An Approach of Developing a Web-Based Learning Environment by Questioning and Answering

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Abstract: In the days, where all the technologies for learning environment are improving tremendously. One part and may be the most important part of learning is still lacking for a kind of improvement in the efficient way. This part is the Web-based learning environment. Where advanced learners who are not directly concerned with any learning environments, such as teaching or research will be beneficial. Also a lot of professionals having lack of time for reading through books or taking courses in the educational institutions can be benefited from such learning environment. It is a complete architecture for breaking the question into taxonomy. This taxonomy is use to search the answer file from a little portion of the storage area. Much of the nowadays learning environments are designed to be associated with the Internet. As Internet is the easiest way for accessing anything and can be used at any time and from any where, its importance on learning environment is most demanding.

Key words: Web, learning, taxonomy, questioning, answering

INTRODUCTION

Learning from the web-based environment is most demanding and appealing (Lobna, 2006; Nengfu and Wenyin, 2005; Dmitri and Jose, 2004; Mark, 1998). Because of the Web contains is very vast, learning a desire thing from the Web is not an easy task. Again, it should be fast enough to keep the learners interest and busy with their learning. There should be a way of accessing a lot of storage environments in a very short amount of time and return the appropriate data or information which the learners are really seeking for.

If the web-based learning environment is friendly to the learners, it grows interest and keeps learners to continue with it. Sufficient resources for each answer make the questioners pleased. The appropriate helps and instruction messages are also required to make the environment a successful one (Calum and Irene, 1997). From the very beginning of Web-based program, it is required to keep the environment free from the cross platform or browser independent.

Problem definition: Web-based learning is now becoming very much popular of all kind of learning environments. This is the environment where advance learners pay their attention to learn in a very short duration of time. But there is great deal of problem with retrieving information from the Web. All learning environments concern with a huge amount of data and information. It is very usual to need a large amount of space to keep all those information and data (Vick, 2002). During the retrieval of required data or information, it needs accessing this large space. This is really hard and time consuming. Besides this, another problem can be occurred when learners use to learn by questioning. Naturally, the questioning styles of human being differ from person to person. Similar question can be asked by the several ways. Sentence structure for the same question is also having different forms. There may be some synthesis or semantic mistakes. May be some question are not clear at all. Some of the questions are submitted by the learners to search but having incorrect spelling of some words. Learners may introduce miss spelling during typing the questions (Mik and Gail, 1999).

A lot of Web-based learning environments connected to the Internet are designed without following such specific standard (Charles and Jerome, 1998; Murray, 1997). The lack of clear and acceptable approaches in questioning and answering has made learners reducing there interest on using such environments. In general, it is clear that when the learners get difficulty to submit questions and can not fulfill the demands from the answers become frustrated. To increase the learners' interest and make them fill easy to learn, such web-based learning environment is provided.
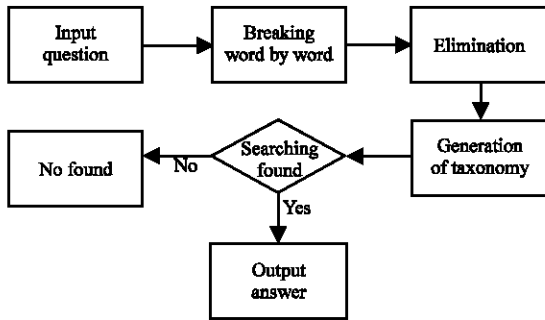

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Fig. 1: Methodology for the web-based learning environment

Objectives: The overall objective is to develop a standard Web-based learning environment. Where learners will provide questions and get the answers from the system because of searching a simple database and storage area. To achieve the main objective, the following sub-objectives will be carried out:

- Convert all the questions in a particular format 'Taxonomy' (Shui and Lee, 2005).
- Breaking the questions to make the searching easy.
- Design and implement a friendly interface.

MATERIALS AND METHODS

A simple methodology is used for this web-based learning environment (Fig. 1).

