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Original Research Article

Impact of Integrating Heutagogy into E-Content For Tertiary Learners

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Learners are the hub in the educational process. Every classroom consists of all the three types of learners i.e Visual learners, Auditory learners, Kinesthetic learners. Paradigm Shift has happened from teacher centered to student centered learning. The challenge of a teacher is to cater to the needs of all types of learners in every classroom. Learning styles vary according to the individuals. Heutagogy, a technique of self-determined learning with the practices and principles rooted from andragogy that could be responsible for the developments in higher education. Technology had made unprecedented changes in the area of education. Advancement of science has to be effectively conveyed to the students without much time gap. Therefore induction of interest among students to learn the basic and the latest advancement in science is essential. e-Content will provide multi-sensory experience of the learners. Also the learners will be able to visualize the entire content and attain mastery over the topics. In the present study e- content on osmosis was developed and given to the tertiary learners for learning. Pre-test and Post-test was administered to the samples to ascertain the impact of e-content. Symbiotic relationship between the learning style and the performance are explored in this paper. Results revealed that e-content with the heutagogical approach for tertiary learners were effective.

Key words: Andragogy, auditory ,autonomous, heutagogy, Kinaesthetic learners, Learning styles, Paradigm Shift , self-determined ,symbiotic, unprecedented , Visual.

INTRODUCTION

We need to go beyond the idea that an education is something that is provided for us and toward the idea that an education is something that we create for ourselves. Stephen Downes. Andragogy a self-directed learning, defined by Knowles (1975) as a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. The goals of self-directed learning include helping learners develop the capacity for self-direction, supporting transformational learning, and promoting emancipatory learning and social action (Merriam, 2001). The instructor shows learners how to find information, relates information to the learner experience, and places a focus on problem-solving within real-world situations (McAuliffe et al., 2008). Instructors establish objectives and curriculum based on learner input and guide students along the learner path, while the responsibility for learning lies with the learner.

Heutagogy is self-determined learning. Heutagogy applies a holistic approach in developing learner capabilities, with learning as an active and proactive process. Heutagogy was initially conceptualized as a natural extension to pedagogy and andragogy by taking into account the increasing

complexity of learning and the corresponding implications for the role of the learner (Hase & Kenyon, 2000).

In a heutagogical approach to teaching and learning, learners are highly autonomous, have increased responsibility and self-determined and emphasis is placed on development of learner capacity and capability with the goal of producing learners who are well-prepared for the complexities of today's workplace (Lisa Marie Blaschke, 2012) and the learners acquire both competencies and capabilities (Stephenson, 1994, Kenyon, 2007). Heutagogy serve as a framework for digital age teaching and learning (Anderson. T, 2010, Wheeler, 2011).

According to Bangura (2005) that heutagogy helps students develop confidence and competence, and to question interpretations of reality different from their own. Heutagogy places the power in the hands of the learner and looks to a future where knowing how to learn will be a fundamental educational skill (Ashton & Newman, 2006). There is a difference prevailing between the androgogy and heutogogy which are given below for better understanding of the concept. Self-Directed Learning is a process in which learners take responsibility typically under the guidance of an instructor for diagnosing learning needs, articulating learning goals, identifying materials and recourses for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes (Knowles, 1975).

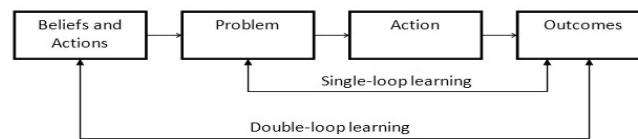


Figure 1. Double-loop learning (Eberle & Childress, 2005, as shown in Eberle, 2009, p. 183).

Self-determined Learning is a process in which learners take initiative in identifying learning needs, formulating learning goals, identifying learning resources, implementing problem solving strategies and reflecting upon the learning process in order to challenge existing assumptions and increase learning capabilities (Blaschke, 2012).

A key concept in heutagogy is double-loop learning and self-reflection (Argyris & Schon, 1996). In double-loop learning, learners, consider the problem and the resulting action and outcomes, in addition to reflecting upon the problem-solving process and how it influences the learner's own beliefs and actions (Figure 1). Double-loop learning occurs when learners "question and test one's personal values and assumptions as being central to enhancing learning how to learn" (Argyris & Schon, 1978).

In self-determined learning, it is important that learners acquire both competencies and capabilities (Stephenson, 1994, Hase & Kenyon, 2007). Competency can be understood as proven ability in acquiring knowledge and skills, while the capability is characterized by learner confidence in his or her competency and as a result, the ability to take appropriate and effective action to formulate and solve problems in both familiar and unfamiliar and changing settings (Cairns, 2000). In the process of double-looping, learners become more aware of their preferred learning style and can easily adapt new learning situations to their learning styles, thus making them more capable learners. With its dual focus on competencies and capability, heutagogy moves educators a step closer toward better addressing the needs of adult learners in complex and changing work environments (Bhoryrub et al., 2010).

