PROBLEM-BASED E-LEARNING SYSTEM FOR AGRICULTURAL EXTENSION

Project Website: e-shamba.com

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# TABLE OF CONTENTS

1.0 INTRODUCTION ........................................................................................................3
  1.1 Objectives ..................................................................................................................3
  1.2 Project Stakeholders .................................................................................................3
  1.3 Previous Efforts .........................................................................................................4
  1.4 Project Outcomes ......................................................................................................4
  1.5 Project Methodology .................................................................................................4
  1.6 Project Monitoring and Evaluation ..........................................................................4
  1.7 Project Activities ......................................................................................................5
  1.8 Risks and Mitigation .................................................................................................5
  1.9 Project Sustainability ...............................................................................................5

2.0 STATUS OF PROJECT ..............................................................................................6
  2.1 Develop Agricultural Extension Curriculum .........................................................6
  2.3 Upload Agricultural Extension Curriculum ............................................................6
  2.4 Develop Problem-based learning (PPL) cases .........................................................7
  2.5 Design code for on-line question assessment, search and comment solicitation ....7
  2.6 Report Writing of Phase I (Interim Report) ..............................................................8
  2.7 Development glossary of terms for selected sections of the curriculum ................8
  2.8 Upload glossaries and related multimedia content ..................................................8
  2.9 Upload PPBL content ...............................................................................................9
  2.10 Monitoring and Evaluation ....................................................................................9
  2.11 Report Writing of Phase II (Final Report) ..............................................................9

3.0 WEB ACCESS STATISTICS ....................................................................................10
  3.1 Summary of Monthly usage (Graphical) .................................................................10
  3.1 Summary of Monthly usage (Hits) ..........................................................................10
  3.2 Daily Usage Statistics for the busiest Month, i.e May 2015 ..................................11
  3.3 Average Hourly Usage Statistics for May 2015 ...................................................11

4.0 CONCLUSION ........................................................................................................12

5.0 REFERENCES ........................................................................................................13
1.0 INTRODUCTION

1.1 Objectives

General:
To develop a problem-based e-learning system to guide school and college learners and to supplement agricultural extension training services.

Specific:
To improve the knowledge, skills, practices and attitudes of the farming community in Western Kenya.

Problem-based learning (PBL) is an approach that challenges users to learn through engagement in a real problem.

The learner centered approach, it develops both problem solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem-solvers.

The project seeks to improve user learning outcomes through the use of contemporary web-based technologies employing problem-based learning and utilizing social media, rich interactive multimedia and digital storytelling. This will complement the existing mode of learning delivery which include:

a) Classroom
b) Field Days
c) Open Days
d) Demonstrations
e) Farm visits
f) Agricultural Shows

1.2 Project Stakeholders

The stakeholders in the project are:

a) Farmers
b) Secondary School Students
c) Agricultural Training Colleges (Agricultural, Dairy Training)
d) Agricultural Research Institutes
e) Kenya Agricultural Research Institute
f) Kenya Sugar Research Foundation
g) Universities
h) Agri-industries
i) Ministry of Agriculture
1.3 Previous Efforts
There have been various efforts to improve the delivery of information, knowledge and skills to using ICT farmers. Notable examples are:
Agriculture for Secondary Schools (Phase One of the Project) by James Kulubi – Website:
Ministry of Agriculture (html and PDF) – Website:
Kenya Agricultural Institute (HTML and PDF) Website :
Sugar Research Foundation (HTML and PDF)- Website:

1.4 Project Outcomes
1. improved the knowledge, skills, practices and attitudes of the farming community in Western Kenya.
2. Improved student performance in agriculture subject in secondary schools.
3. Agricultural farmers’ extension problem-based curriculum:
   a) Course Outline
   b) Learning Outcomes
2. Agricultural farmers’ extension problem-based e-learning system
3. Agricultural secondary school problem-based e-learning system
4. Over 3 Million unique hits per month in the high farm activity period.

