

Responses of Personal Communication

Location	No.	Participant	Request Anonymity	Date	Note
IADA BLS	1	Farmer 1	Request Anonymity	28/05/2008	
	2	Agriculture Department Officer 1	Request Anonymity	28/05/2008	
	3	Farmer 8	Request Anonymity	03/09/2009	
	4	Farmer 8	Request Anonymity	11/11/2009	
	5	Farmer 8	Request Anonymity	03/12/2009	email
	6	Farmer 8	Request Anonymity	02 Jan 2010	
	7	Farmer 8	Request Anonymity	07 Jan 2010	
MADA	8	Agriculture Department Officer 2	Request Anonymity	30/06/2008	
	9	Agriculture Department Officer 3	Request Anonymity	30/06/2008	
	10	Agriculture Department Officer 4	Request Anonymity	03/07/2008	
	11	Agriculture Department Officer 2	Request Anonymity	03/07/2008	
	12	Agriculture Department Officer 2	Request Anonymity	22/02/2009	
	13	Farmer 3	Request Anonymity	20/06/2009	
	14	Farmer 3	Request Anonymity	01/10/2009	
	15	Farmer 9	Request Anonymity	01/10/2009	
	16	Agriculture Department Officer 2	Request Anonymity	05/01/2010	
	17	Farmer 3	Request Anonymity	04/02/2011	
KAHANG	18	Farmer 2	Request Anonymity	11/01/2009	
	19	Farmer 2	Request Anonymity	01/08/2009	
	20	Farmer 7	Request Anonymity	01/08/2009	

	21	Farmer 7	Request Anonymity	02/08/2009	
	22	Farmer 2	Request Anonymity	16/02/2011	email
Bandar Baru Tunjong	23	Farmer 4	Request Anonymity	23/07/2009	
	24	Farmer 5	Request Anonymity	23/07/2009	
	25	Farmer 6	Request Anonymity	23/07/2009	
	26	Farmer 6	Request Anonymity	10/02/2011	Phone call
	27	Farmer 6	Request Anonymity	03/03/2011	

Appendix A: Subject Matter Expert Review Guide

About the Sustainable Paddy Farming System (*Sistem Penanaman Padi Lestari – SiPadi*)

Why this *SiPadi* (prototype of learning environment) is created?

This prototype is created to allow learners (exp: student) to actively construct knowledge through the experience of navigating the various virtual practice in paddy farming through sustainable approach

Who will be the users?

This prototype is intended to create awareness of sustainable practices in paddy farming practices. The users would include public especially, all those involved in the agricultural sector.

Subject Matter expert Evaluation – Instruction sheet for evaluator

Words of appreciation

First of all, I would like to convey my sincere appreciation for your willingness to serve as the subject matter expert for the first prototype of this VR-based learning environment.

What is subject matter expert evaluation?

Expert review involves an expert reviewing an initial prototype of a system to determine its strengths and weaknesses. He or she is also known as content expert and able to provide valuable feedback about content accuracy, completeness, and importance. Acknowledging your experience and knowledge in sustainable paddy practices, I am thus glad to have you as the subject matter expert of this evaluation.

Procedure

As a subject matter evaluator, you need to go through the initial version of the prototype. These questions are meant to lead to problem identification and your suggestion on the necessary revisions is much appreciated.

Output

It is expected that you will provide a list of problems and suggestions for revision related to the content of this prototype.

REVIEW QUESTION

- Does the prototype promote information of sustainable practices in paddy farming?
- Does the prototype persuade people to know about sustainable practices in paddy farming?
- Does the prototype create awareness about sustainable practices in paddy farming?
- Is the use of virtual environment appropriate to improve the retention and transfer of what is learned?
- Is the individual playing mode employed appropriate?
- Is the prototype motivating to the learners?

Briefing

- What are the greatest strengths of this prototype?
- What are the greatest weaknesses of this prototype?
- Will the prototype improve the retention and transfer of what is learned?
- Would learners find this approach interesting?
- If you would change only one thing in this environment, what would it be?
- Are there any other comments on the prototype?

Appendix B: Instructional Design Expert Review Guide

About the Sustainable Paddy Farming System (*Sistem Penanaman Padi Lestari – SiPadi*)

Why this *SiPadi* (prototype of learning environment) is created?

This prototype is created to allow learners (exp: student) to actively construct knowledge through the experience of navigating the various virtual practice in paddy farming through sustainable approach

Who will be the users?

This prototype is intended to create awareness of sustainable practices in paddy farming practices. The users would include public especially, all those involved in the agricultural sector.

Instructional Design Expert Evaluation – Instruction sheet for evaluator

Words of appreciation

First of all, I would like to convey my sincere appreciation for your willingness to serve as the instructional design expert for the first prototype of this VR games-based learning environment.

What is instructional design expert evaluation?

Expert review involves an expert reviewing an initial prototype of a system to determine its strengths and weaknesses. In instructional design expert evaluation, the expert will reviews the instructional design aspects and user interface of the prototype. He or she is able to provide valuable feedback about the adequacy of task appropriateness of strategies and media used, instructional effectiveness of visuals, and the potential transfer and retention of what is learned. Acknowledging your experience and knowledge in virtual reality development and research, I am thus glad to have you as the subject matter expert of this evaluation.

