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April 01, 2016
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CELL (BIOLOGY)-WIKIPEDIA LEARNING PERFORMANCE IN RELATION TO COGNITIVE STYLES, LEARNING STYLES, AND SCIENCE ABILITY OF STUDENTS: A HIERARCHICAL MULTIPLE REGRESSION ANALYSIS

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Abstract: The present study assessed the effect of independent variables (*i.e.* cognitive style, science ability, learning styles, Wikipedia) on dependent variable (*i.e. learning performance*) in relationship with the independent variables (*i.e. cognitive styles, science ability, & learning styles*). For that purpose, the researchers randomly selected two English medium secondary schools in Silchar Town. Similarly, out of more than twenty-five secondary schools having five thousand students, the researcher randomly selected 10 students and assigned five students to the control group and five students to the experimental group to conduct the experiment. Non-Equivalent Pretest-Posttest Quasi Experimental Design based on Regression Analysis used and assessed the effect of independent variables. It was found that Learners' cognitive styles (e.g., extraversion, sensing, thinking and judging) were hierarchical significant relationship with Wikipedia learning performance, but learners' feeling has no significant relationship with Wikipedia learning performance.

Key words: Cell; Cognitive Styles; Learning Styles; Science Ability**;** Wikipedia Learning

Introduction

In this 1st century, classroom teaching learning process is some extent digitalized and teachers are regulating the classes with internet and other virtual Medias. The traditional classes are teacher active where teacher are the sole authority to regulate the classes but teacher sometimes neglect the students' self- reading habits, attitude, learning styles and cognitive style those are directly or indirectly influence the leaning performance. Researchers found that cognitive styles directly influence the achievement (e.g. Altun & Cakan, 2006). Researchers like Bassey, et al (1986) and Carolina, et al (2012) found that cognitive styles influence the academic achievement of university and secondary school students. Similarly, learning ability also a factor promotes achievement (Lund and Smordal

2006). Learners' science ability is the important factor encourages the learners' to learn science. Researchers like-Ayotola & Adedeji,2009 and John & Ademla, 2014 found that science ability, scientific attitude are directly related with learners' gander, age, mental ability, anxiety, self efficiency and achievement. In this virtual learning era, Wikipedia is a common and easily available learning tool to acquire more and more knowledge in the unreal classroom situation. Wikipedia is an internet facilitated online reading material helps maximum for self-reading, and high achievement. Researcher like Almekhlafi, (2006) and Wang et.al (2005) found that wave based collaborative Wikipedia learning helps maximum to the student for self-reading and group learning. Similarly, Wikipedia learning is a virtual learning medium help learner to get online learning benefit.

Cognitive style, learning style & achievement

Cognitive style is the personal feelings, emotion, and attitude towards the teaching learning process; however, cognitive styles and achievement are directly related (Kenth, 2011). Cognitive style is a personal characteristic associates with the student's profession, and selection of job (Witkin, 1973). Similarly, literature found, cognitive style is direct related with gander, academic specialization, attitude towards reading and academic performance (Ahmadzade & Shojae, 2013; Rao, 2014; Sharma, 2013). First, the term cognitive style was traditionally used more with respect to this line of research than to some of the other lines of research described in the following sections, in which other terminology (e.g., learning styles, personal styles) was more common. Cognitive style examines individual differences operating at the basic or early stages of information processing, including perception, concept formation, sorting, and categorization. Cognitive style or "thinking style" is a term used in cognitive psychology to describe the way individuals think, perceive, and remember information. Cognitive style differs from cognitive ability (or level), the latter being measured by aptitude tests or so-called intelligence tests. Goldstein and Blackman define it as "a hypothetical construct that has been developed to explain the process of mediation between stimuli and responses. The term cognitive style refers to characteristic ways in which individuals conceptually organize the environment. Some postulate that cognitive style is a bridge between cognition/intelligence measures and personality measures and it is multiple in nature, having an "either or" measure, where the absence of one characteristic implies the presence of its extreme (Ridding & Cheema, 1991). This is in opposition to personality measures that are more multifaceted (Sternberg & Grigorenko, 1997). Learning style is also sometimes synonymous with cognitive style (Pask, 1976) while others disagree stating that learning style is a preferred strategy, thereby implying that a person can change learning style, while cognitive style is an immutable characteristic of personality (Roberts & Newton, 2001).

