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Enhancing self-directed learning skills through e-SOLMS for Malaysian learners

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Abstract

e-SOLMS (e-Student-Oriented Learning Management System) was developed to raise students' awareness of their own roles in learning for skills needed to 'learn how to learn' or 'self-directed learning' as an important enabling skill before making the transition into tertiary education. e-SOLMS was planned, designed and developed to be deliverd via the Web and it contains lesson ideas which are stored in its repository of Reusable Learning Objects. This model incorporates Self-Directed Learning (SDL) as a personal attribute and a learning process and it also incorporate a third dimension ie. the learning context, to indicate the impact of environmental factors on SDL.

Keywords: Learning management systems; self-directed learning; student-oriented; social-constructivist.

1. Introduction

The e-Learning Centre of Excellence (eLCOE) at the School of Educational Studies, Universiti Sains Malaysia (USM) is devoted to the development of innovative technologies to enhance learning for Malaysian learners. e-SOLMS (e-Student-Oriented Learning Management System) is one such product devloped to raise students' awareness of their own roles in learning (Taylor, 1995) for the skills needed to 'learn how to learn' or 'self-directed learning' would be an enabling skill necessary for learners to master before making the transition into tertiary education (Marjanovic, 2005).

The literature on Self Directed Learning asserts that self-directed learners demonstrate a greater awareness of their responsibility in making learning meaningful and monitoring themselves (Garrison, 1997). They are curious and willing to try new things (Lyman, 1997), view problems as challenges, desire change, and enjoy learning (Taylor, 1995). Taylor also found them to be motivated and persistent, independent, self-disciplined, self-confident and goal-oriented.

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In order to promote the development of self-directed learners, educators must ensure that it provides them with a learning environment as well as a curriculum that facilitates its development. The research and literature recommends certain features that can foster self-directed learners and learning and this includes; (1) The curriculum has opportunities for student's choice in the way mastery of content and subject matter is demonstrated and investigated, (2) Teachers shift some of the responsibility for learning from themselves to the learner. This is not an advocacy that teachers do not teach, plan and design lessons nor facilitate learners' activities. However, the teacher can instruct the class in those areas over which students' have greater control such as amount of effort, note taking, perseverance, locus of control, self-efficacy, and self-regulation, (3) Educators encourage study skills, inquiry, questioning, and an atmosphere where errors are acceptable during the process of arriving at correct answers. They should help students to determine correct answers through critical questioning; expressing differing and conflicting views; and putting assertions and hypotheses to the rigor of disciplined inquiry (scientific method) and (4)Teachers provide opportunities for students to self-monitor, revise work, and reflect on their own thinking and learning processes. Journals, study groups, and critical friends' groups are just a few of the ways to achieve this in classrooms (Abdullah, 2001).

2. Theoretical Framework

The Social Constructivist theory was used as the underlying learning theory to explain the processes of learning taking place. Here learning is viewed as a social interactive process and the interaction between learners and of learners with other people is very important. This too, helps explain the acknowledgement that learning should be conceived as an active experience through which people construct collective meaning and develop perspectives of situations (Simons, 2005). Features of self-directed learning like demonstrating greater awareness of their responsibility in making learning meaningful and self-monitoring themselves (Garrison, 1997), curious and willing to try new things are all indicative of active learning as explicated by social constructivism. Being active helps learners regulate themselves and become more adept at designing their own learning environments.

The Song and Hill (2007) model depicted in Figure 1 is used to understand the self-directed learning factor within an online context. The model incorporates Self-Directed Learning (SDL) as a personal attribute and a learning process as pointed out by most scholars in the literature of SDL. However, this model also incorporate a third dimension ie. the learning context, to indicate the impact of environmental factors on SDL. The online learning context impacts SDL personal attributes of resource use, strategy use, and motivation.