SYSTEM MODEL

The web-based learning environment starts its task with the submission of the question by the learner. Initially, the submitted question is being searched on the database. If the question is found then the taxonomy is to be generated (White and Edwards, 1995; Rachelle and Dianne, 1995). A linear search is being done in the huge storage area with the taxonomy. The file having name same as the taxonomy is the question file. Its name may be of the form 2.3.0031.txt. After that, the taxonomy is to be concatenated with _01 and gets the form of 2.3.0031_01.txt. This is the desire answer file. Another linear search is to be started there after. This is for finding the answer file. Contain of the answer file is the output, if the searching question is directly found. If the question is not directly found then the question is to be divided into several chunks of words. After that, the preposition conjunction and articles are being eliminated. Then, a search on the database is to be performed. By matching other two bits of string from 01-99 are generated. Concatenation is done with it by the previous question taxonomy. After this, the searching is performed on the sub-key database. Getting the desire sub-key set, another

additional two digits are generated. This bit stream along with txt tag is for taxonomy and for the question (Fig. 2).

Getting the matching question's file name, the answer file name is generated. Then a calculation is to be performed. This is for getting the amount of matching of submitted questions with the questions which present on the storage area. After that, the sorting is to be done. By this, the questions are arranging on the priority base. The most matching questions are coming on the begging. There are a number of links with all questions to the answer files. Click on a question, a direct link is to be occurred with the answer file.

Algorithm for the Web-based Learning Environment:

Step 1: Search the database for direct question. If found go to Step 8, else go to Step 2.

Step 2: Search the table for question-word. If no match is found then terminate.

Step 3: Search the table for main-word. If no match is found then terminate.

Step 4: Concatenate the level and category. Search the table sub-key for concatenation.

Step 5: Find the percentage of matching.

Step 6: Sort the matching questions.

Step 7: Show and get the response of the learners.

Step 8: Display the corresponding answers.

Generate taxonomy: The questioning styles of human being vary from man to man. Different pupil may use different format to ask a particular question. By analyzing it can be find out that, there are huge number of question-words such as what, which, how, etc. These can be classified into the major 6 categories. They are:

- Knowledge Base
  [The question is mostly started with "Who", "What", "When", "Where"]
- Descriptive
  [The question is mostly started with "Define in your own", "Explain"]
- Enquiry Type
  [The question is mostly started with "Classify", "Choose", "Demonstrate"]
- Comparison Based
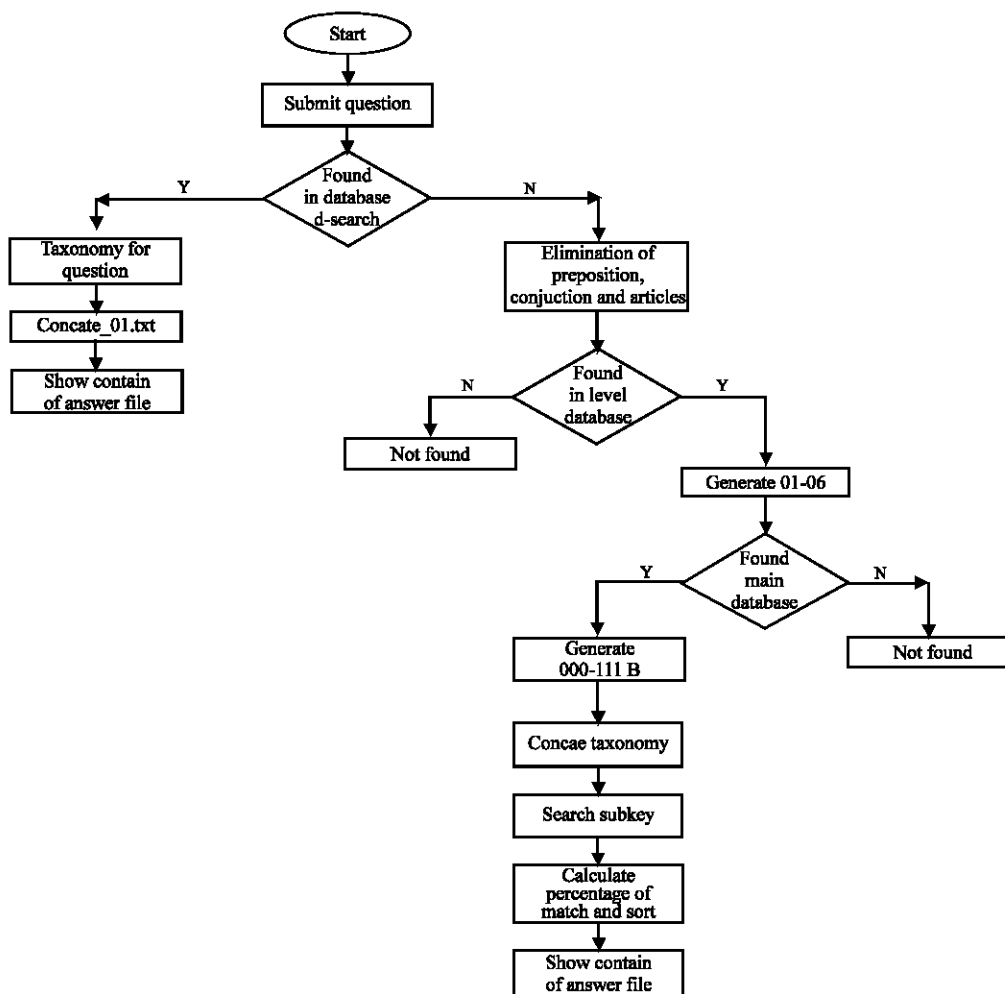 [The question is mostly started with "Analyze", "Appraise", "Arrange"]
- Proposal Type