Science ability and achievement

Science ability is the effort to learn science or having positive attention towards the science. Literature found that scientific attitude could influence science achievement of senior secondary school students (John & Ademla 2014). Achievement of students could be predicted through science ability (Finn et.al 2014).

Concept of Wikipedia and its educational applications

Wikipedia is online software needs log in for edition and deletion of content regarding the teaching learning process. Wiki is a collaborative workspace in which information can be gathered, shared, evaluated, organized or used to produce something new. Wikipedia is a multilingual, web-based, free-content encyclopaedia supported by the Wikimedia foundation and based on a model of openly editable content. The name 'Wikipedia" is a portmanteau of the words Wiki (a technology for creating collaborative websites, from the Hawaiian word wiki, meaning " quick") and encyclopaedia. Wikipedia's articles provide links designed to guide the user to related pages with additional information. Largely anonymous volunteers who write without pay write Wikipedia collaboratively. Wiki is a piece of sever software that allows users to freely create and edit web page content using any web browser. It supports hyperlinks and has simple text syntax for creating new pages on the fly. It is a fully editable website whose content can be edited by anyone who has access to it. Wiki is a great tool to use in education because of its numerous features.

Wikipedia has following educational implication

- It is software, contents programmers those use for self-learning.
- Wikipedia is incomplete self-reading tool needs regular clarification, addition, deletion by experts.
- Most of the Wiki hosting platforms are free.
- It does not require HTML or other programming languages.
- Anyone can access as well as manage with an Internet connection.
- Wiki is collaborative platform for students and educators involved in a learning process.

Significance of the study

In the recent study, cognitive styles, learning styles and science abilities are the independent variables whereas achievement is a dependent variable. Similarly, Wikipedia learning was the virtual learning tool or instructional model become an independent variables. Achievement depends on learner's cognitive style, learning styles and science ability, and methods of instruction. Almekhlafi (2006) found computer assisted learning improved English performance among pre-school students. Similarly, Wang, et al (2005) & Lund (2006) found collaborative technology based wiki learning technology is naturally beneficial for learning. In fact, it was found that technology rich collaborative environment and application of media wiki recently helpful to the learners. Ganapathy et al, 2006 assessed that collaborative wiki technology based learning and found it has significant relationship with learning performance or achievement. Xiao & Lucking (2008) found students were satisfied with Wikipedia environment. Similarly, Azher et al (2014) found internet addiction and anxiety among students have positive relationship. Sahin et al. (2010) used internet in University classes and found student have positive attitude and increased achievement rate over traditional learning. Al-Salameh (2011) studied the future of e-education and found that technology in education increased the students' knowledge intact capacity. However, cognitive style directly related with students' achievement (Altun and Cakan ,2006). A path analysis revealed that learning strategies were significantly contributed to academic achievement (Carolina et al., 2012). In fact, cognitive style, secondary school students' attitude and academic achievement in Chemistry were co-related (Bassey et al,1986). Witkin (1973) studied the role of field dependent and academic achievement found that cognitive style was highly related with academic achievement. Similarly, Science ability was directly related with science learning and students' achievement. John & Ademla (2014) found Science attitude and Science Achievement are dependent. Narmadha and Chamundeswari (2013) found science ability and attitude are related with science achievement.

From the above discussion, it was very difficult to determine whether cognitive style is related with Wikipedia learning performance or not. If so, then how cognitive style is related with Wikipedia learning performance. Based on literatures availability, the results are unclear, and therefore, it is essential to investigate its significance. That is why the present study is undertaken.

Research questions

Is it possible to assess, learners' cognitive style, and science ability, if possible, then how these cognitive style and science ability affect the learning performance? Whether virtual learning environment, and its learning performance of student affected by the cognitive style and science affect the Wikipedia learning of performance of secondary school student.

Objectives

1. To study the effect of Wikipedia learning over traditional approach.
2 To study the hierarchical relationship between cognitive styles and learning performance of traditional group students.
3: To study the hierarchical relationship among science ability, learning style and traditional learning performance of students
4 To study the hierarchical relationship between cognitive style and Wikipedia learning performance of students.
5 To study the hierarchical relationship among science ability, learning style and Wikipedia learning performance.