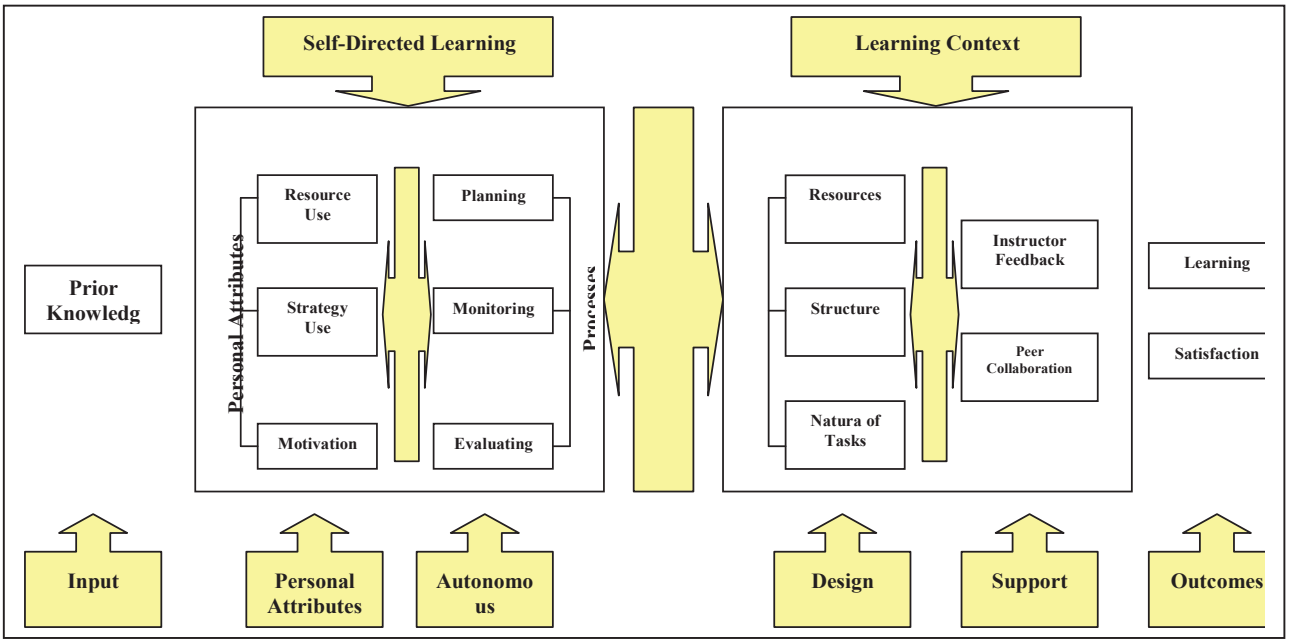

Figure 1: Model Song & Hill (2007)

The online environment of the Student-Oriented Learning Management system lends itself to a self-directed learning (SDL) experience while qualifying for the contextual dimension of a constructivist leaning. To succeed in online learning context, learners need to take control in planning their learning pace (Chizmar & Walbert, 1999) monitoring their learning comprehension (Shapley, 2000), and making judgments on various aspects in their learning process (Petrides, 2002). Recent research in an online distance education indicates that students need to have a high level of self-direction to succeed in online learning environment (Shapley, 2000). In fact, not only does an online learning context influence the amount of control that is given to (or expected of) learners, it also impacts a learner's perception of his or her level of self-direction.

Planning, designing and development of an alternative learning management system aptly name **Student-Oriented Learning Management System (SOLMS)** was duly embarked with a research grant from the University (USM). It was proposed that the existing prototype (eLC) be extended to enable learners to make their own selection of lessons (from the resource pool) and monitor their own progress through the different difficulty levels by engaging in the on-line diagnostic tests. These diagnostics tests would indicate to the learners their level of competency as well as the areas in the curriculum where remedial and enrichment tasks are considered necessary. Project-based modules as adjunct materials would be provided to learners to provide ample opportunities for the development of social skills like collaboration, cooperation and consensus-making so crucial for self-directed learning.

Periodic monitoring of the learners development of their self-directed learning skills would be mapped out by the system administrators and its growth made visually possible by repeated measures on scores of self-directed learning skills. In addition, we also propose that SOLMS is readily accessed by the learners' academic advisors who would monitor their progress and based on that, provide the necessary academic advice and guidance. An added feature to SOLMS is be the possibility of parents gaining access to the learning system to enable them to track their children's academic progress.

