
<td>0.717</td>
<td>0.823</td>
</tr>
<tr>
<td>SI</td>
<td>3</td>
<td>-</td>
<td>3.82</td>
<td>0.738</td>
<td>0.806</td>
</tr>
<tr>
<td>PQWL</td>
<td>4</td>
<td>PQWL1</td>
<td>3.89</td>
<td>0.684</td>
<td>0.809</td>
</tr>
<tr>
<td>IMI</td>
<td>4</td>
<td>-</td>
<td>3.76</td>
<td>0.666</td>
<td>0.733</td>
</tr>
<tr>
<td>BI</td>
<td>3</td>
<td>-</td>
<td>4.12</td>
<td>0.811</td>
<td>0.789</td>
</tr>
</tbody>
</table>
Philippine setting. The third column shows the items deleted during the exploratory factor analysis (EFA) for two possible reasons encountered during the process: (1) there was a cross loading or (2) the variables were unqualified for the factor loading of more than 0.4 based on a statistics book [54].

As shown in Table 4, the factor correlation coefficients are ranging from 0.509 to 0.821 indicating that all of the constructs employed in the study were positively correlated construct, hence, providing a strong evidence of discriminant validity or simply that the statistical constructs or latent variables are distinct from each other allowing a measure to capture some phenomenon that other measures do not. Since there is no cross-factor correlation of 0.85 or higher on the result, it is safe to say that there are no factors that measure the same construct.

Table 4. Factor Correlations.

<table>
<thead>
<tr>
<th>Factors</th>
<th>ICE</th>
<th>PU</th>
<th>SMI</th>
<th>PEOU</th>
<th>SI</th>
<th>PQWL</th>
<th>IMI</th>
<th>BI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICE</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.721</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMI</td>
<td>0.576</td>
<td>0.685</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEOU</td>
<td>0.711</td>
<td>0.759</td>
<td>0.510</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>0.721</td>
<td>0.678</td>
<td>0.509</td>
<td>0.700</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PQWL</td>
<td>0.698</td>
<td>0.657</td>
<td>0.521</td>
<td>0.699</td>
<td>0.531</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMI</td>
<td>0.521</td>
<td>0.624</td>
<td>0.602</td>
<td>0.663</td>
<td>0.592</td>
<td>0.606</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>BI</td>
<td>0.811</td>
<td>0.769</td>
<td>0.821</td>
<td>0.701</td>
<td>0.652</td>
<td>0.532</td>
<td>0.578</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5. Evaluation of SEM with Goodness of fit Measure.

<table>
<thead>
<tr>
<th>Type of Measure</th>
<th>Goodness of Fit Measures</th>
<th>Research Result</th>
<th>Desired Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute fit Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-Square Test</td>
<td>421.212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of Freedom</td>
<td>212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chi-square/Degree of Freedom</td>
<td>2.426</td>
<td></td>
<td>2-5</td>
</tr>
<tr>
<td>Goodness-of-fit Index</td>
<td>0.898</td>
<td></td>
<td>&gt;.90</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation</td>
<td>0.061</td>
<td></td>
<td>&lt;.08</td>
</tr>
<tr>
<td>Incremental Fit Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted Good-of-Fit Index</td>
<td>0.886</td>
<td></td>
<td>&gt;.90</td>
</tr>
<tr>
<td>Tucker-Lewis Index</td>
<td>0.922</td>
<td></td>
<td>&gt;.90</td>
</tr>
<tr>
<td>Normed Fit Index</td>
<td>0.905</td>
<td></td>
<td>&gt;.90</td>
</tr>
<tr>
<td>Comparative Fit Index</td>
<td>0.948</td>
<td></td>
<td>&gt;.90</td>
</tr>
<tr>
<td>Parsimonious Fit Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parsimonious Normed Fit Index</td>
<td>0.429</td>
<td></td>
<td>&gt;.50</td>
</tr>
<tr>
<td>Parsimonious Good-of-Fit Index</td>
<td>0.507</td>
<td></td>
<td>&gt;.50</td>
</tr>
</tbody>
</table>

Table 6. Summary of Path Test Result.