Fig. 2: Flowchart for the web-based learning environment

Table 1: Question-words and categories

Catagorey	Question-word	Level
Knowledge based	List, Show, Is, Are, Can, Who, Arrange, Cite, Collect, Copy, Examine, Gather, Itemize, Label, Know, Note, Order.	01
Descriptive	Explain, Alter, Change, Classify, Contrast, Convert, Discover, Describe.	02
Enquirey type	What, Which, Please, Build, Calculate, Construct, Discover.	03
Comparison based	Compare, When, Examine, Differ, Why.	04
Proposal type	Propose, Summerize, Generalized, Improve, Incorporate, Integrate.	05
Decision type	Give, Evaluate, Criticize, Make.	06

Table 2: Unnecessary spaces and common words

Tag	Word	Comment
1	"", " ", " ", "", ".	Space of different length
2	A, An, The.	Articles
3	To, Of, With, In, On, By, Along, Besides.	Preposition
4	And, Or, Either, Nor, Nither, Between.	Conjunction

Table 3: Partial table for main-word

Question tag	Main-word	Main-word tag	Concatenation
01	Server	7	01.7
03	Browser	6	03.6
02	Dtatbase	3	02.3
05	Distributed	6	05.6
06	Client	3	03.6

[The question is mostly started with "How can we improve"]

- Decision type

[The question is mostly started with "Discriminate", "Estimate", "Evaluate"]

By analyzing the question-words for the different questions, a decision can be taken that the use of the following catagorey will meet most of our demand. Each catagorey is assigned a unique value called level (Table 1).

Eleminate unnecessary spaces and common words: During the submision of a question, a learner may use a lot of unnecessary spaces. This may have no usual

Table 4: Partial table for sub-key

| Lev key	Sub 1	Sub 2	Sub 3	Sub 4	Extra 1	Ans_file
01.7	Cookie	Component	Function	Component	Show	1.7,002_01, txt
01.7	Cookie	Safe	Threaten	Client	They	1.7,004_01, txt
02.7	Create	New	Java	Script	Object	2.7,003_01, txt
02.7	Create	Inheritance	Relationship	Java	Script	2.7,004_01, txt
02.7	Relation	Client	Side	Server	Javascript	2.7,005_01, txt
01.7	Step	Cookie	Working	Process	Show	1.7,005_01, txt
02.7	Javascrip	Relate	Differ	From	Java	2.7,006_01, txt
02.7	Javascrip	Fit	Into	Web	Page	2.7,007_01, txt
04.7	Compa	Class	Prototype	Based	System	4.7,005_01, txt
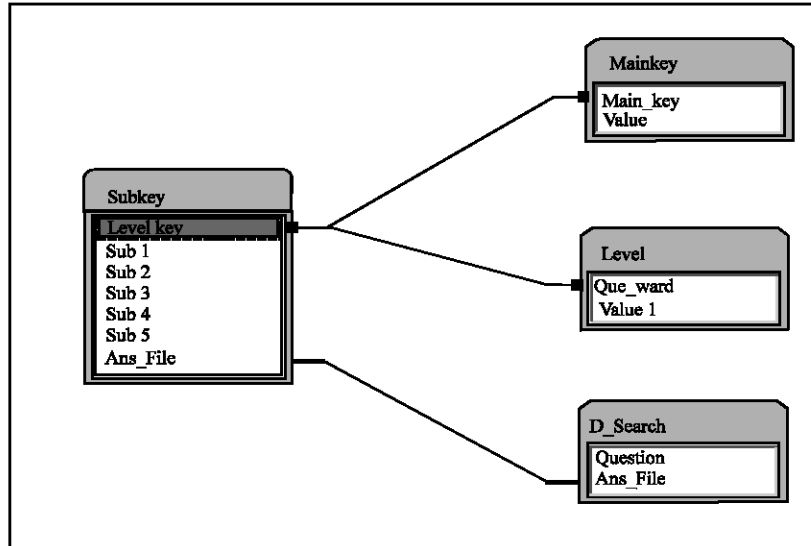
Fig. 3: Relational database design for the web-based learning environment