Hypotheses

H1: There is a significant effect of Wikipedia learning over traditional approach.

H2 There is a significant hierarchical relationship between cognitive Styles and learning performance of traditional group students.
H3: There is significant hierarchical relationship among science ability, learning style and traditional learning performance of students
H4 There is a significant hierarchical relationship between cognitive style and Wikipedia learning performance of students.
H5 There is a significant hierarchical relationship among science ability, learning style and Wikipedia learning performance.

Methodology

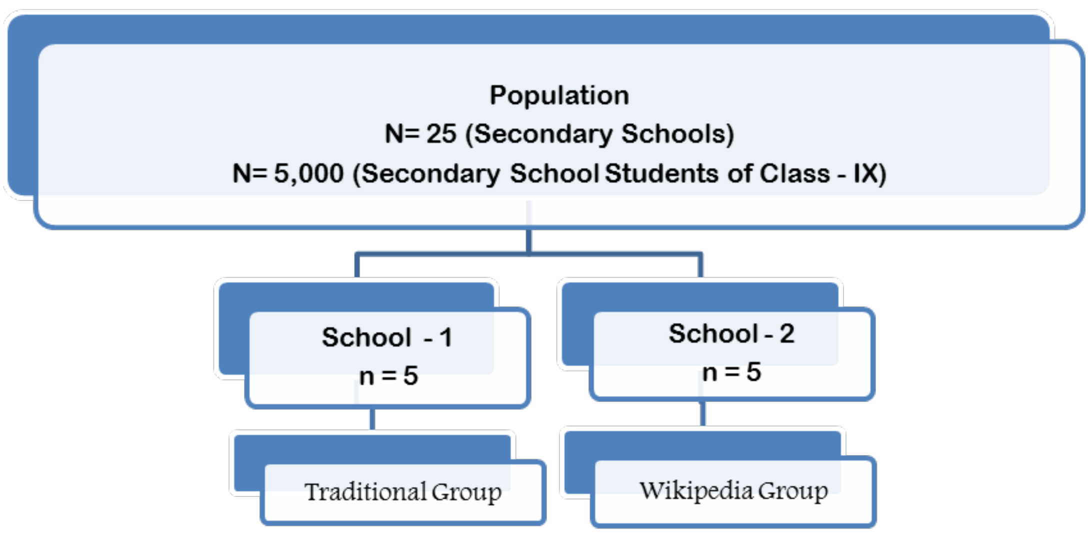
Population

The population of the present study involves all the secondary schools of Silchar Town and all the secondary students studying in class IX.

Sample

The present study assessed the effect of independent variables (*i.e.* cognitive style, science ability, learning styles, Wikipedia, and you tube) on dependent variable (*i.e. learning performance*) in relationship with the independent variables (*i.e. cognitive styles, science ability, & learning styles*). For that purpose, the researchers randomly selected three English medium secondary schools of Silchar Town. Similarly, out of more than twenty-five secondary schools having five thousand students, the researcher randomly selected 10 students and assigned five students for the control group and 5 students for the experimental group to conduct the experiment. The population and sample design is shown in Figure No- 1.1

Figure-1.1 population and sample design



Design of the study

The present study was a ***Non-Equivalent Pretest-Posttest Quasi Experimental Design*** based on ***Regression Analysis*** assessed the effect of independent variables. The participants were randomly selected, and assigned to the control and experimental classes. A pre-test was administered to both the control and experimental group participants to know their previous knowledge and understanding on "cell". Control group was taught through traditional approach and experimental group was exposed to Wikipedia reading on "cell". During the Cell Pre-test, a Learning Style Inventory, a Science Ability Test and a Cognitive Style Questionnaire was administered to evaluate the previous knowledge, their selection learning style, ability to learn science and different cognitive styles among the participants. However, Learning Style Inventory identified participants' styles of learning. During the Wikipedia reading, the researcher facilitated the learner how to link and read the concepts to frame the propositions. In this research, achievement was the dependent variable whereas cognitive style, science ability, learning style and Wikipedia was independent variable. The researchers have tried to control the extraneous variable such as testing, maturation, regression effect through statistical techniques and random sample techniques. The overall design of the study is shown in the Box 1.