<table>
<thead>
<tr>
<th>H#</th>
<th>Proposed Relationship</th>
<th>Path Coefficient</th>
<th>P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>ICE → PEOU</td>
<td>0.519</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H2</td>
<td>ICE → BI</td>
<td>0.923</td>
<td>**</td>
<td>S</td>
</tr>
<tr>
<td>H3</td>
<td>PU → BI</td>
<td>0.892</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H4</td>
<td>SMI → PU</td>
<td>0.622</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H5</td>
<td>SMI → BI</td>
<td>0.970</td>
<td>**</td>
<td>S</td>
</tr>
<tr>
<td>H6</td>
<td>PEOU → PU</td>
<td>0.458</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H7</td>
<td>PEOU → BI</td>
<td>0.461</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H8</td>
<td>SI → PU</td>
<td>0.638</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H9</td>
<td>SU → PQWL</td>
<td>0.553</td>
<td>0.358</td>
<td>NS</td>
</tr>
<tr>
<td>H10</td>
<td>PQWL → BI</td>
<td>0.572</td>
<td>0.106</td>
<td>NS</td>
</tr>
<tr>
<td>H11</td>
<td>IMI → PEOU</td>
<td>0.431</td>
<td>***</td>
<td>S</td>
</tr>
<tr>
<td>H12</td>
<td>IMI → PQWL</td>
<td>0.572</td>
<td>0.237</td>
<td>NS</td>
</tr>
</tbody>
</table>

Note: *** p-value < 0.01; ** p-value < 0.05; * p-value <0.10; S=Significant; NS=Not Significant
Table 5 shows the data analysis using structural equation modeling with AMOS 18 where all measures are within the desired range values indicating a good model fit [55-57]. On the Table 6, it can be seen the path coefficient of the e-learning technology acceptance of Filipino college students whereas it showed a significant effect among constructs such as ICE to PEOU ($\beta = .519, p < .01$), ICE to BI ($\beta = .923, p < .05$), PU to BI ($\beta = .892, p < .01$), SMI to PU ($\beta = .622, p < .01$), SMI to BI ($\beta = .970, p < .05$), PEOU to PU ($\beta = .458, p < .01$), PEOU to BI ($\beta = .461, p < .01$), SI to PU ($\beta = .638, p < .01$), and IMI to PEOU ($\beta = .431, p < .01$).

The current study found that internet connectivity experience has a positive relationship with perceived ease of use ($\beta = .519, p < .01$) and behavioral intention ($\beta = .923, p < .05$) supporting H1 and H2 respectively. With regards to the relationship between ICE and PEOU, students can obviously notice the ease of using the LMS when the internet connection is fast. Moreover, they are more likely to adopt and use the system given the high-speed internet which is consistent with the result of the study conducted by Peltier and Youssef [26]. Both educational institutions and software vendor can clearly help with the internet speed issue. First of all, colleges and universities may opt with enhancing their IT infrastructure, increasing the Internet bandwidth and offering consistent and reliable Wi-Fi connection for those who are going to access the LMS outside the computer laboratory. In the case of the software vendors, reducing the load time of web pages is the key especially that most people expect a web page to load in two seconds or less. This can be done by minimizing HTTP requests, reducing server response time, enabling compression, activating browser caching, minifying resources, optimizing images, reducing redirects and many more. Since the Philippines has the slowest internet speed in the world, ICE will clearly play an important role in the e-learning technology adoption of Filipino college students and maybe to other settings with a slow internet connection.

Social media influence, as hypothesized in H4 and H5, has also an effect to perceived usefulness ($\beta = .622, p < .01$) and behavioral intention ($\beta = .970, p < .05$). These relationships, SMI to PU and SMI to BI, although with a separate relationship, have a connection in between. Filipino college students couldn’t appreciate the usefulness of LMS simply because that the things that they accomplish on the system can actually be done in SNS like sharing files such as learning materials and documents, socializing with other users and creating a group (class) to name some; hence, the debate whether SNS can act as LMS. Due to the lack of appreciation of the usefulness of LMS, the BI in adopting it is affected. For a country like the Philippines that is considered as a promoter of social media usage, educational institutions must find a way to make LMS stand out from SNS. When there is a fine line between LMS and SNS, students will be able to appreciate LMS more as a cutting-edge pedagogy purposely created for education.

The results also show that system interactivity has a positive relationship with perceived usefulness ($\beta = .638, p < .01$) as hypothesized in H8 but there is no strong evidence that it also influences the perceived quality work of life contrary to H9. The relationship between SI and PU clearly revealed the thoughts of Filipino college students in terms of how they appreciate the usefulness of a system. The interaction within the system (learner–interface, learner-tool, learner-task, learner-content, learner-instructor, and learner-student) undoubtedly resolves one of the established weaknesses of e-learning which is the absence of face-to-face interaction. SI, as an exogenous variable, showing a positive influence towards PU is similar to past studies of Wu & Wu [58] and Lee, Hsieh & Chen [59]. On the other hand, the lack of evidence between the relationship of SI and PQWL only shows that Filipino college students will actively participate, or not, in the platform regardless of the interaction the system has to offer perhaps because the will and motivation of their participation relies on personal characteristics and cultural setup [60]. Nonetheless, SI is still an important construct as it influences PU which influences BI.