preposition, conjunction and articles have also no importance when any question is submitted. This is why a table is being generated in which this spaces and words are being kept, like (Table 2).

Searching with the main-key database: When the submitted question is divided into the 6 of its categories, it reduces the searching area on one sixth. In this stage, the words of the question are searching on the main-key database until a match is found.

It will eliminate the total searching for less than one tenth. After this stage, the generate taxonomy is of the form 01.3 or something like this. Here all the searching areas are reduced to one sixteenth, though which will get the correct searching result (Table 3).

Searching with the sub-key database: After determining the question format and the area from where the question is being asked, the next task is to determine the field in where maximum words are to be matched. This is the final taxonomy. Including the .txt with this we get the question file name. A linear search is to be done there after. After
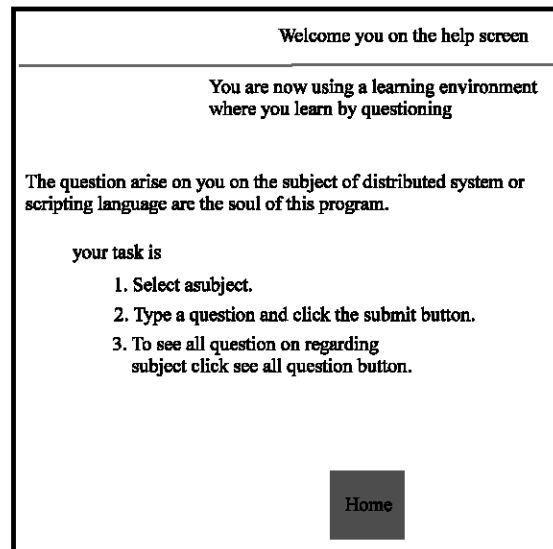