1.5 Project Methodology
Specific actions to be carried out include:
1. Develop the e-learning curriculum
2. Acquire and develop agricultural certificate and extension examination papers/assessments and their solutions in the last 10 years
3. Develop problem-based learning guides
4. Extract and package individual problem-cases and develop metadata and links
5. Create Multimedia and text content in HTML5 with social media accessibility
6. Link and upload to website
7. Promote the website site
8. Monitor user comments and reply or modify content as per suggestions
9. Monitor access and search statistics
10. Review web content based on the results from (8) and (9)
11. Develop performance report

1.6 Project Monitoring and Evaluation
Assessment of Work Done by Project Leader and assessment of resources used carried out by the university internal auditor and
accountant. In addition the project leader will regularly review web usage statistics, web-search activity and comments from users and other stakeholders. Web access statistics and web search history will be used to assess user interests which will be used to enrich content.

1.7 Project Activities
The project activities are as follows:
1. Develop Agricultural Extension Curriculum
2. Acquire Website (e-shamba.com)
3. Upload Agricultural Extension Curriculum
4. Develop Problem-based learning (PPL) cases
5. Design of on-line question assessment, search and comment solicitation
6. Upload PPL Content (www.eshamba.net)
7. Report Writing of Phase I (Interim Report)
8. Development glossary of terms for selected sections of the curriculum
9. Upload glossaries and related multimedia content
10. Upload PPBL content
11. Monitoring and Evaluation
12. Report Writing of Phase II (Final Report)

1.8 Risks and Mitigation
1. Legal – Infringement on copyrighted works (books, video, etc)
2. Economic – Ability of farmers to purchase phones and computers capable of receiving rich multimedia content.
3. Technical – Wireless broadband access in rural areas
**Mitigation:**
1. Legal: Develop original content and include expert review.
2. Economic: Phase the project with government e-initiatives e.g. Internet for schools and zero taxation on computer equipment
3. Technical: Ride on the government broadband project now in phase II

1.9 Project Sustainability
Advertisements placed on webpages
Premium content will be accessed at a fee following the following developments in Kenya from:
a) Mobile Money Service
b) Licensing of MVNOs
2.0 STATUS OF PROJECT

2.1 Develop Agricultural Extension Curriculum
Status: Complete
The agricultural extension curriculum was developed in consultation with the Ministry of Agriculture, Kenya Agricultural and Livestock Research Organization, Department of Agriculture, Egerton University, Department of Agriculture (MMUST), Bukura Agricultural College and Extension officers in Western region of Kenya (Kakamega, Bungoma, Busia, Vihiga, Siaya, Kisii, Kisumu, and Migori counties).

2.2 Acquire Website
Status: Complete
A domain name (URL: http://www.e-shamba.com) was registered on 15th November 2014. Web hosting services acquired for a period of one year from hostingU.com. An e-receipt for the same was issued and is shown below.

2.3 Upload Agricultural Extension Curriculum
Status: Complete
Curriculum available at: http://www.e-shamba.com
2.4 Develop Problem-based learning (PPL) cases
On-going
Review of cases ongoing by experts and the project team

2.5 Design code for on-line question assessment, search and comment solicitation
On-going
Code and testing development on going using HTML5, SQL
Upload PPL Agricultural extension curriculum to project website (www.e-shamba.com)

On-going
The following curriculum content has been uploaded:
1. Introduction to Agriculture:
   http://e-shamba.com/Introduction/default_Introduction.html
2. Agricultural economics
   http://e-shamba.com/Agricultural_Economics/default_Agricultural_Economics.html
3. Agroforestry
   http://e-shamba.com/Agroforestry/default_Agroforestry.html
4. Apiculture (Bee-Keeping)
   http://e-shamba.com/Bees/Apiculture_Apiculture/default.html
5. Aquaculture (Fish farming)
   http://e-shamba.com/aquaculture/Aquaculture/Aquaculture/default.html
6. Farm Power and machinery
   http://e-shamba.com/Farm%20Power/Farm%20Power_Machinery/default.html
7. Farm Structures
   http://e-shamba.com/Farm%20Structures/Farm%20Structures/default.html
8. Farm Management
   http://e-shamba.com/Farm_Management/Farm_Management/default.html
9. Farm Tools and Equipment
   http://e-shamba.com/Farm_tools_Equipment/Farm%20Tools%20and%20Equipment/default.html
10. Inorganic Fertilizers
    http://e-shamba.com/Inorganic%20Fertilizer/Inorganic%20Fertilizer/default.html
11. Irrigation and Drainage
    http://e-shamba.com/Irrigation/Irrigation_Drainage.html
12. Land Preparation
13. Livestock Selection and Breeding
   http://e-shamba.com/Livestock%20Breeds/Livestock_Breeding_default.html
14. Livestock Health
   http://e-shamba.com/Livestock_Health/Livestock%20Health_default.html
15. Poultry production
   http://e-shamba.com/Poultry/Poultry_default.html
16. Livestock Food and Nutrition
17. Organic Fertilizers
18. Soil Conservation
19. Water Supply and Conservation
20. Weeds and Weed Control