Procedure

As an instructional designer evaluator, you need to go through the initial version of prototype. These questions are meant to lead to problem identification and your suggestion on the necessary revisions is much appreciated.

Output

It is expected that you will provide a list of problems and suggestion of revisions related to the instructional design of this prototype.

REVIEW QUESTION

Introduction

Is the content accurate? (any incorrect information)
Is the content complete? (any missing information)
Is the content up-to-date (any outdated information)

Importance

Is the content accurate? (any incorrect information)
Is the content complete? (any missing information)
Is the content up-to-date (any outdated information)

Learning problem

Is the description of the learning problem clear?
Is the description of the learning problem accurate?
Is the description of the learning problem complete?

Description of games

Is the description of the games clear?
Is the description of the games accurate?
Is the description of the games complete?

Links

Is the content accurate? (any incorrect information)
Is the content complete? (any missing information)
Is the content up-to-date (any outdated information)

Message design (pop-up message and narration)

Is the message accurate?
Is there any incorrect terms?
Is there any unnecessary jargon?

REVISION (general)

How would you revise it?

Debriefing

What are the greatest strengths of this prototype?
What are the greatest weaknesses of this prototype?
Would learners find this approach interesting?
If you would change only one thing in this environment, what would it be?
Are there any other comments on the prototype?

Appendix C – Questionnaire Form for Lab Experiment

Appendix C – Questionnaire Form for Lab Experiment

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QUESTIONNAIRE

**Awareness towards paddy planting practices
in the aspect of preserving the environment**

Zakirah Othman,

Science and Technology Studies Department

Science Faculty
University Malaya

PART 1: Demography

Please mark [] in the boxes prepared.

- 1.1 Gender
[] Male [] Female
- 1.2 Age : _____
- 1.3 Department and Faculty: _____
- 1.4 Have you ever used a computer education package?
[] Yes [] No
- 1.5 Have you ever played virtual reality computer games?
[] Yes [] No
- 1.6 When was the last time you used this computer game?

- 1.7 Have you ever been involved in or worked as a paddy farmer?
[] Yes [] No

PART 2: Awareness towards paddy planting practices in the aspect of preserving the environment

2.1 Sustainable agriculture from your perspective means

The capability of a farm to sustain the production of its plantation while conserving the environment continuously

Agriculture that does not use technology and can conserve the environment continuously

Agriculture that is capable of providing produce that is productive

Others, please state _____

2.2 Is the organic agriculture system a sustainable agricultural practice?

Yes Not sure No

2.3 Do you know of any other sustainable agricultural practice programs in Malaysia?

Yes Not sure No

2.4 Have you participated in a campaign or program on sustainable agricultural practices regarding paddy or the rice sector?

Yes No

If your answer is Yes,

please state: _____

2.5 Do you know of the Malaysian Organic Certificate (SOM)?

Yes Not sure No

2.6 Do you know about the Good Malaysian Farming System (SALM)?

Yes Not sure No

2.7 Do you agree that the issue of the burning of paddy straw is one of the factors causing environmental pollution?

Yes Not sure No

If your answer is Yes, please state your views on how to resolve this problems.

2.8 Do you agree that the use of pesticide spray is more suitable in controlling snails in the paddy field?

Yes Not sure No

If your answer is No, please state your views on ways to control snails in the paddy field.

2.9 Do you agree that the use of chemical fertilizers will pollute the environment?

Yes Not sure No

If your answer is Yes, please state your views on how to resolve this problems.

PART 3: Awareness towards paddy planting practices in the aspect of preserving the environment after using the system.

- 3.1 Sustainable agriculture from your perspective means
- The capability of a farm to sustain the production of its plantation while conserving the environment continuously
 - Agriculture that does not use technology and can conserve the environment continuously
 - Agriculture that is capable of providing produce that is productive

Others, please state _____

- 3.2 Is the organic agriculture system a sustainable agricultural practice?
 Yes Not sure No

- 3.3 Do you know of any other sustainable agricultural practice programs in Malaysia?
 Yes Not sure No

- 3.4 Have you participated in a campaign or program on sustainable agricultural practices regarding paddy or the rice sector?
 Yes No

If your answer is Yes,
please state: _____

- 3.5 Do you know of the Malaysian Organic Certificate (SOM)?
 Yes Not sure No

- 3.6 Do you know about the Good Malaysian Farming System (SALM)?
 Yes Not sure No

3.7 Do you agree that the issue of the burning paddy straw is one of the factors of environmental pollution?

Yes Not sure No

If your answer is Yes, please state your views on how to resolve this problems.

3.8 Do you agree that the use of pesticide spray is more suitable in controlling snails in the paddy field?

Yes Not sure No

If your answer is No, please state your views on ways to control the snails in the paddy field.

3.9 Do you agree that the use of chemical fertilizers will pollute the environment?

Yes Not sure No

If your answer is Yes, please state your views on how to resolve this problems.

3.10 In your opinion, why is it that paddy farmers in Malaysia do not practice sustainable agriculture?

- a) Low level of awareness
- b) Lack of programs provided
- c) Lack of knowledge on sustainable agricultural practices
- d) High costs
- e) Low productivity
- f) Others, please state:

3.11 Does this system give information related to sustainability awareness in paddy planting practice?

Yes Not sure No

3.12 Does this system help you to understand sustainable paddy farming practices?

Yes Not sure No

3.13 Does this system provide a view or experience of organic farming practice?

Yes Not sure No

3.14 Does you agree that sustainable agriculture practices can preserve the earth's ecosystem?

Yes Not sure No

3.15 Will you use sustainable agriculture practices in the future if you are involved in the agriculture sector?

Yes Not sure No

PART 4: User Interface Satisfaction

Please tick at suitable scale.