Fig. 4: Typical screen for help message

that, the taxonomy is to be concatanate with _01.txt. Now the taxonomy is the form of 1.1.0001_01.txt. This is
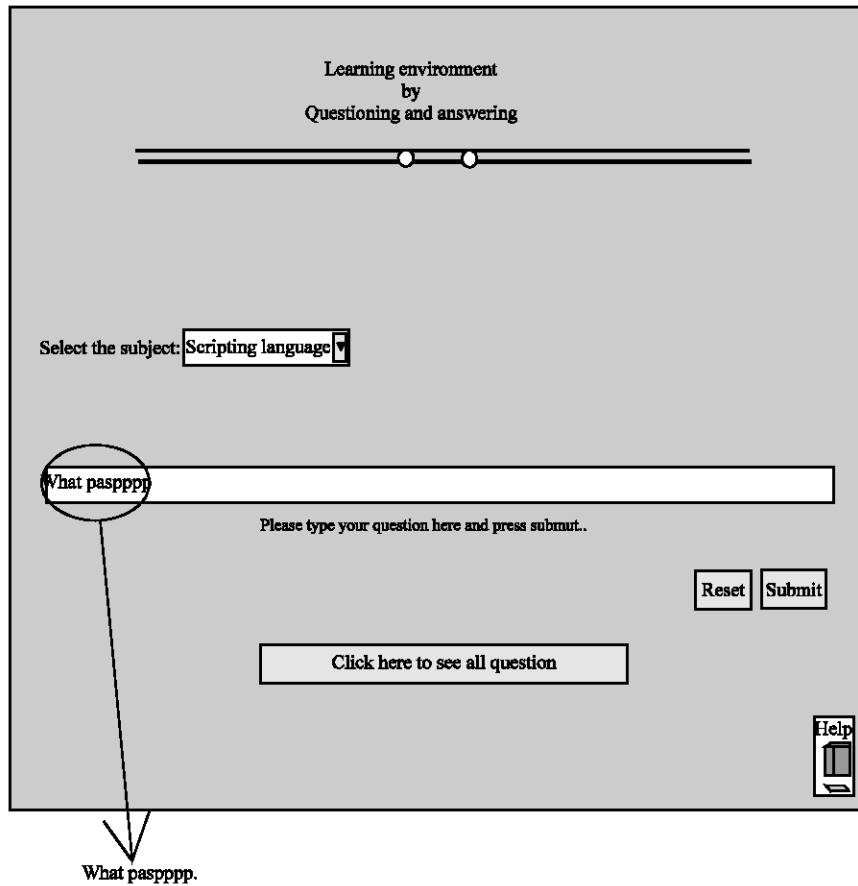
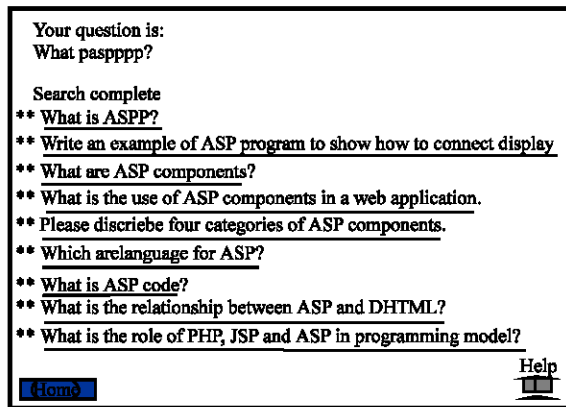Fig. 5: Example of a submitted question with error

Fig. 6: Example of viewing questions

basically the name of the answer file. Then, another linear search is being performed. Through which obtain the answer file. Then, the contain of the answer file is read character by character. An output file is generated which is the answer of the submitted question provided by the learner (Table 4).

Relational database for the web-based learning environment: In web-based learning environment system, there are four tables to do the main job of answering. One of them for storing question and answer file names. The other three for identifying the level, category and for the answer file name (Fig. 3) (Abraham *et al.*, 1997).

Errors and help messages: During the time of accessing the Web-based learning environment, learner may need some help on how the environment work. For this reason, in each screen several messages are being generated. These messages are to the point and clear enough to meet the requirement of the enquiry for the learners.

Besides this, learner may create some mistake during the entry of the question. Miss spelling or structural missing may occur. In this case, searching is done by taking an assumption of what the learner may want to submit. An example of help message is shown in the Fig. 4.