More mature learners require less instructor control and course structure and can be more self-directed in their learning, while less mature learners require more instructor guidance and course scaffolding (Canning & Callan, 2010; Kenyon & Hase, 2010). Education professionals have found heutagogy to be a credible response to the critical issues that their learners are faced with in the workplace and have designed their learning environments based on the approach (Bhoryrub et al., 2010; Ashton & Newman, 2006; Gardner et al., 2007).

Reviews for gaining insights

Canning and Callan (2010) report on three higher education institutions in the UK found that heutagogical approach supports learner control over learning and develops critical thinking and reflection which can be applied in practical situations. According to Schon (1983), reflective practice supports learners in becoming lifelong learners, as when a practitioner becomes a researcher into his own practice, he engages in a continuing process of self-education.

Ashton and Elliott (2007) promote learning dependent upon a range of life experiences where educators can only guide the formation of ideas and not force feed the ideas of others. The online forums generate a sharing of knowledge and experience from practice and students then engage in self-

reflection which triggers others within the learning community to respond and add to the co-constructed learning that is taking place.

Ashton and Newman (2006) acknowledge that heutagogy places power in the hands of the learner. Within the foundation degree this has attempted to be a gentle and secure process where the student is supported in every aspect of knowledge development and critical reflection.

Bangura (2005) notes that heutagogy or self-directed learning helps students develop confidence and competence, and to question interpretations of reality different from their own. This differentiates heutagogy from more traditional pedagogies (Bangura, 2005), heutagogy places the power in the hands of the learner and looks to a future where knowing how to learn will be a fundamental educational skill (Ashton & Newman, 2006).

Programmed instruction models as suggested by Skinner (1954) can be used to provide learners learn at their own pace and give immediate feedback. Multimedia tools provide a wide range of sensory stimuli. The animations, simulations, software packages to teach various subjects, speech, music, multimedia networks, image enhancements, etc. create virtual realities and experience for the learners, which in turn, help in making learning a more direct, useful, and joyful experience and retain knowledge for a longer time (Shamsha Emanuel, 2010). E-Content in osmosis includes process like script writing, story board which are integrated with multimedia components such as text, audio, video, animation and image. It will provide multi-sensory experience to the learners. Learners construct new knowledge and modify existing knowledge as they experience situations, problems, circumstances, and other events in learning settings (Tzeng & Schwen, 2003).

Objectives

- To develop e-learning module in osmosis
- To find out the effectiveness of the e-learning module in osmosis
- To understand the effect of the heutagogical approach in tertiary learners
- To evolve recommendations on the basis of the findings of the study for future policy and planning for tertiary learners.

Hypothesis

There is no significant difference in the Pre-test mean score between Control group and Experimental Group.

There is no significant difference in the Post-test mean score between Control group and Experimental Group.

There is no significant difference between the Post-test mean score of Control group and Experimental Group based on the gender. Following are the different steps to be adopted in the development of an e-content:

Result and Discussion

Table 1: Showing Mean scores of Control Group in the pre-test

Control group	N	Mean Pretest	SD	't' value	Sig
Pre-test	10	9.50	0.707	37.404	0.00
Post-test	10	47.00	3.900		Sig

Table 2: Showing Mean scores of Experimental group in the post-test

Experimental group	N	Mean Post test	SD	't' value	Sig
Pre-test	10	12.1	1.287	30.168	0.00
Post-test	10	60.0	6.272		Sig

Table 3: Showing Mean scores of Control Group and Experimental group in the post-test based on gender

Group		N	Mean	SD	't' value	Sig
Control Group Pre-test	Male	6	9.33	0.516	0.904	0.135
	Female	4	9.75	0.957		NS
Post-test	Male	6	47.0	3.033	0.883	0.096
	Female	4	49.25	5.123		Sig
Experimental Group Pre-test	Male	5	11.40	1.342	1.980	0.083
	Female	5	12.80	0.837		Sig
Post-test	Male	5	56.80	7.050	1.804	0.109
	Female	5	63.20	3.633		NS

Selection of the topic

Selection of the topic for the development of e-content has its own significance in any subject in general and science in particular. As far as science subject is concerned, unless a teacher provides opportunity for a student to visualize certain topics in science, the student finds very difficult to master the ideas behind those contents. Science involves explaining abstract concepts and call for visualization of microscopic objects / organisms or gigantic processes. These challenges are met effectively by using

graphics, animations and simulations on computers. Indeed, technology is used to provide opportunities for students to apply knowledge in real world contents and engage in active participation, exploration and research (Amutha, 2010).