		1	2	3	4	5	
Overall Reaction to The software							
4.1	terrible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	wonderful
4.2	difficult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	easy
4.3	frustrating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	satisfying
4.4	inadequate power	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	adequate powerful
4.5	boring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	interesting
4.6	rigid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	flexible
Screen							
4.7	Reading characters on the screen	hard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	easy
4.8	Tasks are labeled easily	not at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very much
4.9	Organization of information	confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very clear
4.10	Sequence of screens	confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very clear
Terminology and System Information							
4.11	Use of term throughout system	inconsistent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	consistent
4.12	Terminology related to task	never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	always
4.13	Position of messages on screen	inconsistent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	consistent
4.14	Actual view on organic paddy planting practices	confusing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	clear

Learning										
4.15 Learning to operate the system	difficult <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> easy									
4.16 Exploring new features by trial and error	difficult <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> easy									
4.17 Remembering labels and use of commands	difficult <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> easy									
System Capabilities (Games)										
4.18 Virtual environment image speed	too slow <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> fast enough									
4.19 System reliability	frustrating <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> satisfying									
4.20 Designed for all levels of users	never <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> always									
	<table border="1"> <tr> <td></td> <td></td> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td></td> </tr> </table>				1	2	3	4	5	
			1	2	3	4	5			

Note:

Thanks.

Appendix D – Permission Letter to Use Computer Lab and Students as Lab Tests

Refer Thesis

Appendix E – Informal Letter to the Respondent

Refer thesis

Appendix F – Declaration Form to be the Respondent

- I volunteer to cooperate in this usability test.
- I have been informed of the task and procedures.
- I have been given the opportunity to ask questions and have obtained satisfactory answers
- I realize that I have the right to withdraw from testing at any time, without prejudice in the future.

My signature below indicates my consent to all the above statements and it was first given to me before the test was conducted.

Matrik: _____

Signature: _____

Date: _____

Malay Language

- Saya secara sukarela memberi kerjasama dalam ujian kebolegunaan ini.
- Saya telah dimaklumkan akan tugas dan prosedur yang harus saya lakukan.
- Saya telah diberi peluang untuk bertanya soalan dan telah memperolehi jawapan yang memuaskan bagi soalan-soalan tersebut.
- Saya sedar bahawa saya mempunyai hak untuk menarik diri daripada ujian ini pada bila-bila masa, tanpa prejudis terhadap layanan kepada saya di masa akan datang.

Tandatangan saya di bawah ini merupakan keputusan persetujuan kepada semua pernyataan di atas dan ia telah di beri terlebih dahulu kepada saya sebelum ujian ini dijalankan.

Matrik: _____

Tandatangan: _____

Tarikh: _____

Appendix G – Example of Transcript Data

Refer: V 23 07 2009; MVI_0408, 3.18-2.27

Appendix H – Translation of Transcript

Part A: Translations from Interview Document

Original Text	Translation
<p>“Mahu bagusnya ini (sambil menunjukkan sawah padinya), memerlukan pengorbanan, lebih banyak. Sedangkan dia ingin himat. Hasil ingin baik, lebih picit lagi, lebih serakah lagi. Orang kena hama, sedikit saja. Sudah langsung di <i>spray</i>, sebab takutnya dia tak makan... tak bisa makan.... atau tak, tak jadi wang. (Pekerja tersebut membandingkan dengan kaedah tanaman konvensional).</p> <p>Kalau ini bukan. Ini yang Lillah Taala. Yang kerana loh bekerja, perintah bahawa ini alam ini harus di jaga. Kita sebagai Khalifah dimuka bumi ini untuk menyelamatkan alam ini. Baru itu akan Tidak ada modalpun, pekerjaan banyak. Baru itu akan berjalan. Perlahan-lahan. Dan nanti akan jadi kecanduan. Bukan hasil padinya yang dilihat, dalam hatinya ada kepuasan tersendiri.”</p>	<p><i>“To ensure that this (pointing to his paddy field) is good, more sacrifice is required. It requires wisdom. By doing this, the outcome is better. When a farmer face pests they just spray insecticide directly on them, the paddy will not grow well, and hence, not much profit will be gained. (The worker compared it with the conventional planting method.).</i></p> <p><i>It is the decree of Allah that nature needs to be preserved. We, as Caliph on this earth have to save this world. Not much capital is required but there is a lot of hard work and ultimately we’ll get used to it, gradually there will be results. It is not in visible results of the paddy, but rather in the feeling of self satisfaction”</i></p> <p>(Farmer 4, personal communication, July 23, 2009)</p> <p>Source: Interview 23 July 2009. Refer: V 23 07 2009; MVI_0408 and File: Transcript 1 KONSEP LESTARI: Row 3-10.</p>
<p>“ ... sistem yang buat ni, lebih kepada.... siapa yang belajar ni , memang dia akan tengok ibadat kepada Allah Taala, Itulah yang paling seronok!. Sebabaaa..dia</p>	<p><i>“ This system is more of an act of worship (ibadah) to Allah Taala. That is the best part!. This is as we serve the land, we will reap returns from the Al-mighty ”.</i></p>