Box 1 Design of the study

Sl. no	Group	Pre Intervention Test	Treatment	Post Intervention test
1	Traditional(n=5)	Achievement Test Cognitive Style Questionnaire Science Ability Test Learning Style Inventory	Traditional	Achievement Test
2	Wikipedia (n=5)	Achievement Test Cognitive Style Questionnaire Science Ability Test Learning Style Inventory	Online Wikipedia	Achievement Test

Tools

In the present study, the researcher has used four tools, which were self-developed and standardized.

Cell Test

Cell test was an achievement test developed by following the steps of standardization of the tool. At the planning and preparation stage of the test, 30 items were prepared by using table of specification. A group of experts of life science, education and measurement and evaluation reviewed the items and finally 15 multiple choice type items were accepted through primary, secondary are final tryout. The content validity ratio was (CVR=.60) and Cronbach α reliability test found .75. To access the students' previous knowledge, and understanding on CELL, this test was administered as a pre-test and post test. The test contains 15 items having a correct answer and two powerful destructors.

Science Ability Test

Science ability test was a self-developed tool having 10 statement form items. It is a Likert type test having 5 responses, like strongly agree (SA), agree (A), undecided (UN), disagree (D), strongly disagree (SD) like options. All the items were based on individual's thinking, belief, analogy, skill and practice of science. During the development of the tool, the research has followed the standardized procedure of Likert test. The average content validity ratio (CVR=.60) and Split- Half reliability co-efficient was 0.75.To assess the students' science ability, the researcher has administer the test as a pre-test. One's the tools were administer before instruction to access the relationship between science ability and effect of Wikipedia and YouTube learning over traditional approach.

Cognitive Style Questionnaires

The researcher developed the cognitive style questionnaire by following all the standardized steps. The test was set of question, design to access, individual cognitive style. They are 30 items in the tool and each has two responses but both responses have two rates by the individual out of 5 points. The items are total 8 categories, such as extraversion (2b+ 5b+8a+15a+19a+20b), introversion(2a+5a+8b+15b+11a+12B+17b+25a+29a+30b), intuitive

(4a+9b+11b+12a+17a+25b+29b+30a), thinking (1b+7b+13b+16a+22b+24a+26b+27b), feeling (1a+7a+13a+16b+22a+24b+26a+27a), Judging (3a+6b+10a+14b+18a+20b+23a), perceiving (3b=6a+10b=14a+18b+20a+23b). If 1 is more than 4 point larger than other ,i.e., a type of cognitive style for example if an individual score 25 on extroversion and 15 on introversion then these individuals are extrovert. Similarly, if the scores are less than 5 points apart then the individual are in between extrovert and introvert. The content valid ratio was found (CVR 0.60) and KR^{20} Reliability found 0.70.

Learning Style Inventory

A self-developed learning style questionnaire was developed having 24 items and three options each (i.e. often, sometimes and seldom). The researcher has identified four basic learning styles among the students. These are deep learning styles, surface learning styles, strategic learning styles, and apathetic learning styles. Factor Analysis Technique used during the preparation of the items. The content valid ratio was found (CVR 0.62) and Split half Reliability found 0.72.

Procedure of experiment

The procedure of experiment has 4 basic components, such as

i. Participants for the 2 groups (i.e., Traditional group, and Wiki group).
ii. Activities for each group.
iii. Administration of cognitive style and science ability test.

For the present study, the researcher has randomly selected a school from the population for the experiment. Out f three sections of 9th class of that school, the researcher has assign the section A five students for traditional learning, and five students for Wikipedia learning from section B. Those participants where willingly attended the course.