Aside from the lack of evidence in the relationship of perceived quality work of life and system interactivity, the same thing can be said with perceived quality work of life and
behavioral intention as well as perceived quality work of life and integrated multimedia instruction since their relationships are not supported by the results of the study contrary to H10 and H12. In totality, PQWL did not perform well as a factor which contradicts the results from the previous findings of Tarhini, Hone, & Liu [31]. However, IMI should not be taken for granted as the construct has a positive influence to PEOU (β = .431, p < .01) as hypothesized in H11. Filipino college students take multimedia instruction as a positive element that doesn’t only make the system easier to use but also enhances their learning. The use of multimedia in the delivery of e-learning technology undoubtedly needs to be considered by educational institutions especially that many research papers prove the use of such integration in the learning process can enhance students’ academic achievement [61-63].

Other hypotheses that were supported by the study, H3 and H7, showed the positive relationship of both perceived usefulness (β = .892, p < .01) and perceived ease of use (β = .461, p < .01) to behavioral intention. These hypotheses were merely a confirmation in the Philippine setting since lots of researchers [64-67], [40], [36], [31], [15], [16] have already concluded that PU and PEOU are two of the strongest determinants of BI. The findings were also supporting previous literature [22], [65], [36], [15] which stated the positive relationship between PEOU and PU (β = .458, p < .01) as hypothesized in H6. When a system is easy to use, it is also perceived as useful tool.

Figure 2. Conceptual Framework of the Study based on TAM and 3-TUM.
CONCLUSION

The study has empirically investigated the behavioral intention to use e-learning technology of Filipino college students using the TAM with additional predictor values (internet connectivity experience, social media influence, integrated multimedia instruction, system interactivity and perceived quality work of life) modeled using 3-TUM. In the context of Philippines, the aforementioned additional predictors, except perceived quality work of life, together with the original TAM predictors play a critical role in the Filipino college students’ acceptance towards e-learning technology. From the theory-testing perspective, the results of this study primarily serve as a contribution towards the extension and validation of the research results from the literature. While doing so, it provided practical and technical implications to colleges and universities in the Philippines (which might be applicable as well in international setting) that may help to convince the students in their acceptance of e-learning technology like LMS as discussed in the previous section.

While the study has successfully looked into the factors that might possibly affect Filipino college students’ behavioral intention to use LMS, it has certain limitations. Firstly, self-reported data were gathered from various colleges and universities through an online questionnaire. With regards to the sampling and factors, the current study was assessed in the Philippine context (Filipino college students), thus, the applicability and generalizability of the findings are limited. Notwithstanding, future researchers can also validate the results of this study by using the same proposed model in primary and secondary education. Furthermore, the additional predictors purposely added in the Philippine context offers more future research possibilities. If similar studies are replicated in other countries for further investigations, findings could be discussed through a comparative analysis. Other factors may be explored as well such as group influence, cultural lineage and other influences that could overcome the limitation of not using cross-sectional data. Finally, future researchers could also carry out similar research in other e-learning practices. As this study focused on LMS which has been used as a tool in a blended learning environment, researchers may conduct similar studies that deal with pure online environments, online courses and so on.

With the convergence of technology comes the pedagogical challenges associated with e-learning implementation; hence, educational leaders should not worry anymore about the elements that stimulate participation across diversity that determine the e-learning acceptance rate, educational technologists should already know how to attack the development of the digital environment to ensure pedagogically sound learning experience, and educators and learners with different academic, industry and support needs should be in concert in maximizing the benefits of using the educational technology that can lead learners to global certification. While these were the derivations why the researcher conducted the study, the results are also meant to serve as one of the pioneers that offer information on e-learning acceptance in the Philippines.

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Students’ Perception in NUST with the Lens of Socio Cultural Adjustment and Language Apprehension

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ABSTRACT

Changing educational scenarios and need of achievements make the want for learning, adopting and respecting of new culture obvious. Communication skills besides certain other factors strengthen our place in a new culture to overcome cultural shock. The Purpose of the article is to explore the impact of cultural adaptability (SCA) factors on communication apprehension (CA) in diversified students of Pakistan’s top ranked university (NUST) in Islamabad. The article addresses the problems that students face, in socio cultural adjustment when they enter in the National University of sciences and Technology (NUST) from different educational institutions and its link with communication in new educational atmosphere. The study shed light on the relationship of communication apprehension with academic performance of students, community involvement, language proficiency and interpersonal communication. Study also highlights gender wise differences in communication apprehension and thus in adaptation process. For data collection through survey, Communication Apprehension Scale (PRCA-24) and Sociocultural Adaptation Scale (SCAS) are used. It is concluded that there is negative relation between SCA and CA. Study did not find any indications of gender wise differences in level of communication apprehension among students of NUST. It was discovered that less interpersonal communication is linked with high communication apprehension. Likewise, students who proclaimed less involvement in community works are figured out to be a significant predictor of increase in CA.