<p>mesti berbakti kepada tanah. Siapa berbakti kepada tanah, tanah akan balik bagi hasil bagi pada dia”.</p>	<p>(Farmer 5, personal communication, July 23, 2009)</p> <p>Source: Interview V 23 07 2009; MVI_0402 and File Transcript 2 KONSEP LESTARI: Row 39 -41.</p>
<p>“.. dengan tanaman organik yang tanpa racun, tanpa kimia ini, sudah ada kurang lebih saya yaa. sekitar 50 belut-belut besar yang bisa dimanfaatkan. Baru umur padi sebegini, apalagi kalau nanti dituai sudah berapa bulan berjalan, mungkin lebih banyak lagi sebab akan berkembang biak lebih banyak cacing, ikan-ikan kecil, dia ekosistemnya lengkap, akan menambah populasi yang lebih cepat”.</p>	<p><i>"organic crops without using pesticides and chemical. Currently, there are about 50 large eels. How about the harvest in several months later? Probably more animals breed, more worms, small fish, ecosystem at the farm complete, will add a more population, rapidly."</i></p> <p>(Farmer 4, personal communication, July 23, 2009)</p> <p>Source: Interview V 23 07 2009; MVI_0407 :0.27</p>
<p>“<i>complete</i> dia punya ekosistemnya, termasuklah di .. di ... kita tengok di badanpun, di sawah inipun kita tengok dia <i>complete</i>. Biar sampai ada hidupan-hidupan. Sampai ada belut .. ada...dia mesti ada hidup. Sebab, dia nak tengok, nak tengok pertumbuhannya pada padi ni, subur”.</p>	<p><i>" the ecosystem is complete, let's look at this farm, we see it complete. There are living things. There is an ell. There must be life. Then there is growth... and the paddy will grow well"</i> .</p> <p>(Farmer 5, personal communication, July 23, 2009)</p> <p>Sources: Interview V 23 07 2009; MVI_0402 and File: Transcript 2 KONSEP LESTARI: Row 7-10.</p>

Part B: Pilot Study Document

Original text

Ulasan

1. Terbaik
2. Amat menyeronokkan. Boleh dijadikan satu sistem pembelajaran berkesan secara berterusan.
3. Interface program sama seperti game-game computer yang sedia ada dan selalu saya main. So, agak senang untuk menggunakan program ini.
4. Sistem yang dilakukan amat berkesan untuk memberi kesedaran.
5. Sistem ini mampu memberi pengetahuan secara asas kepada orang umum dan sesuai untuk semua peringkat umur.
6. Bermanfaat kepada pelajar.
7. Memberangsangkan pemikiran saya.
8. Tahniah atas usaha anda menghasilkan perisian yang bagus dan berguna seperti ini.
9. Sistem ini mampu memberi pengetahuan secara asas kepada orang umum dan sesuai untuk semua peringkat umur.
10. Menambah pengetahuan dalam sistem penanaman padi
11. Sistem yang menarik
12. Sistem yang amat berkesan untuk memberi pendedahan kepada masyarakat mengenai pertanian lestari.

13. Sistem ini sangat bagus dan menarik. Pengguna bukan sahaja dapat menambahkan pengetahuan tapi juga merasai gambaran sebenar amalan tanaman padi organik.

14. Tahniah

15. Penyampaian yang jelas. Pembelajaran dapat disampaikan dengan jelas dan betul.

16. Kesan khas kurang.

17. Sistem ini sangat bagus dan menarik. Pengguna bukan sahaja dapat menambahkan pengetahuan tapi juga merasai gambaran sebenar amalan tanaman padi organik.

Translations from Pilot Study Document

Comments

1. Best.
2. Very enjoyable. Anyone can use it as an effective system for continuous learning.
3. Interface program is like the computer games available that I always play. So, quite happy to use this program.
4. This system is highly effective in creating awareness.
5. The system is able to provide basic knowledge to the public and suitable for all ages.
6. Beneficial to students.
7. Stimulating.
8. Congratulations on your efforts in producing a good and useful software like this.
9. The system is able to provide basic knowledge to the public and suitable for all ages.
10. Increases knowledge of rice farming systems.
11. Interesting system.
12. The system is very effective to expose the public to sustainable agriculture.
13. The system is very good and interesting. Users can not only gain knowledge but also experience a true practice of organic farming.
14. Congratulations.
15. Presentation is clear. Lessons can be conveyed clearly and correctly

16. Lack of special effects.

17. The system is very good and interesting. Users not only gain knowledge but also experience the actual organic rice farming practices.