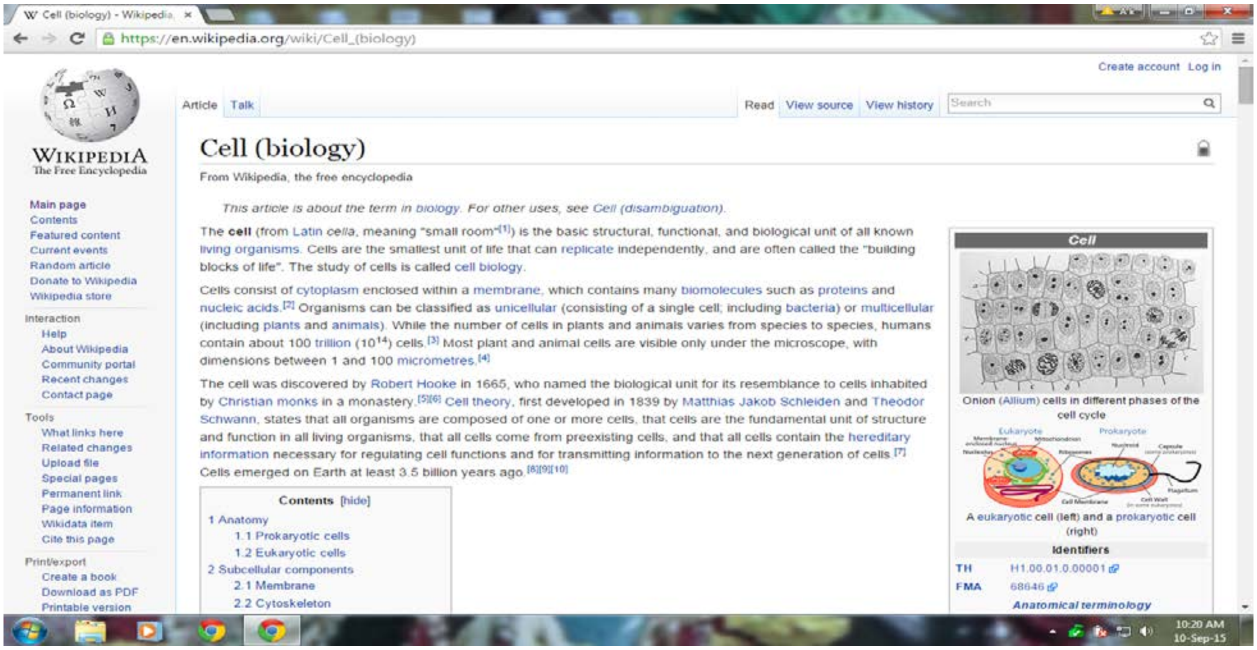
Activity I

A traditional group having 5 students learn Cell Concept, structure & function of cell, component of the cell of cell organelles through the traditional lecture method. The researcher has pre-planned all the teaching points and completed these within 7 contact hours. Before these instructions, cognitive styles, learning styles and science ability questionnaire were administered among the students.

Activity II How to read Wikipedia

School 2 was assigned Wikipedia learning to five students. The learners used cell (Biology) Wikipedia through online (https://en.wikipedia.org/wiki/Cell_(biology). Students searched and read the concepts like cell structure and functions of the cell organs through online Wikipedia (*see* figure 1). For that purpose, the researcher facilitated them and helped the students to operate Wikipedia, and trained how to enter different concept in search engines to find these in the Wikipedia. However, learners used their self-pace in reading. They himself and herself read and prepared their learning note for long retention.