2.6 Report Writing of Phase I (Interim Report)
Status: Complete
Submitted to FireAfrica in January 2015.

2.7 Development glossary of terms for selected sections of the curriculum
Status: Complete
Extensive glossary of terms and standards have been developed by using web resources, dictionaries and textbooks to cover the following sections.
1. Agricultural Economics
2. Agroforestry
3. Apiculture (Beekeeping)
4. Aquaculture (Fish-farming)
5. Farm power and machinery
6. Farm Tools and Equipment
7. Livestock production
8. Poultry Production

2.8 Upload glossaries and related multimedia content
Status: Complete
The following glossaries have been developed and uploaded. Click on Hyperlink to access the content.
1. Agricultural Economics
2. **Agroforestry**
3. **Apiculture (Beekeeping)**
4. **Aquaculture (Fish-farming)**
5. **Farm power and machinery**
6. **Farm Tools and Equipment**
7. **Livestock production**
8. **Poultry Production**

### 2.9 Upload PPBL content

Status: Yet to start
The Problem-based content is being reviewed by the project team and experts. It will be uploaded in stages as soon as the coding of web-based assessment modules is tested and installed on the web server.

### 2.10 Monitoring and Evaluation

Status: On-going
Monitoring and evaluation of the project in being carried out by both the project leader and the university audit and accounting departments. Web access and web search statistics are evaluated weekly and are discussed in the next section.

### 2.11 Report Writing of Phase II (Final Report)

Status: Ongoing
3.0 WEB ACCESS STATISTICS

The website has been monitored since the web site was activated. The weblizer statistics as shown below.

3.1 Summary of Monthly usage (Graphical)

Each unit (■) represents 100 requests for pages or part thereof.

<table>
<thead>
<tr>
<th>month</th>
<th>#reqs</th>
<th>#pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 2014</td>
<td>278</td>
<td>208</td>
</tr>
<tr>
<td>Dec 2014</td>
<td>194</td>
<td>185</td>
</tr>
<tr>
<td>Jan 2015</td>
<td>135</td>
<td>131</td>
</tr>
<tr>
<td>Feb 2015</td>
<td>105</td>
<td>103</td>
</tr>
<tr>
<td>Mar 2015</td>
<td>117</td>
<td>112</td>
</tr>
<tr>
<td>Apr 2015</td>
<td>104</td>
<td>103</td>
</tr>
<tr>
<td>May 2015</td>
<td>17891</td>
<td>3886</td>
</tr>
</tbody>
</table>


3.1 Summary of Monthly usage (Hits)
3.2 Daily Usage Statistics for the busiest Month, i.e May 2015

3.3 Average Hourly Usage Statistics for May 2015
4.0 CONCLUSION

The project has reached the final stages with the outstanding activities being:
   a) coding of the routines for assessing questions;
   b) uploading the questions to the web server
   c) Monitoring and analysis usage.

The challenges in developing the system so far have been:
   a) optimizing the website for access by smart phones.
   b) Assessing the scope of the project which not only includes deciding on the topics in agricultural extension to be covered but also on the access level.

The project teach expects the system to be fully functional in August 2015 for the following modules:
   1. Agro forestry
   2. Livestock production
   3. Poultry
   4. Soil conservation
   5. Water supply and conservation
   6. Weeds and weed control
5.0 REFERENCES