Figure 2 below illustrates the planning and designing phases involved in the development of e-SOLMS while figure 3 is considered the blueprint for the portion of 'Student Login'. Blueprints for Project Supervisor and Parents were also prepared to ensure details were not overlooked when transforming the blueprints into digital forms.

3. The Planning and Designing of e-SOLMS

Planning, designing and development of an alternative learning management system aptly name **Student-Oriented Learning Management System (SOLMS)** was duly embarked with a research grant from the University (USM). It was proposed that the existing prototype (eLC) be extended to enable learners to make their own selection of lessons (from the resource pool) and monitor their own progress through the different difficulty levels by engaging in the on-line diagnostic tests. These diagnostics tests would indicate to the learners their level of competency as well as the areas in the curriculum where remedial and enrichment tasks are considered necessary. Project-based modules as adjunct materials would be provided to learners to provide ample opportunities for the development of social skills like collaboration, cooperation and consensus-making so crucial for self-directed learning.

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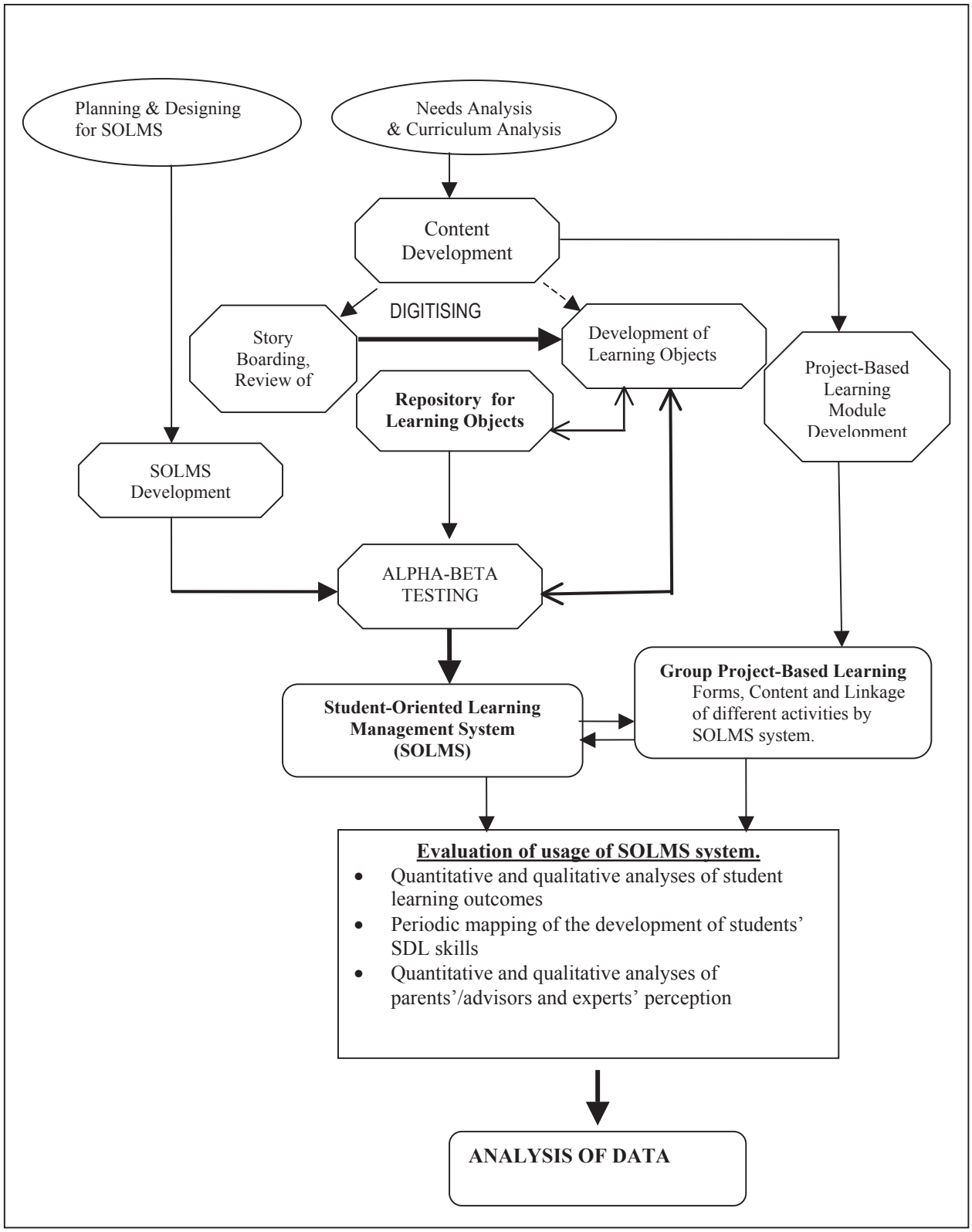