Fig-1 cell biology Wikipedia page



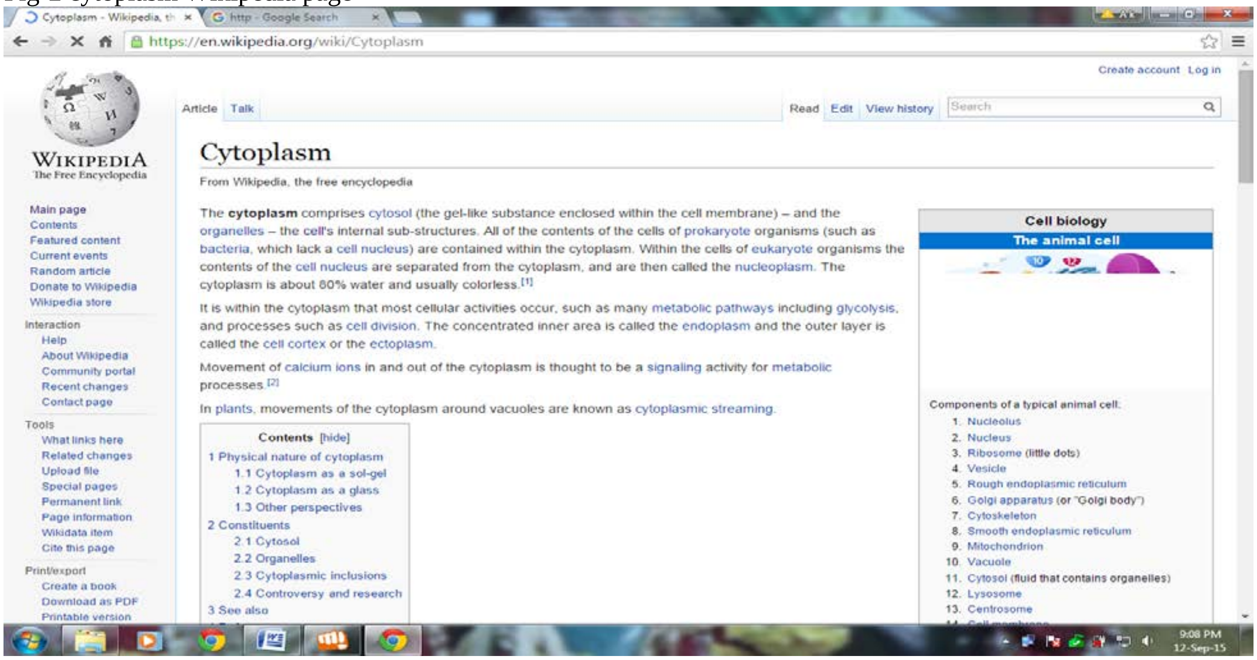
Stage1 Read "Cell" concept in Wikipedia and identify other linked concepts

In the first page of the cell Wikipedia, students found different linked concepts like; living organisms; replicate cell biology; cytoplasm membrane; biomolecules proteins; nucleic acids; unicellular bacteria; multicellular plants animals; Robert Hooke Cell theory; Matthias Jakob Schleiden and Theodor Schwann, and hereditary information which were hyperlinked to search and read more information in their respected web address.

Stage1I Read more by clicking the hyperlinks

To get more information regarding linked concepts, students went through the hyperlinks those were mentioned in the primary cell Wikipedia page. These were :https:// en.wikipedia .org/ wiki/living;https://en.wikipedia.org/wiki/organism;https://en.wikipedia.org/wiki/biology;https://en.wikipedia.org/wiki/replication;https://en.wikipedia.org/wiki/cytoplasm;https://en.wikipedia.org/wiki/membren;https://en.wikipedia.org/wiki/biomolecules;https://en.wikipedia.org/wiki/protein;https://en.wikipedia.org/wiki/nucleicacids;https://en.wikipedia.org/wiki/unicellular;https://en.wikipedia.org/wiki/bacteria;https://en.wikipedia.org/wiki/multicellular;https://en.wikipedia.org/wiki/Robert_Hooke (see figure 2).

Fig-2 cytoplasm Wikipedia page



The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web. Hypertext is structured text that uses logical links (hyperlinks) between nodes containing text. Different authors develop the contents linked to the hyperlinks but learners read at a time more than related contents by clicking in the hyperlinks.

Stage III Collaborative discussion

Learner collaborately discussed with each other and in the mean time, researchers helped and clarified researchers all arguments through examples. However, the researchers experienced learners feeling and understanding regarding the existence of cell, types of cell, compositions and functions of cell. Students drawn the labelled diagrams of ultra structure of cell and diagrams of cell organelles, and shared these among the peers for modification or addition or deletion of error concepts. Later these diagrams generalized among the students.

Activity II Administration of Questionnaires

Before instruction, cell test was administered as a pre-test and after instruction, the same cell test was administered as post -test. Moreover, cognitive style and science ability questionnaires were administered among the students to assess the students' deep learning styles, surface learning styles, strategic learning styles, and apathetic learning styles.

Procedure of data collection

Ten students were interested and showed their willingness to attend the traditional and virtual learning instruction. Out of them, five student of school 1, and 5student of school 2 were assigned traditional learning and

Wikipedia learning respectively. Before instruction, all three groups of students were assigned to response the cognitive style questionnaire, science ability questionnaire and learning style inventory, and pre-test of cell. After the collection of students' response sheets, the researcher administered that teaching strategies and activities in three sections. After instruction, the researcher again administers the cell test to collect the post instructional achievement as the data for study. As a whole, the researcher has collected cognitive style questionnaire dada, science ability data and pre-test, post-test data for scoring, analysis and interpretation.