The learners may make a lot of mistakes during submitting the tasks, but in this case it will show the
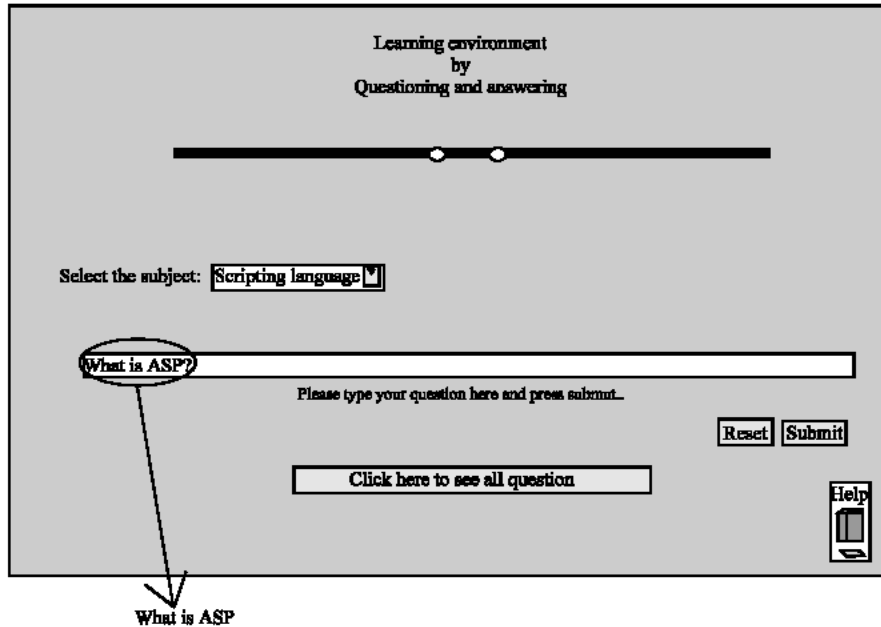
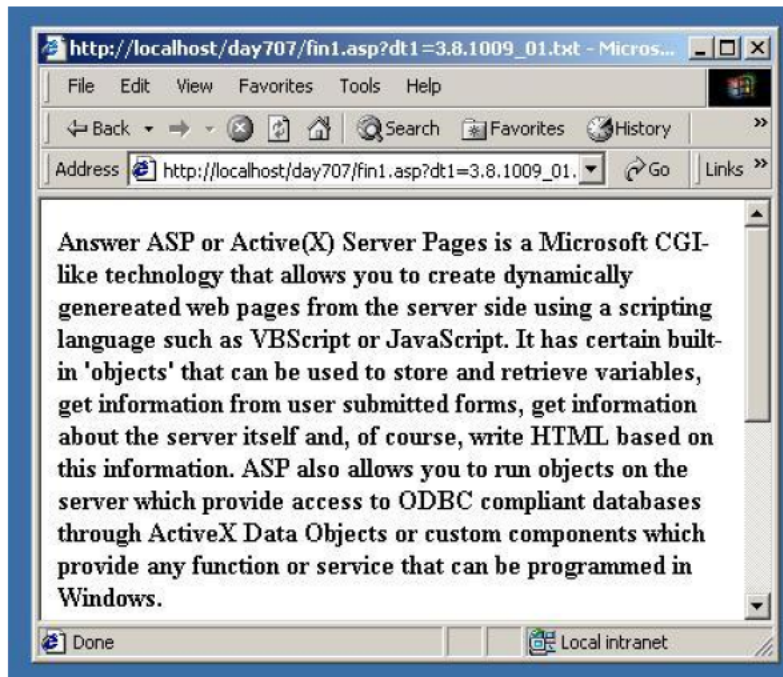Fig. 7: Example of a submitted question without error

Fig. 8: Example of the answer

partial matching questions. Some of the technical and networking errors may be occurred, they are similar as the existing error messages of several operating systems such as Windows 2000 Server. Though the number of such error messages are negligible. Only if the searching question is not available on database or there is no similar like questioning the database then a message is being shown as 'Sorry, such question is not found' (Fig. 5-8).

Acceptance tests: Acceptance tests are performed to measure the validity of the system (Elias, 2001). The designers usually set objective and measurable goals for
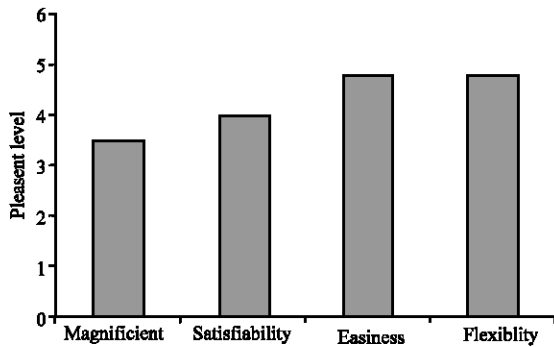
Fig. 9: Chart for the overall reaction to the system

Table 5: Table for the overall reaction to the system
Total no. of persons who fill the questionnaires: 1000

	Magnificent	Satisfiability	Easiness	Flexibility
Average % of pleasant	58.34%	66.67%	80%	80%
Average % of satisfaction: ((58.34+66.67+80+80)/4)=71.26%				

the systems performance. Typically, a set of test cases is specified for the system, with possible response-time requirements for the system. If the completed product fails to meet these acceptance criteria, the system must be reworked until success is demonstrated.

Acceptance test is performed by the usability study. After performing the analysis of the questionnaires and plotting the result on different chart, is almost acceptable. All the pleasant level is having a value greater then medium. It satisfies more then seventy percent of the total person who fill the questionnaires so it may conclude that the system might work successfully (Table 5 and Fig. 9).

CONCLUSION

The system is designed for a standard web-based learning environment. The primary goal is to provide learning environment for advanced learner to learn various specific subjects through Internet using Microsoft® ASP.NET, Microsoft® Visual Studio®.NET and Microsoft SQL Server 2000 (ASP.NET, 2007; SQL Server, 2007). The system employs a number of techniques such as leveling, categories to give better results.