Part C: Lab Experiment 1 Document

Original text

1. Alert signal should be more visualize. Refer game data, high graphic requirement.
2. Bagus dan tahniah untuk kerja yang memuaskan, diharap segala yang anda buat berjaya dengan jayanya.
3. Baiki/upgrade sistem.
4. Best.
5. First time and mengkagumkan.
6. Good! and interesting.
7. Kefahaman dan terangan boleh diringkaskan supaya senang difahami oleh semua lapisan masyarakat.
8. Label di halaman utama terlalu banyak. Boleh dipermudahkan lagi. Dalam permainan, saya hanya fokus pada orang (apa yang patut dibuat). Setelah sekian lama baru saya tahu di hujung atas kiri skrin adalah apa yang sedang berlaku. Kedudukan mesej kurang menarik.
9. Ok.
10. Penggunaan perisian yang menakjubkan tetapi adakah pertanian menggunakannya?
11. Perlu dibaiki.
12. Permainan seronok.
13. Saya berharap sistem ini dapat dijelaskan kepada para petani supaya amalan pertanian lestari dapat dijalankan. Amalan pertanian lestari dapat mengurangkan pencemaran alam.

14. Secara keseluruhan sistem ini sangat menarik dan membantu menambahkan pengetahuan cuma mengambil masa yang agak lama untuk loading.
15. Sesetengah pengguna mengalami masalah pening kepala apabila menggunakan permainan.
16. Sistem ini bagus.
17. Sistem ini memuaskan dan menarik perhatian.
18. Sistem ini patut didedahkan bukan hanya di kalangan pelajar IPT malah kepada golongan luar.
19. Sistem yang menarik, mampu menarik minat golongan tertentu. Perlu disesuaikan mengikut golongan yang menyertai atau mengikuti sistem.
20. The system is a very good effort that can increase the knowledge among the farmer to apply the sustainable farming the future. I really believe one day the farming system in Malaysia will change. Good luck!

Translations from Lab Experiment 1 Document

1. Alert signal should be more visualize. Refer game data, high graphic requirement.
2. *Well done and congratulations for the satisfactory work, hopefully everything you do succeeds well.*
3. Repair/upgrade the sistem.
4. Best.
5. First time and *impressive*.
6. Good and interesting.
7. *Explanation should be concise so easily understood by all levels of society.*
8. *The label on the main page too much. Should be further simplified. In the game, I only focus on the people (what I should do). After all this while I realize that left top screen shows what is happening. The positioning of the message is inappropriate.*
9. Ok.
10. *Amazing software but can farmers use them?*
11. *It needs to be improved.*
12. *Fun games.*
13. *I hope this system could be explained to farmers, so that sustainable agriculture could be implemented. Sustainable agricultural practices can reduce pollution.*
14. *Overall the system is very interesting and helpful to learn more but it takes time to upload.*
15. *Some users experienced dizziness when using the game.*
16. *This system is good.*
17. *This system is satisfactory and attractive.*
18. *This system should be exposed to not only university students but also to the public.*
19. *The system is interesting, to attract specific groups. Should be adjusted according to those who participate in or use the system.*

20. The system is a very good effort that can increase the knowledge among the farmer to apply the sustainable farming the future. I really believe one day the farming system in Malaysia will change. Good luck!

Appendix I – Storyboard

Refer thesis

Appendix J – Preparing Script of *SiPadi*

SISTEM PADI LESTARI (SIPADI)

TAJUK: PENANAMAN PADI LESTARI - ORGANIK

Pengenalan

Pertanian lestari
Tahukah anda?
Skim dalam pertanian lestari

Kaedah tanaman

- Padi Organik (Paparan Maya)
- Pembajaan
- Pengurusan makhluk perosak

Pengalaman

Kes Mada
Kes Salor
Kes Kahang
Kes Sabak Bernam

Permainan - (Paparan Maya)

Bantuan

Pengenalan

**Pertanian lestari
Tahukah anda?
Skim dalam pertanian lestari**

Pertanian lestari

Pertanian lestari merujuk kepada kebolehan sesebuah ladang untuk mengekalkan pengeluaran tanaman disamping dapat memelihara/mengekalkan alam sekitar dan ekosistem secara berterusan.

Kaedah Organik

Kaedah Organik merujuk kepada tanaman tanpa menggunakan bahan kimia, matlamatnya menjaga alam secara semulajadi.

Pertanian Organik bukanlah sesuatu yang baru tetapi bermula sejak manusia mula bertani, bagaimanapun semuanya berubah apabila pengeluaran makanan dunia perlu dipertingkatkan selepas perang dunia. Dengan itu terhasillah baja dan racun serangga kimia.

Terdapat beberapa kaedah penanaman padi organik dan di antara yang popular adalah Sistem Keamatan Padi (SRI). SRI adalah satu kaedah lestari untuk meningkatkan penghasilan penanaman padi beririgasi yang mengurangkan penggunaan air, baja dan bahan kimia.

Kaedah yang merupakan revolusi dalam pertanian padi ini mula diperkenalkan sejak 1983 di Madagascar dan berjaya diadaptasi di 30 buah negara terutama negara sedang membangun. Kaedah ini dilakukan dengan mengubah pengurusan pokok, air, tanah dan nutrisi.

Prinsip agroekologi yang disumbangkan dalam keberkesanan SRI mempunyai asas saintifik yang lebih baik. Kaedah dan konsep SRI juga sesuai untuk tanaman padi tanah tinggi, dan kini ia sedang dikembangkan kepada tanaman lain seperti gandum dan tebu.

KEBAIKAN PERTANIAN LESTARI - ORGANIK

1. Memelihara keseimbangan sistem ekologi
2. Menjamin alam sekitar yang selamat dan bersih (mesra alam sekitar)
3. Menjaga tanah dan kepelbagaian organisma tanah
4. Memberi hasil tanaman yang lebih bermutu dan berkualiti

5. Menghasilkan makanan yang sihat dan selamat
 6. Tanaman mempunyai daya tahan terhadap penyakit
 7. Mengurangkan penggunaan air
 8. Meningkatkan produktiviti dan mengurangkan kos
-

Tahukah anda?