1.10.0 Analysis and results

1.10.1 Hypothesis 1: There is a significant effect of Wikipedia learning over traditional approach.

Table 1.1 Mean standard deviation (SD) of pre-test, posttest of traditional approach and Wikipedia approach

		Mean	N	Std. Deviation	Std. Error Mean
Traditional Group	pretest	12.00	10	2.309	.730
	posttest	14.40	10	2.459	.777
Wikipedia Group	pretest	13.60	10	1.578	.499
	posttest	27.20	10	3.676	1.162

Table 1.2 Mean SD and t of pre-test, posttest of traditional approach and Wikipedia approach

	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed
Traditional Group pretest - posttest	-2.400	2.066	.653	-3.674	9	.005
Wikipedia Group pretest - posttest	-13.600	3.373	1.067	-12.750	9	.000
Traditional Group posttest – Wkipedia Group posttest	-12.800	5.432	1.718	-7.451	9	.000

With reference to table 1.1 the descriptive analysis resulted that the tradition group mean, pre-test mean (12 ± 2.309) is lower than the post test mean (14.40 ± 2.459) similarly, the Wikipedia pre-test mean (13.60± 1.578) which is also lower post test mean (27.20± 3.676). It is resulted that the Wikipedia post-test mean was higher than traditional learning. The t-value of pre-test and post of traditional group (t_9 3.674 $p \leq .05$) was significant and Wikipedia grouped pre-test, post-test, t value (t_9 12.750 $P < .05$). Therefore, the posttest was significantly, better than the pre test mean of traditional, and Wikipedia learning. Similarly, the t value of post test of traditional and Wikipedia group (t_9 7.451 $P < .05$) where Wikipedia group is significantly better than the traditional group performance (see table 1.2).

1.10.2 Hypothesis 2 (a) There is a significant hierarchical relationship between cognitive Styles and learning performance of traditional group students.

Table 2.1 hierarchical regression analysis between cognitive Styles and learning performance of traditional group students

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.910[a]	.828	.807	1.080	.828	38.629	1	8	.000
2	.963[b]	.926	.905	.756	.098	9.333	1	7	.018
3	1.000[c]	1.000	1.000	.000	.074	.	1	6	.

a. Predictors: (Constant), Extraversion b. Predictors: (Constant), Extraversion, Sensing

Table 2.2 ANOVA of cognitive Styles and learning performance of traditional group students

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	45.067	1	45.067	38.629	.000a
	Residual	9.333	8	1.167		
	Total	54.400	9			
2	Regression	50.400	2	25.200	44.100	.000b
	Residual	4.000	7	.571		
	Total	54.400	9			
3	Regression	54.400	3	18.133	.	.c
	Residual	.000	6	.000		
	Total	54.400	9			

a. Predictors: (Constant), Extraversion
b. Predictors: (Constant), Extraversion, Sensing
c. Predictors: (Constant), Extraversion, Sensing, Thinking
d. Dependent Variable: Traditional learning performance

Table 2.3 Unstandardized Coefficients[a] of cognitive Styles and learning performance of traditional group students

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.333	1.034		8.058	.000
	Extraversion	.619	.100	.910	6.215	.000
2	(Constant)	3.000	1.890		1.587	.156
	Extraversion	.714	.076	1.050	9.354	.000
	Sensing	.250	.082	.343	3.055	.018
3	(Constant)	4.000	.000		.	.
	Extraversion	.857	.000	1.260	.	.
	Sensing	.250	.000	.343	.	.
	Thinking	-.250	.000	-.343	.	.

a. Dependent Variable: Traditional learning performance

The regression of traditional performance on the basic model (R= .910 R^2=.828) and adjusted (R^2= .807 P<.05) revealed significant positive relationship with extraversion (ß= .619 P<.05) The value (dß 1/8 38.629 P< .05) the regression of sensing (R= 0.963 R^2= 0.926 and adjusted R^2= 0.905 P<.o5) found significant relationship as with traditional performance (ß= 0.250 P<.05). The F value (df 2/7 44.10 P< .05) is a significant relationship with traditional learning (*see* table 2.1, 2.2 & 2.3).