KEYWORDS:

Sociocultural adjustment, communication apprehension, academic environment

1- Introduction:

The process of getting accustomed to new way of life is called cultural adjustment. People feel difficulty and confusion in accepting beliefs, traditions and values of new culture which are different from their own stand-point. This difficult state is called cultural shock (Ward and Furnham 2001). Sometimes this situation of differences is so undesirable that it can affect the behavior of that person. This shock can direct them towards tension and stress (Barna 1976). To respond the problems of sojourners, scholars
have thoroughly studied these difficulties in the way of adjustment (M Javidan 2002). Mostly researches revolve around the concept of examining the factors that are involved in sojourner’s adjustment to the cultural shock. Many early researches focused on u curve adjustment shape that occurred after spending specific time in new culture. (Black, oddou and Mendenhall 1991). There are many scholars that has studied factors related to the level of SCA experiences by expatriates (e.g., Brisset et al, 2010; Yang et al., 2006; Li & Gasser, 2005). According to Ruben (1979) in the process of acculturation those members are successful who adopt the integration strategy and feel less stress as compared to marginalized group. Mostly researches e.g. Dodge (1990) conducted on cultural adjustment factors are related to travel abroad only; in fact, these problems can be faced by a native person also, amidst certain peculiar scenarios. The aim of the present research is to address the communication apprehension faced by the students when they enter a leading university of Pakistan that is National University of Sciences and Technology (NUST), from diversified educational environments. The high standards of education, social conduct and discipline demanded by top ranking universities put some students in a state of disarray. McCroskey (1982) described Communication apprehension as anxiety that student feel in communication while cultural assimilation and getting atoned to new academic atmosphere. In the process of acculturation those people are successful who accept the norms of other culture and find their feet in the new conditions. One issue in adaptation is reluctance to accept foreign cultural norms and be restricted and stuck with ethnic cultural values (Berry, 2005).

The theme is significant as it will help students in better socio-cultural adjustment, development of problem-solving skills and in turn, achieve academic excellence. The article discovers the bearing of cultural shock during sociocultural adaptability. This study aims at discovering the impact of cultural adaptability factors such as academic performance of students, community involvement, language proficiency and interpersonal communication on the degree of communication anxiety, students suffered in a given situation. It also investigates the Gender wise differences in language apprehension during the adjustment process.

1.1- SOCIO-CULTURAL ADAPTATION

Every region has a specific culture and people of that area are accustomed to that precise way of living. Contrarily, acculturation is the situation; people face when they enter a different culture and social environment (Gibson 2001). Many researches have proved that people face hurdles in adjustment in a new culture due to differences in standards, cultural values and customs (Ang and Lianputtong 2008). In a broad sense, cultural adjustment is defined as the extent of overcoming the clashes and increasing efficiency in new environment (Searle & Ward, 1990).
According to Aycan (1997), adjustment process can be categorized in two types; social adjustment and psychological adjustment. Ward’s (1996) study reveals that Socio-cultural adjustment is related with adapting skills in a new society and modifying behavior according to the culture of host society. On the other hand, psychological adjustment is characterized with emotional stability and successfully overcoming the stress. Stress reduction is associated with good relations of expatriate with host residents (Searle and Ward 1990). These theories largely support Black, Oddou & Mendenhall (1991) model of sociocultural adjustment which has described psychological adjustment, work adjustment and behavioral adjustment as three kinds of adjustment. Likewise, Aycan’s (1997) model suggests that sociocultural adjustment and work adjustment are interdependent.

There are many factors which have a direct bearing on socio-cultural adaptation process. Many cultural adaptation researches focus on these factors. Li & Gasser (2005) described the connection between SCA and self-efficacy (Fan & Mak, 1998) of Asian undergraduate students. According to Li and Gasser (2005); Chirkov, et al (2008), cross culture self-efficacy positively affects socio-cultural adjustment and relations with host community facilitate it. It has been found that host country fellowship depicts good effects on self-efficacy of sojourners. Mak & Tran (2001) Study concludes that Sojourners in Australia who had high self-efficacy in cross culture had greater ability of adapting to a new environment. While, another view is that social adjustment is related to perceptions and social learning. (Searle and Ward 1990). One issue in adaptation is reluctance to accept and learn foreign cultural norms and being restricted to ethnic cultural values (Berry 2005). Berry’s (1980) acculturation model describes the variant styles combinations of adaptation phenomenon related to convergence and divergence of values either towards homegrown cultural values or new cultural values. According to Berry’s (1980) model some people fully adopt the new culture and cut off their roots in the old culture after few months of transition. Conversely, the other group sticks to their native norms and falls prey to dissonance in the new environment. The third group adjusts to new culture while retaining certain norms of the native culture; thus being adaptable to both.