Thus the selection of the topic is to be done by keeping the following in the mind:

- The topic should be relevant to the audience and it should confirm to the curriculum
- It must pave the way to provide multi-sensory experience for the students.

- Ensure whether the student finds difficulty in understanding and mastering the content.
- Ensure the topic is difficult to be explained through chalk and talk method.
- Ensure the topic which may require virtual reality
- Ensure things pertaining to the content are to be witnessed by the students by not allowing them to assume.

Designing of e-content

In the present study, the investigator decided to develop the e-content in HTML format based on the objectives. In this stage, the topic divided into sub topics. Appropriate images, animations, and videos were collected.

Script writing for video :The investigator prepared the script where the message was carefully planned and sketched out. The audio part of the script was what would be said and what sound effect would be recorded. The 'visual' part of the script shows every shot that will be used in the final production.

Story Board for Video

The first step of the video shooting, the investigator prepared a storyboard, which is the working document of video in the e-content. The investigator used three column format for story board writing. In this format the first column contains content part, the second column contains proposed visuals, and the third column contains effect for e-content.

Video shooting

A professional videographer in the studio was arranged for shooting.

Editing

Editing was done by the investigators with the help of experts in the studio. The video programmer covers the topic 'osmosis'. The e-content in HTML format, contains text, images, video and animations. The investigators prepared the video and animation to explain the concept according to the instructional objectives. After that all files and videos are carefully edited according to the original storyboard.

The investigators used Adobe premiere software for video editing. After the editing process, the total video portion is presented as a completely. The content is validated by the experts. Since the content is given to the students for self learning all the contents like objectives, glossary, script, storyboard, video, related links, quiz for evaluation were given in the module.

Design of the study

Experimental research method with two group design was adopted in this study. Investigator selected 20 UG final year Botany students from an Arts and Science College in Tiruchirappalli for the present study. The e-content was validated by the experts in Educational Technology and Botany. The achievement test was developed by the investigator based on the guidelines of Bloom (1956) and it was validated by the experts. The pre-test was conducted for all the 20 students. 10 students of the control group were received conventional method of teaching and the remaining 10 belonging to experimental group were exposed to e-

learning module. The investigator attempted their queries if any, in the experimentation phase. Learners were made to feel at home. Soon after the experimentation the post-test was conducted for all the 20 students.

Apart from the experimentation, students belonging to experimental group were asked to self-reflect the process of their learning in order to ascertain their style of learning since the heutagogical approach was adopted in this study. PGRMT (Planning, Goal setting, Reflection, Measurable outcome and Time management) method was adopted to self-reflect their learning.

It can be seen from the table that the calculated 't' value is greater than that of the table value at 0.01 level of significance. Hence their post test mean scores outnumber the pre test scores. This clearly shows that the e-content delivered its goods for the better performance of all the 10 students. It is also inferred from the above table that the female students performed well compared to the male students. Thus, e-content is effective and it can enhance the knowledge and understanding of the students as it is developed with combinations of text, audio, animation, images, video and pedagogical applications which are blended to visualize the content.

Outcome of self-reflection

All the ten students have planned before they start learning. Goal setting was also done by everybody. Regarding reflection 7 students were able to reflect based on the goal setting. 8 students out of ten were able to measure their progress, remaining two were not able measure their progress exactly. All the 10 students were able to manage their time well.

Recommendations

The following recommendations are given based on the findings and conclusions

- Develop a partnership between educational institutions and the IT industry for the continuous development of new content and methodology taking into account contemporary technology.
- The distribution of the e-content to teachers and students from formal and non-formal educational modes, for supplementing and complementing the process of teaching and learning in higher education.
- Self-reflection training to be given to students for better learning in heutagogical approach.
- Laboratory demonstration like dissection of plants and animals can also be taught through multimedia so that no animal or plant has to sacrifice its life.

Conclusion

The best way to help students become future ready is to guide them towards becoming self-determined in their learning. e-Content learning encourages open-minded, reflective, critical and active learning. With e-content materials, the learner and teacher will understand that he or she is changing from a provider of facts to the one who facilitates a learning environment. It is in this assumption that this investigation attempts to devise an innovative teaching technique through e-content approach. Humans can integrate information from different sensory modalities into one meaningful experience. E-Learning modules are becoming an important tool for faculty in the biological sciences due to increasing conceptual and

functional complexity that presents educational challenges that cannot be adequately addressed by traditional teaching methods (Buckley et al., 1999). Heutagogical approach helps to learn science at a faster rate. In science subjects

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