Figure 2: Flow Chart for Planning and Designing of e-SOLMS

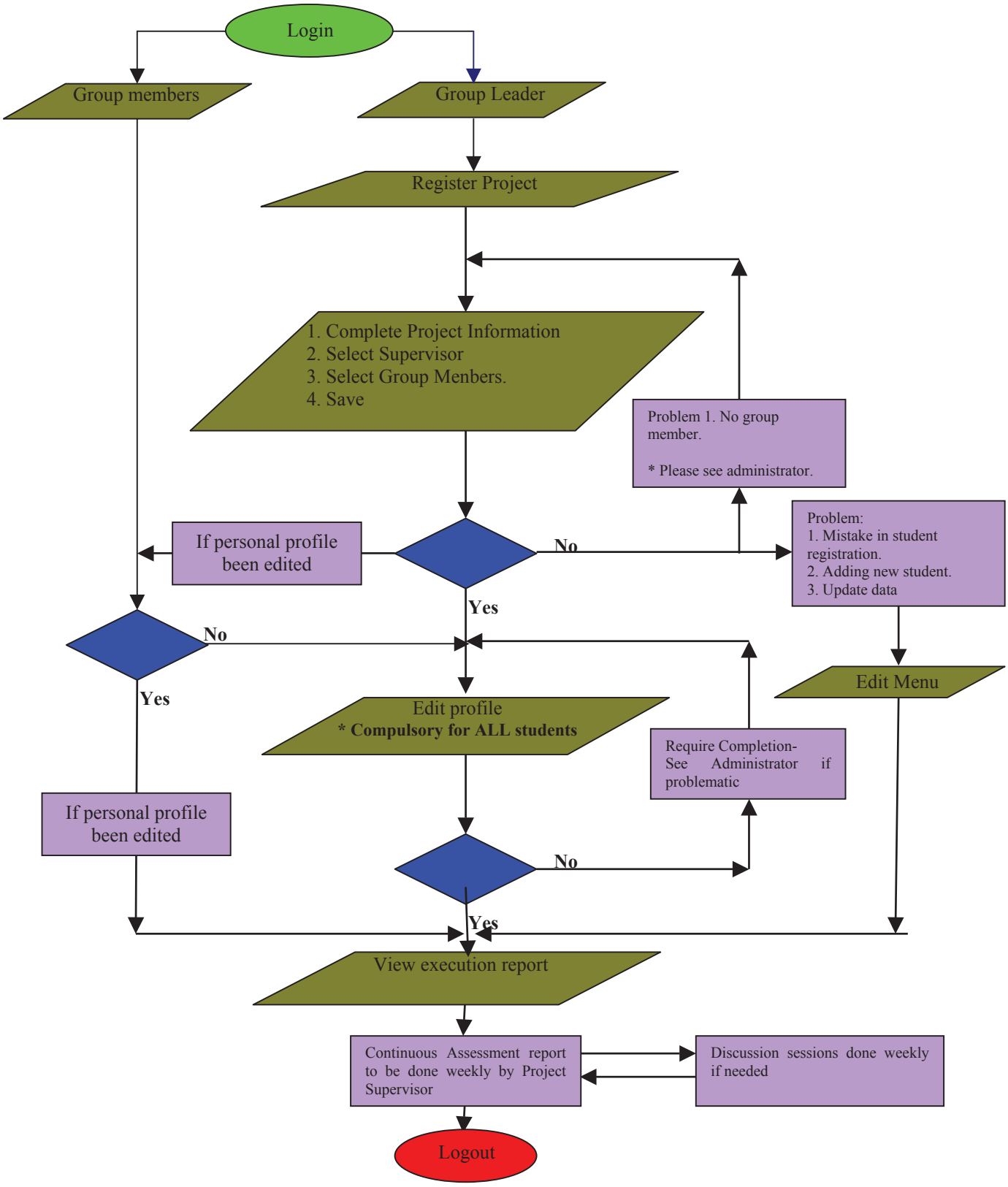

Figure 3: Flow Chart for Student Login (Blueprint)