1.2- COMMUNITY INVOLVEMENT

Toyokawa & Toyokawa’s (2002) study on international students reflects that sojourners participation in extracurricular activities is the positive step in building good relations with host community and consequently in cultural adjustment. According to Li & Gasser (2005), good relations with host community and self-efficacy are two reasons of sociocultural adjustment. This study states the view point that Ethnic identity and friendly relations with host community are inversely proportional. But at the same time, it rejects the concept that ethnic values negatively affect socio-cultural
adjustment. Yan & Berliner (2009), reveal that lack of interaction with host community creates stress in students and obviously affect their better adaptation. There is a debate on the concept that host country friends or fellow nationals, who are most supportive in adjustment process. Chapdelaine & Alexich (2004) divulged that students having strong contacts with family members have less contact with host society fellows. However, Chan-Hoong Leeong’s (2000) study proved that there is no dependency between national identity and host identity. An individual can maintain both identities at the same time. Newcomers face challenges in a new culture. According to Yan & Berliner (2009) cultural gaps and difference in educational standards affect the adaptation process. The differences in cultural settings are directly proportional to the problems of adjustment for a sojourner. If differences in values and customs are bigger it will be even harder for a newcomer to acquire social skills in a new culture.

1.3- COMMUNICATION

Along with other factors, communication proficiency plays a beneficial role in adaptation process. It intervenes the impact of self-construal on process of adaptation (Yang, Noels and Saumure 2006). Masgoret’s (2006) research about foreign language instructors in a host community disclosed that Instructors who could find similarities in their own culture and host culture have greater satisfaction with job and show high magnitude of adaptability. With passage of time, worries of sojourners about the host community attitude and host language decrease and their confidence increases. Foreigners having more contacts with members of host community, experience less difficulty in adjustment. Some Human personality traits are useful in adjustment in any culture. The research proves that proficiency in foreign language, experience of living in different foreign cultures and enthusiasm to work in a new culture play an effective role in socio cultural adjustment. Culture relocation variables such as language skills and long stay in a foreign culture are also helpful in adjustment process. Mak & Tran’s (2001) research in Kenya reveals that interpersonal communication and communication skills are linked with each other and affect the adjustment process. Communication behavior is strongly related with orientation to knowledge. Communication apprehension is defined as fear, people feel in communicating with others. (McCroskey,1977,1984). A research of Roacha and Olanirana (2001) explored the negative relation between communication apprehension and satisfaction with relationships in new culture. A person, who feels fear in communication, cannot build good relations with host community persons.

1.4- PERSONAL INTERESTS

Yang et al. (2006) used Ward and Kennedy’s (1999) Sociocultural Adaptation Scale (SCAS) to analyze the difficulties students face in new
academic environment. Study revealed that Independent Self-construal plays a significant role in sociocultural adjustment. Some individual has specific characteristic and ways of communicating and addressing surroundings. These ways help them in better Cross culture adaptation (Yang, Noels and Saumure 2006). People who have interest and motivation to adopt a new culture, have desire of learning new norms and are interested in making new friends in new environment are more successful in a new culture (Chirkov, et al. 2008). This signifies the role of aptitude in socio-cultural adjustment. Ruben’s (1979)article about intercultural relations reveal that in a group, people from different cultural backgrounds, have diversified views and skills, however, these conflicts can be minimized through negotiations. Common acceptance in a group can be achieved through discussion. The objective of this study is to examine the influence of various dimensions of sociocultural adaptability (Interpersonal Communication, Language Proficiency, Community Involvement, Personal Interests, and Ecological Adaptation) on communication apprehension of Pakistani students. Students, who move from one academic ambiance into another, feel intricacy in communication at different tiers. Purpose of this research is to identify such communication difficulties and their link with various factors of socio-cultural adaptability. Study also aims to discover the gender wise differences in level of communication apprehension among students.

2- RESEARCH QUESTIONS

RQ1: How will overall sociocultural adoptability correlate with level of communication apprehension?

RQ2: what are the gender wise differences in level of communication apprehension among students of NUST?

RQ3: How much interpersonal relations effect level of communication apprehension.