Furthermore, it is a complete architecture for breaking the question into taxonomy. This taxonomy consists of question category, level, subject matter and file type. This taxonomy is use to search the answer file. This is way, in which only searching a little portion of the storage area the desire answer can be obtain. Every system is having a performance level (Gardner *et al.*, 2001). It defines in practical environment how much effectively the system

work. It also represents the user satisfaction. By the usability testing, system performance is measured. It seems that on average the performance and user satisfaction is more than seventy percent. So, it can be concluded, the system will work in the real life.

In future, this web-based learning environment can be applicable for the educational institutions such as university, college and school in Bangladesh.

REFERENCES

Abraham Silberschatz, Henry F. Korth and S. Sudarshan, 1997. Database System Concepts, McGraw-Hill International Editions, Computer Science Series, (3rd Edn.).

ASP.NET, 2007. Course 2310: Developing Microsoft® ASP.NET Web Applications Using Visual Studio®.NET, Microsoft E-Learning.

Calum Smeaton and Irene Neilson, 1997. Adapting the Infrastructure Provided by the World Wide Web for Educational Purposes, 23rd EUROMICRO Conf. New Frontiers of Inform. Tech., pp: 72.

Charles, Y.Y. Cheng and Jerome Yen, 1998. Virtual Learning Environment (VLE): A Web-Based Collaborative Learning System, Thirty-First Annual Hawaii International Conf. Sys. Sci., 1: 480.

Dmitri Roussinov and Jose Robles, 2004, Learning Patterns to Answer Open Domain Questions on the Web, Proceedings of the 27th Annual Int. Conf. Res. Dev. Inform. Retrieval (SIGIR), pp: 347-348.

Elias M. Awad, 2001. System Analysis and Design, Galgotia Publications (P) Ltd., (2nd Edn.).

Gardner, L., D. Sheridan and D. White, 2001. Computer Supported Learning. A Large-Scale, Web-based Learning and Assessment System to Support Flexible Education, 34th Annual Hawaii Int. Conf. Sys. Sci. (HICSS-34), 1: 1046.

https://itacademy.microsoftelearning. com/eLearning/ courseContent. aspx?courseId=19333.

https://itacademy.microsoftelearning.com/ eLearning/ courseContent.aspx?courseId=4097.

Lobna Karoui, 2006, Intelligent Ontology Learning based on Context: Answering Crucial Questions, International Conference on Computational Intelligence for Modeling Control and Automation and International Conference on Intelligent Agents Web Technologies and International Commerce (CIMCA), pp: 260.

Mark Resmer, 1998. Internet Architectures for Learning, Computer, pp: 105-106.

Mik Kersten and Gail C. Murphy, 1999. Atlas: A Case Study in Building a Web-Based Learning Environment using Aspect-oriented Programming, Proceedings of the 1999 ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA), pp: 150-151.

Murray W. Goldberg, 1997. WebCT, A Tool for the Creation of Sophisticated Web-Based Learning Environments (Demonstration), The Supplemental Proceedings of the Conference on Integrating Technology into Computer Science Education: Working Group Reports and Supplemental Proceedings (ITiCSE-WGR)., pp: 149.

Nengfu Xie and Wenyin Liu, 2005. An Answer Fusion Model for Web-based Question Answering, First International Conference on Semantics, Knowledge and Grid (SKG)., pp: 8.

Rachelle, S. Heller and C. Dianne Martin, 1995. A Media Taxonomy, IEEE. MultiMedia, pp: 36-45.

Shui-Lung Chuang and Lee-Feng Chien, 2005. Taxonomy Generation for Text Segments: A Practical web-Based Approach, ACM Trans. Inform. Sys., 23: 363-396.

SQL Server, 2007. Microsoft SQL Server 2000: Database Design, Microsoft E-Learning.

Vick, R., 2002. Measuring Performance and Evaluating Progress in a Web-Based Synchronous Interactive Learning Environment, 35th Annual Hawaii Int. Conf. Sys. Sci. (HICSS), 5: 135.

White, S. and M. Edwards, 1995. A Requirements Taxonomy for Specifying Complex Systems, First IEEE. Int. Conf. Eng. Complex Comput. Sys. (ICECCS)., pp: 373.