4. Development of e-SOLMS

4.1. Reuseable Learning Objects

These computer-mediated learning objects were developed around the principles of reusability, meaning that lessons can be generated and customized for specific topics. Therefore a single learning object may be used in multiple contexts for multiple purposes and these were developed as an outcome of the 'curriculum analysis'. The use of digital cameras and video cameras were used to capture authentic scenes in current teaching experiences and these were later digitised and transformed into audio and video files to support and enhance the learning objects. The learning objects were prepared by lecturers (as content experts) in the Mechanical Engineering assisted with three instructional designers and the digitising process by a multimedia specialist. A total of 48 learning objects were finally developed. Some of the files uploaded into the repository were:

- Audio files- wma, wav, mp3, mpu, midi, au (all files that can be supported by windows media player)
- Portable Document Format (PDF)
- Powerpoint files
- Text files
- Video files-wmv, wvx, dvr-ms, avi, mpeg, mpg (all files that can be supported by windows media player

4.2. Interface Design

Designing an effective and efficient navigational system is recognized as the most difficult challenge and it outlines many issues in relations to navigation in systems such as in e-SOLMS. The organization of the space to enable users to navigate content by following meaningful paths (Lyardet, Rossi and Schwabe, 1998) and the extent to which users should have flexibility in exploring a program's contents or should programs predetermine a user's navigational pathway (Lawless and Brown, 1997) were considerd when designing the interface. But mainly the IT and multimedia specialist were recommended to work on website design principles by adhering closlely to the heuristics compiled by Nielsen (1994, see Table 1 below) which included such widely accepted principles of user interface design as "supports recognition rather than recall" and "prevents errors".

The heuristics proposed by Nielsen were adapted with minor changes to the wording of some descriptors to facilitate understanding. Nielsen's set of heuristics are shown in Table 1.

Table 1: Interface design heuristics [Nielsen,1994]

Ensures visibility of system status	The software keeps the user informed about what is going on through appropriate and timely feedback.
Maximises match between the system and the real world	The software speaks the users' language rather than jargon. Information appears in a natural and logical order.
Maximises user control and freedom	Users are able to exit locations and undo mistakes.
Maximises consistency and matches standards	Users do not have to wonder whether different words, situations or actions mean the same thing. Common operating system standards are followed.
Prevents errors	The design provides guidance which reduces the risk of user errors.
Supports recognition rather than recall	Objects, actions and options are visible. The user does not have to rely on memory. Information is visible or easily accessed whenever appropriate.
Supports flexibility and efficiency of use	The software allows experienced users to use shortcuts and adjust settings to suit.
Uses aesthetic and minimalist design	The software provides an appealing overall design and does not display irrelevant or infrequently used information.

Helps users recognise, diagnose and recover from errors	Error messages are expressed in plain language, clearly indicate the problem and recommend a solution.
Provides help and documentation	The software provides appropriate online help and documentation which is easily accessed and related to the users' needs.

Figure 5 below shows an example of the interface design which depicts the main menu.

Figure 5: The main menu on e-SOLMS

4.3 Programming Languages Used

The e-SOLMS system was developed using JSP java *(Java Server Pages)* for the web application and the software server Apache was used in order to run the Java pages.

This web application needs a web browser like Internet Explorer or Mozilla Firefox in order to run the application. JSP being an open source system did not require any payment or license in order to utilise it.

SQL or Structured Query Language was the programming language used to develop the e-SOLMS data base. The programming aspect of e-SOLMS was undertaken with help from a computer programmer and IT specialist who were also teaching at the Polytechnic college in the IT department.