RQ4: How much academic performance affects level of communication apprehension 

RQ5: How much community involvement affects level of communication apprehension 

RQ6: What bearing does language proficiency have on communication apprehension? RQ7: How much ecological adaptation affects level of communication apprehension

3- METHODOLOGY

3.1- Data Collection

This survey was conducted to get information about self-reported communication apprehension, students experience when they enter in one of the leading universities of Pakistan. National University of Science and Technology (NUST) is selected for this purpose. The reason of selecting this university is that according to the reviews and ranking list 2016, NUST is the leading university of Pakistan. Majority of students want to study in this university. But due to high standards of
education and changed social scenarios students face difficulties in adaptation process and consequently it adversely affects their achievements. A case study was conducted in medical students of Pakistan which revealed that 90% students admitted that they have been stressed at different times, due to work load and psychological pressure (Sheikh, et al. 2004). Sometimes these unsatisfactory circumstances direct them towards tension and stress. These feelings of incompetency lead them towards drop out from university. The research focused on the relation between factors of sociocultural adaptability and communication apprehension, the study also explores which factors of sociocultural adaptability trigger communication apprehension, mostly. These findings will help students in better adjustment in new educational environment, in enhancing problem-solving skills and in turn, achieving academic excellence.

3.2 Sampling Technique

Purposive sampling method was used to select students. Questionnaires were filled only by the new students, in NUST. All the students who participated in this study belonged to second semester. This study was conducted in the month of April and during this month, 1st semester students were not available. Intentionally new students were selected for the research because according to theory of cultural adjustment, new students experience cultural shock in an unfamiliar environment and with passage of time they get accustomed in that environment. 400 students were initially selected from six departments of NUST. Students were selected at Random with in each department (Engineer IT, Social sciences, Business school, Biosciences, Natural science and Art design and architecture) to collect data with no distinction of gender. Data was collected on paper and questionnaires were filled manually by students. Total 351 students completed the questionnaire.

3.3 Measuring Instruments

Communication apprehension is a dependent variable. To measure Communication apprehension previously published scale (PRCA- 24) is used (J. C. McCroskey 1982). To determine the communication apprehension there are 24 items in survey related to feelings of new students regarding group discussions, meetings, interpersonal conversation and public communication. Five-point scale is used to judge the intensity of CA, which range from strongly agree to strongly disagree. To judge the cultural adaptability of students in new educational atmosphere, SCAS scale was used (Wilson 2013). There were 21 statements in this inquiry form, concerning academic performance of students, community involvement, interpersonal communication, ecological adaptation and language proficiency. Gender, status in university, academic programs, and factors of SCA are considered as independent variables. To judge the level of sociocultural adaptability, respondent was asked to rate on a five-point
scale range from ‘not at all competent’ to ‘extremely competent’.

3.4- Demographics

Participatory students were asked to tell about gender, age, previous institution, and current educational program, department, native city, and comfortable language for communication and education level.

4- DATA ANALYSIS AND RESULTS

Correlation, ANOVA and regression analyses were used to answer the research questions. Demographics of Respondents: A total of 351 NUST students contributed to manual survey sampling and data collection process. 54.4% of the under-study personnel were male, while, 45.6% were female. Likewise, 279 students (79.5%) were under graduates and 72 (20.5%) were the post-graduate students. They all gave diversified opinion about their preceding institutions. There were 146 institutions in the list of sample students’ previous institution, from where, they had migrated to NUST. Finally 27%, 22% and 18% respondents respectively declared their affiliation with Punjab College, APS & Colleges and Beacon house, which were the highest frequencies in the sample. In sample 14 (3%) students were studying in arts designing and architecture, 27 (7%) in Biosciences, 47 (13%) in Business programs, 156 (44%) in Engineering/IT, 27(7%) in Natural Science (22%), 1 in Robotics and 79 in Social Sciences. 193(54%) students reported that they were day scholars, whereas, 158 (45%) reported to have been hostilities. After Rawalpindi (68) and Islamabad (65), highest frequency of students who participated in survey, belonged to Lahore (40 students). 261 (75%) students termed Urdu to be the language of comfort for communication, whilst, 90 (25%) students termed English as more convenient language for them.

Configuration of Communication apprehension

Table 1: Tab CA Score

<table>
<thead>
<tr>
<th>CA Score 2</th>
<th>Freq.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Communication</td>
<td>1</td>
<td>0.28%</td>
</tr>
<tr>
<td>Apprehension</td>
<td>99</td>
<td>28.21%</td>
</tr>
<tr>
<td>Low level of Communication</td>
<td>221</td>
<td>62.96%</td>
</tr>
<tr>
<td>Apprehension</td>
<td>30</td>
<td>8.55%</td>
</tr>
<tr>
<td>Moderate Communication Apprehension</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As shown in the table, new students face different levels of communication apprehension (CA). As shown in the graph cluster is between 60 and 77 which indicate that mostly new students face moderate level of CA.

Socio cultural adaptation amongst new students of NUST the data analysis shows the degree to which new students feel difficulties in adaptation process.