Kebanyakan racun serangga mengandungi methyl bromida iaitu antara bahan-bahan pemusnah ozon. Bahan kimia ini menyebabkan lapisan ozon semakin menipis.

Apakah itu ozon?

Ozon merupakan sejenis gas yang membentuk lapisan pertahanan yang nipis di atas langit, ataupun atmosfera dan menyelubungi Bumi ini. Lapisan ozon membenarkan cahaya matahari menembusnya dan pada masa yang sama menghalang kemasukan sinaran ultra ungu atau juga dikenali sebagai sinaran UV (untraviolet) yang berbahaya.

Sinaran UV yang berlebihan akan membantutkan proses pertumbuhan tumbuh-tumbuhan, yang mengakibatkan jumlah makanan berkurangan. Sinaran UV yang tinggi juga akan memusnahkan plankton-plankton di laut yang menjadikan haiwan dilaut turut mengalami kekurangan jumlah makanan.

Lapisan ozon bertindak sebagai pelindung atau perisai kepada kesemua hidupan di bumi dengan menyerap hampir semua daripada sinaran-sinaran ultra ungu merbahaya daripada matahari. Tanpa lapisan ozon ini, hidupan di bumi akan terjejas seperti manusia akan mengidap penyakit kanser kulit, penyakit mata (katarak) dan selaran matahari.

Walau bagaimanapun, keadaan semasa ini menunjukkan terdapat "lubang" yang ditemui pada lapisan ozon.

Tahukah anda?

Kesan pembakaran jerami.

Pada masa kini pengusaha-pengusaha sawah menjalankan pembakaran jerami secara terbuka kerana dianggap tiada nilai ekonomi dan kos bagi membuang jerami akan menambahkan bebanan mereka.

Pembakaran jerami mendatangkan kesan negatif kepada alam sekitar dari segi pencemaran serta merupakan faktor utama masalah kesihatan seperti lelah dan asma. Malah pembakaran jerami berhampiran laluan utama juga boleh mengakibatkan kemalangan kenderaan yang serius. Pada tahun 2004 telah berlaku kemalangan di lebuh raya utara-selatan yang melibatkan 21 buah kenderaan akibat dari gangguan asap tebal dari pembakaran jerami.

Tahukah anda?

Baja kimia sering mengandungi nitrogen, fosforus dan potasium dimana nitrogen dikaitkan dengan masalah kesihatan.

Bagaimana?

Nitrogen, di dalam bentuk nitrat dan ammonia boleh ditukar kepada bentuk lain oleh tindakan kimia yang berlaku secara semulajadi di dalam alam sekitar.

a) Nitrit

Nitrogen (baja kimia) yang terlalu banyak dalam tanah akan diserap dalam bentuk nitrit. Nitrogen di dalam tanah bentuk nitrit amatlah toksik. Jika ia dimakan atau diminum melalui sayur-sayuran yang dimakan, ia akan memasuki saluran darah dan mengganggu keupayaan darah membawa oksigen. Nitrit-nitrit juga bergabung menjadi sebatian nitrosamine yang mungkin mengakibatkan barah kepada manusia.

B) Nitrat

Nitrat kurang toksik dari nitrit. Haiwan berperut tunggal boleh nyahkan nitrat di dalam bentuk air kencing. Tetapi di dalam perut lembu, haiwan muda dan kanak-kanak, nitrat akan ditukar kepada nitrit; satu keadaan yang boleh membahayakan.

Skim dan program kerajaan dalam pertanian lestari

1. SKIM AMALAN LADANG BAIK MALAYSIA (SALM)



SALM ialah satu skim pensijilan yang dirangka oleh Jabatan Pertanian untuk memberi pengiktirafan kepada ladang-ladang yang mengamalkan Amalan Pertanian Baik (APB) berkonsepkan mesra alam sekitar, menjaga kebajikan dan keselamatan pekerja bagi menghasilkan produk yang berkualiti, selamat dan sesuai dimakan.

Skim ini berpandukan kepada Standard Skim Amalan Ladang Baik Malaysia (SALM) dan berdasarkan kepada Malaysian Standard MS1784:2005 Crop Commodities – Good Agricultural Practice (GAP).

2. PENSIJILAN SKIM ORGANIK MALAYSIA (SOM)

SOM ialah sebuah program pensijilan yang dibangunkan oleh Jabatan Pertanian untuk mengiktiraf ladang-ladang yang diusahakan secara organik mengikut kriteria dan keperluan yang telah ditetapkan dalam Standard Skim Organik Malaysia (SOM).

Standard SOM adalah berasaskan kepada **Malaysian Standard MS1529:2001 The Production, Processing, Labelling and Marketing of Plant Based Organically Produced Foods.**

Standard SOM juga merangkumi syarat-syarat dan kriteria yang terbit dari peruntukan dalam undang-undang untuk mengawal hazard yang mempunyai impak ke atas alam sekitar, keselamatan makanan dan kesihatan dan keselamatan pekerja.