5. Initial Findings

Initial findings on the effects of e-SOLMS on self-directed learning readiness of the sample will be discussed here. The scores of the 3 constructs of SDLR namely (1) self-management (2) desire for learning and (3) self-control are shown in Table 2 comprising of both the control and experimental groups. In all the 3 constructs the experimental group had means of gain scores that were consistently higher than those obtained from the control group and that these means were significantly different. In other words the students in the experimental group had

benefited in terms of enhanced self-directed learning dispositions compared to those in the control group (using existing teaching and learning methods).

Table 2: Comparison of pre and post-SDLR scores for Control and Experimental Groups

Construct	Group	N	Mean	S.P.	D.F.	t-value	Sig.
Self-manage nent (Pre)	Control group	122	2.2509	.98419	237	.772	.054
	Experimental group	117	2.1571	.89093			
Self-manage nent Post)	Control group	122	3.3228	.84251	216.772	-7.462	.000*
	Experimental group	117	4.0217	.58790			
Desire to Le rn (Pre)	Control group	122	2.4727	1.10728	237	.648	.139
	Experimental group	117	2.3846	.98794			
Desire to Le rn(Post)	Control group	122	3.3962	.85141	236.898	-7.628	.040*
	Experimental group	117	4.2108	.79957			
Self control Pre)	Control group	122	2.5104	1.10980	237	.875	.172
	Experimental group	117	2.3915	.98341			
Self control Post)	Control group	122	3.2842	.80889	233.977	-8.283	.014*
	Experimental group	117	4.0895	.69172			

Table 3: Self Directed Learning Readiness score and scale(SDLRS)

SDLRS score	SDL Readiness Scale
40 – 86	Low
87 – 111	Below moderate
112 – 136	Moderate
137 – 161	Above moderate
162 – 200	High

Source: Guglielmino (1989)

Table 4: Percentage of sample with post SDLRS

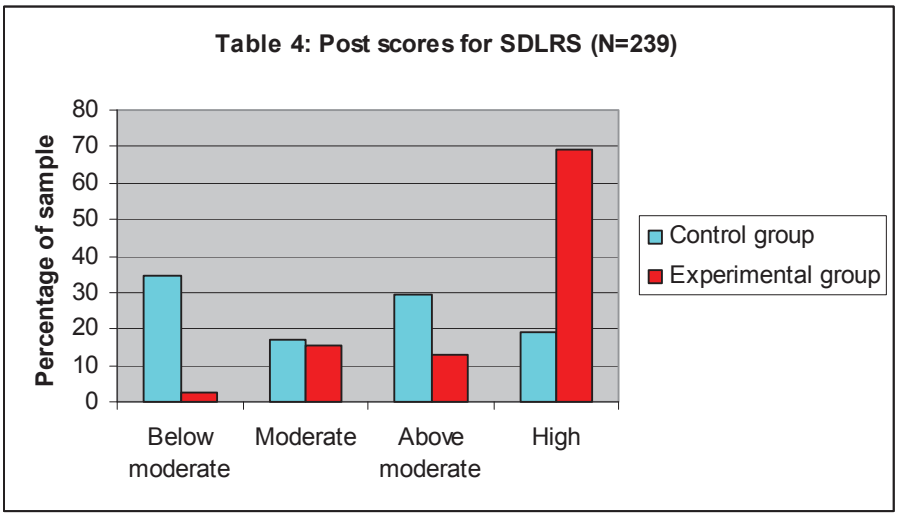

Table 4 shows the percentage of sample with post-scores of SDLR in both experimental and control groups. The high percentage of students from the experimental group with 'high' scores in SDLR (69.2%) in contrast to 'above moderate' (12.8%) and 'moderate (15.4%) would suggest that this learning system managed to provide a fresh outlook and enthusiasm in learning that was absent before when they were 'languishing' in the 'moderate and above moderate' levels. In addition, we would also like to suggest that the extremely low (2.6%) percentage of the experimental group (control gp at 34.4%) still locked in 'below moderate' was due to the majority's mobility elevating to higher levels due to the success of e-SOLMS. This finding promises a learning innovation that can benefit learners who find the existing approaches to teaching and learning as being tired and washed out and may provide the learning environment that can reignite their enthusiasm especially in the enhancement of self-directed learning skills.

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