Table 2: Difficulty in culture adaptation

<table>
<thead>
<tr>
<th>SCA</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Competent</td>
<td>8</td>
<td>2.28</td>
<td>2.28</td>
</tr>
<tr>
<td>Average competent</td>
<td>222</td>
<td>63.25</td>
<td>65.53</td>
</tr>
<tr>
<td>Extremely competent</td>
<td>121</td>
<td>34.47</td>
<td>100.00</td>
</tr>
<tr>
<td>Total</td>
<td>351</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

To find out the answer to first research question that is the relationship between Socio cultural adaptability (SCA) level and communication apprehension (CA), Pearson correlation analysis was carried out. r is -0.3807. It shows the negative relation between SCA and CA.

According to Cohen (1988) guideline, there is medium level of correlation. (r= -0.38) between CA and overall SCA although relation is negative one. It shows, students who feel minimum difficulty in cultural adaptation or in other word well adopted a new culture feel less communication apprehension on different levels.

Table 3

<table>
<thead>
<tr>
<th>Correlation CA Score &amp; SCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA score</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1.0000</td>
</tr>
</tbody>
</table>

To find the answer to 2nd research question that pertains to gender wise differences in level of communication apprehension, two-sample tests with equal variances were carried out.

Results of two groups mean comparison show that there was no difference in the level of communication apprehension on the basis of gender (Pr = 0.3468 p value > 0.05). Male and female students experience same level of CA.
T-test SCA, by(gender) Two-sample t test with equal variances

<table>
<thead>
<tr>
<th>Group</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>Std. Dev.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>female</td>
<td>160</td>
<td>71.25</td>
<td>1.113631</td>
<td>14.08644</td>
<td>69.05058 - 73.44942</td>
</tr>
<tr>
<td>male</td>
<td>191</td>
<td>70.19372</td>
<td>0.8584887</td>
<td>11.86455</td>
<td>68.50032 - 71.88711</td>
</tr>
<tr>
<td>combined</td>
<td>351</td>
<td>70.67521</td>
<td>0.689434</td>
<td>12.91654</td>
<td>69.31926 - 72.03117</td>
</tr>
</tbody>
</table>

diff = mean(female) - mean(male)  
\[ t = \frac{71.25 - 70.19372}{0.689434} = 1.667922 \]

0.05 significant level

Y = a + bx  
\[ Communication\ apprehension = 3.010552 + 0.0030661(\text{academic}) - 0.0116844(\text{language}) - 0.0221337(\text{community involvement}) - 0.0264393(\text{interpersonal}) \]

P value = 0.4462, is greater than 0.05. It means null hypothesis that, there is a gender wise differences between SCA” is rejected. Results of two groups mean comparison show that male and females face same types of difficulties in socio-cultural adaptation.

Rests of the research questions were concerned that how factors of sociocultural adaptability, (Interpersonal relations, academic performance, community involvement, language proficiency, ecological adaptation) affect level of communication apprehension.

To explore the answer of these research questions, regression analysis was conducted.

**Table 4: Regression analysis of predictors of socio cultural adaptability**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Communication apprehension, P value</th>
<th>T value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpersonal communication</td>
<td>-0.002</td>
<td>-3.13</td>
</tr>
<tr>
<td>Academic performance</td>
<td>0.801</td>
<td>0.25</td>
</tr>
<tr>
<td>Community Involvement</td>
<td>-0.043</td>
<td>-2.03</td>
</tr>
<tr>
<td>Ecological Adaptation</td>
<td>-0.089</td>
<td>-1.71</td>
</tr>
<tr>
<td>Language Proficiency</td>
<td>-0.504</td>
<td>-0.67</td>
</tr>
</tbody>
</table>

It was observed that a negative relation existed between CA and interpersonal communication, community involvement, ecological adaptation and language proficiency. Interpersonal communication and community involvement proved to be significant foreteller of communication apprehension (p<0.05 in both). Those who had less community involvement, faced high level of CA. likewise, students who were not competent enough in building interpersonal relation, reported high level of communication apprehension as compared to others. The relationships between other factors of SCA and communication apprehension were negative but not very significant. Yet there was no relationship found between Academic performance and level of communication apprehension. One-way ANOVA is run to check the differences in CA between different educational programs.
P value=0.007 which is below .05, indicate the significant difference in the level of CA between groups. Different groups show different levels in environment of each department of NUST. The section displays quantitative results of the research. The research was about the relationships between communication apprehension, sociocultural adaptation, and factors of SCA among the new students of NUST. The findings of this study are based on the research questionnaire. The findings in response to first research query indicate a negative relation between Communication apprehension and overall SCA. As a new student face substantial difficulty in adapting to a socio culture; they would face even more communication apprehension. Further, as per survey, 63% of new students reported moderate level of CA. Study did not find any clues of gender wise differences in level of communication apprehension among students of NUST. While discovering the impact of interpersonal communication on CA, it was discovered that dependent variable (CA) and independent variable (interpersonal communication) had significant negative relation. Likewise, decrease in community involvement also figured out to be a significant predictor of increase in CA. Study revealed that community involvement and language proficiency had negative relation with communication apprehension. Thus the students with less / poor community involvement and language proficiency would face enhanced communication apprehension. But the relationship between these two variables was observed as weak. Study did not find any significant relation between academic performance and communication apprehension.