3. Skim Pengesahan Benih Padi

Tujuan utama skim ini adalah untuk memperakukan ketulenan genetik dan identiti varieti benih padi yang dikeluarkan. Skim ini disediakan untuk pengeluaran benih padi sah oleh pengeluar yang dilantik sahaja. Lot-lot benih yang diperakui menepati piawaian akan diberi label perakuan kualiti berwarna biru bagi benih padi sah dan ungu muda bagi benih padi daftar.

Klasifikasi Kategori Benih Dalam Proses Pengeluaran Benih Padi Sah

- **Biji Benih Asas** : Biji benih asas adalah progeni daripada penanaman benih baka yang dikawal pengeluarannya mengikut prosedur tertentu bagi memastikan tahap ketulenan genetik dan diperakui menepati piawaian yang ditetapkan. Benih asas dikeluarkan oleh Institut Penyelidikan dan Kemajuan Pertanian Malaysia (MARDI).
- **Biji Benih Daftar** : Biji benih daftar adalah progeni daripada penanaman biji benih asas yang dikawal pengeluarannya mengikut prosedur tertentu bagi memastikan tahap ketulenan genetik dan diperakui menepati piawaian yang ditetapkan di bawah Standard Jabatan Pertanian Malaysia (SJPM – 2009).
- **Biji Benih Sah** : Biji benih sah adalah progeni daripada penanaman biji benih daftar yang dikawal pengeluarannya mengikut prosedur Skim

Pengesahan Benih Padi dan Standard Jabatan Pertanian Malaysia (SJPM – 2009) bagi memastikan tahap ketulenan genetik dan diperakui menepati piawaian yang ditetapkan.

4. Program pertanian organik

Sekolah Lestari - Anugerah Alam Sekitar

Program Sekolah Lestari Anugerah Alam Sekitar adalah program kerjasama di antara Jabatan Alam Sekitar, Kementerian Sumber Asli dan Alam Sekitar, Jabatan Sekolah, Kementerian Pelajaran Malaysia serta Institusi Alam Sekitar dan Pembangunan, Universiti Kebangsaan Malaysia (UKM) yang telah dilancarkan pada 27 Januari 2005. Program ini bertujuan untuk membantu sekolah memperkukuhkan program-program pendidikan alam sekitar yang sedia ada.

Kem Kesedaran Alam Sekitar (KeKAS)

Kem ini telah dilaksanakan oleh Jabatan Alam Sekitar dengan kerjasama Kementerian Pelajaran Malaysia dan Jabatan-jabatan Pelajaran Negeri. Modul yang digunapakai adalah berkaitan dengan Ekosistem Marin, Hutan, Tanah Tinggi, Pertanian Organik, Urbanisasi dan Perladangan Kelapa Sawit. KeKAS telah dinajurkan sebagai acara tahunan untuk pelajar-pelajar sekolah.

Debat Alam Sekitar Antara Institut Pengajian Tinggi

Pertandingan ini adalah anjuran Jabatan Alam Sekitar bersama dengan Majlis Debat Universiti-Universiti Malaysia (MADUM), Dewan Bahasa dan Pustaka, Kementerian Pengajian Tinggi Malaysia mula diperkenalkan pada tahun 1991. Pertandingan menggunakan kaedah system power match berkumpulan (bracket power match) untuk pusingan bagi menentukan pasukan yang akan berlawan dan juga peranan mereka (kerajaan/pembangkang). Setiap pasukan akan ditentukan kedudukan mereka berdasarkan menang/ kalah, juri, margin (julat kemenangan) dan markah.

Projek Wira Alam

Projek Wira Alam yang telah dilancarkan pada tahun 1998 adalah program kesedaran alam sekitar yang dianjurkan oleh JAS dengan kerjasama Persatuan Pencinta Alam Malaysia (MNS) dan Kementerian Pelajaran Malaysia. Projek ini dibahagikan kepada tiga tahap iaitu Tahap 1 (Wira Diri), Tahap 2 (Wira Komuniti) dan Tahap 3 (Wira Alam). Setiap pelajar perlu menyelesaikan tugas yang ditetapkan di dalam buku aktiviti Projek Wira Alam setiap tahap sebelum ke peringkat seterusnya.

Kitar Semula Bateri Telefon Bimbit Terpakai

Pada tahun 2006 , sebanyak 350 buah tong kitar semula telah disediakan dan diedarkan ke Pejabat-pejabat Agensi Kerajaan dan Swasta, Syarikat Telekomunikasi, Institut Pengajian Tinggi serta Pasaraya-Pasaraya terpilih sekitar Lembah Klang dan Putrajaya.

Bandar Lestari Anugerah Alam Sekitar

Anugerah Bandar Lestari Anugerah Alam Sekitar untuk memberi pengiktirafan kepada Pihak Berkuasa Tempatan yang telah mengintegrasikan elemen kelestarian alam sekitar dalam perancangan, pentadbiran dan pelaksanaan program, projek dan aktiviti mereka yang telah dipergiatkan lagi dengan sokongan dan kerjasama yang lebih hebat dari Jabatan Kerajaan Tempatan (Kementerian Perumahan dan Kerajaan Tempatan) dan Institut Alam Sekitar dan Pembangunan (LESTARI UKM). Penilaian adalah berdasarkan persekitaran fizikal, inisiatif ekologi, perkhidmatan perbandaran, pentadbiran alam sekitar, pendidikan dan kesedaran alam sekitar.