5- DISCUSSION AND RECOMMENDATIONS

This study was based on manual survey. The study was aimed at exploring the difficulties; students face in socio-cultural adjustment when they enter a new educational environment. The study also focused upon the relationship between SCA and communication apprehension and the influence of interpersonal relations, academic performance, community involvement, language proficiency and ecological adaptation on level of CA. During the research, an effort was made to find out the gender wise differences in level of CA and SCA, as well. This study was consistent with the previous study of Li & Gasser (2005) which indicated good associations and openness

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**Table 5: Summary of CA score:**

<table>
<thead>
<tr>
<th>Program</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Freq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer IT</td>
<td>1.820</td>
<td>.6165</td>
<td>156</td>
</tr>
<tr>
<td>Social sciences</td>
<td>1.696</td>
<td>.5395</td>
<td>79</td>
</tr>
<tr>
<td>Business</td>
<td>1.787</td>
<td>.4633</td>
<td>47</td>
</tr>
<tr>
<td>Biosciences</td>
<td>1.85</td>
<td>.5337</td>
<td>27</td>
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<tr>
<td>Natural science</td>
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<tr>
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<td>.7703</td>
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<tr>
<td>Robotics</td>
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<td>0</td>
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<tr>
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<td>63.632</td>
<td>15.104</td>
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with members of new culture as a progressive step in cultural adjustment. Results of this study revealed that deficiency of interpersonal communication with the members of a new culture leads towards greater level of communication apprehension (CA) and that CA was negatively related with sociocultural adaptation. People who are puny in interpersonal communications face more hurdles in adjustment process in new environment. The present study concluded that interpersonal communication had significant opposing relation with Communication apprehension and thus significant favorable relation with SCA. Findings of this research were consistent with Toyokawa & Toyokawa (2002; Yan & Berliner, 2009;) those who explored sojourners participation in extracurricular activities as the positive way of establishing healthy relations with host community and that hearty relations with host country members was the basis of better adjustment in new environment. The results of current study indicate that students, who were more competent towards community involvement, faced low level of communication apprehension. They had the ability to overcome anxiety and in turn had better adaptability for a new culture. According to their study there is a strong conflicting relation between differences in educational setting and degree of sociocultural adaptability but in the present study did not find any substantial relation between academic performance and communication apprehension and thus with SCA. According to this study academic performance was not responsible for altering the level of communication apprehension. At the same time results showed no differences in level of communication apprehension among day scholars and hostilities. These findings suggested that distance was negligible in defining CA. According to Conway and Schaller (2007) Culture is considered as the way of life. Cultural variables have strong impact on the different features of the communicative process. In line, communication forms culture. When people of two different cultures meet, language is the basic tool to show shared world and to make them familiarized. Studies of Yang, Noels & Saumure (2006) showed that communication proficiency played an important role in sociocultural adaptation. Correspondingly, findings of present study revealed negative relation between Communication apprehension and language proficiency and CA was correlated with sociocultural adaptability. It meant students who were more competent in communication skills experienced low level of CA and had more chance of adjustment in new environment and vice versa. Roacha & Olanirana (2001) indicated a negative relation between CA and gratification with relationships in new culture. The result of
present study also demonstrated that communication apprehension and interpersonal relationships in host community were inversely proportional. In fact, these all mentioned variables are inter related with one another. If a person didn’t accept the beliefs and values of the people of host country he couldn’t be able to build good relations with host community (Berry 2005). Due to this reluctance in accepting foreign values he felt hurdles in sociocultural adjustment. In turn, he couldn’t learn the traditions and host language because social adjustment is related to social learning. (Searle and Ward 1990). This study concluded, interpersonal communication, community involvement, ecological adaptation and language proficiency are pillars of SCA and communication apprehension adversely affect these pillars. This study was limited in a sense that it gathered the data from NUST students only. Future study should be carried out while obtaining data from few more leading Universities of Pakistan, along with NUST, should it conform to be more realistic / representative sample. Further researches can be done to see the impact of Locus of control on communication apprehension. CA can be studied from the perspective of Characteristics of individuals which help in adjustment process. The research can be done to explore the social media role in establishing interpersonal relations in new environment and consequently aiding sociocultural adjustment.

REFERENCES


[27] Yang, Ruby Pi-Ju, Kimberly A. Noels, and Kristie D. Saumure. "Multiple routes to cross-cultural adaptation for international students: Mapping the paths between self-construals, English language confidence, and adjustment."