Anugerah Langkawi

Anugerah Langkawi merupakan anugerah paling berprestij di Malaysia diberi bagi mengiktiraf sumbangan cemerlang dalam bidang pengurusan alam sekitar, pemuliharaan dan perlindungan. Pemenang Anugerah Langkawi akan menerima plak dan sijil yang ditandatangani oleh D.Y.M.M. Seri Paduka Baginda Yang di-Pertuan Agong bersama-sama wang tunai bernilai RM 10,000.

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Akhir sekali,

Tiada yang seagung nikmat tuhan yang memberi rahmatnya.

Appendix M – Resume and Publication

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Nationality: Malaysian



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Formal Education:

Sultan Zainal Abidin College (KUSZA), Malaysia, 1994-97

Universiti Kebangsaan Malaysia, Malaysia, 1997-99

University Utara Malaysia, 2000-2002

Academic Qualifications:

Diploma (IT) (KUSZA, 1997)

B.Sc(Hons) Information Technology in Information Science(UKM, 1999)

M.Sc. Information Technology By Research, (UUM, 2003) Title: Virtual Environment Using AutoCAD Modelling and Image-Based Approach

Journal Paper (2008-1011)

Othman, Z., & Muhammad, A. (2011). Design Strategies to persuasive learning for promoting sustainable practices in paddy farming. *American Journal of Economics and Business Administration* 3(1), 197-202.

Othman, Z., Muhammad, A. & Abu Bakar, M. A. (2010). A sustainable paddy farming practice in West Malaysia. *The International Journal of Interdisciplinary Social Sciences*, 5(2), 425-438.

Other Publication

Othman, Z. & Muhammad, A. (2012). Organic Paddy Farming Practices to Learning Application. *Knowledge Management International Conference 2012 (KMICe 2012)*. Johor Bharu: Universiti Utara Malaysia.

Othman, Z. (2011). Peranan IT dalam penyebaran SRI. Paper presented at the 1st National Conference on System of Rice Intensification (SRI) for Sustainable Rice Security and Heritage.

Othman, Z., & Muhammad, A. (2011). Learning prototype as a tool to promote sustainable awareness. *Proceedings of the 3rd International Conference on Computing and Informatics (ICOCI 2011)*, Bandung, Indonesia.

Othman, Z. and Muhammad, A. (2010). A sustainable paddy farming practice in West Malaysia. 5th International Conference of Interdisciplinary Social Sciences. Cambridge University.

Othman, Z. & Muhammad, A. (2010). E-learning: Design Strategies for Promoting Sustainable Practices in Paddy Farming. *Knowledge Management International Conference 2010 (KMICe 2010)*. Terengganu: Universiti Utara Malaysia.

Othman, Z. & Muhammad, A. (2009) Sustainable agriculture in paddy farming system. *International Society for Southeast Asian Agricultural Science (ISSAAS) Congress*. Thailand: Extension and Training Office. Organize by Kasetsart University and the ISSAAS International Congress 2009. Bangkok.

Othman, Z. & Muhammad, A. (2008) Information and communication technology in sustainable agriculture: A study in paddy farming system. In CD *Proceedings of International Conference on Science and Technology*. Malaysia: Uitm Penang.

Award & Poster presented:

- ▶ Bronze award, **Invention & Innovation Awards 2010** in Malaysia Technology Expo. 4th – 6th February 2010. Putra World Trade Centre - Kuala Lumpur. Title: Using learning games as a tool to promote sustainable awareness in paddy farming practice.

- ▶ Silver award, Malaysia Technology Expo - 2008. (Virtual Museum Project). Collaboration with UUM.

- ▶ 16-17 Dec 2008. 3rd International conference on postgraduate education. Title: ICT in Sustainable Agriculture: A study in Paddy Farming System. Organized by graduate's studies deans council.

PHD workshop presented

11 August 2009, Doctoral Research Workshop. 6th International Conference Computer Graphics, Imaging & Visualization. Title: Virtual Technology in Sustainable Agriculture: A case study in farming practice in West Malaysia. Tianjin University, China.

Conference/Seminar Attended:

31/1/2008 - 1/2/2008. *UUM Workshop: Quantitative and qualitative research.*
Organized by UUM.

24 June 2008. *Sustainable agrifood system as a response to the current food crisis seminar.* Organized by Science and Technology Studies Department, Faculty Science. UM.

23 July 2008. *Initiatives On Sustainable in Science and Technology: Perspectives from Agriculture and Environment.* Organized by Science and Technology Studies Department, Faculty Science, UM and Consumers Association of Penang (CAP).

24-25 July 2008. *National Conference in Sustainable Agriculture.* Organized by Consumers Association of Penang (CAP) at Shah Village Hotel, Kuala Lumpur.

11-12 Mei 2009, 3d design visualization. Organized by Uitm and Quest3d.

12 – 13 March 2009, Critical Mind Skills: The industry perspective. Organized by University of Malaya Centre of Innovation and Commercialization in cooperation with Global Innovation Research Centre.

21-22 December 2010. *2nd International Conference on Sustainability Science: Values and sustainability.* Organized by Centre for Civilisational Dialogue, Science and Technology Studies Department, Faculty Science, Sustainability Science Research Cluster and UM CARES, UM.