1.10.3 Hypothesis 3: There is significant hierarchical relationship among science ability, learning style and traditional learning performance of students.

Table 3.1 hierarchical regression analysis among science ability, learning style and traditional learning performance of students.

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.765[a]	.585	.533	1.680	.585	11.267	1	8	.010
2	.773[b]	.597	.482	1.770	.012	.210	1	7	.661

a. Predictors: (Constant), Science_ability

b. Predictors: (Constant), Science_ability, Learning_style

3.2 ANOVA[c] among science ability, learning style and traditional learning performance of students.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.812	1	31.812	11.267	.010[a]
	Residual	22.588	8	2.824		
	Total	54.400	9			
2	Regression	32.470	2	16.235	5.182	.042[b]
	Residual	21.930	7	3.133		
	Total	54.400	9			

a. Predictors: (Constant), Science_ability

b. Predictors: (Constant), Science_ability, Learning_style

c. Dependent Variable: Traditional learning performance

Table 3.3 Unstandardized Coefficients[a] among science ability, learning style and traditional learning performance of students.

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	-22.000	10.857		-2.026	.077
	Science_ability	1.529	.456	.765	3.357	.010
2	(Constant)	-18.503	13.747		-1.346	.220
	Science_ability	1.636	.534	.818	3.066	.018
	Learning_style	-.280	.610	-.122	-.458	.661

a. Dependent Variable: Traditional learning performance

The regression model of basic model ($R= 0.765$ $R^2=0.85$ & adjusted $R^2 = 0.533$ $P< .05$) is significant relationship with traditional learning performance where ($ß= 1.29$ $P<.05$). The F value (df 1/8 11.267 $P<.05$) whereas the learning style ($R=0.773$ $R^2=0.597$ & adjusted $R^2 =0.482$ $P<.05$) is not significant ($ß= 0.280$ $P>.05$). So, Science ability has significant relationship with traditional learning performance over learning style of the student(*see* table 3.1,3.2 & 3.3).

1.10.4 Hypothesis 4 There is a significant hierarchical relationship between cognitive style and Wikipedia learning performance of students.

Table 4.1 Hierarchical regression analysis between cognitive style and Wikipedia learning performance of students.

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.749[a]	.561	.507	2.582	.561	10.240	1	8	.013
2	.980[b]	.961	.949	.827	.399	70.946	1	7	.000
3	.991[c]	.982	.973	.606	.021	7.059	1	6	.038
4	.993[d]	.985	.974	.594	.004	1.228	1	5	.318
5	.998[e]	.996	.990	.362	.010	9.453	1	4	.037

a. Predictors: (Constant), Extraversion
b. Predictors: (Constant), Extraversion, Sensing
c. Predictors: (Constant), Extraversion, Sensing, Thinking
d. Predictors: (Constant), Extraversion, Sensing, Thinking, Feeling
e. Predictors: (Constant), Extraversion, Sensing, Thinking, Feeling, Judging

4.2ANOVA[f] between cognitive style and Wikipedia learning performance of students.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68.267	1	68.267	10.240	.013[a]
	Residual	53.333	8	6.667		
	Total	121.600	9			
2	Regression	116.810	2	58.405	85.358	.000[b]
	Residual	4.790	7	.684		
	Total	121.600	9			
3	Regression	119.399	3	39.800	108.517	.000[c]
	Residual	2.201	6	.367		
	Total	121.600	9			
4	Regression	119.833	4	29.958	84.786	.000[d]
	Residual	1.767	5	.353		
	Total	121.600	9			
5	Regression	121.075	5	24.215	184.392	.000[e]
	Residual	.525	4	.131		
	Total	121.600	9			

a. Predictors: (Constant), Extraversion
b. Predictors: (Constant), Extraversion, Sensing

c. Predictors: (Constant), Extraversion, Sensing, Thinking
d. Predictors: (Constant), Extraversion, Sensing, Thinking, Feeling
e. Predictors: (Constant), Extraversion, Sensing, Thinking, Feeling, Judging
f. Dependent Variable: Wikipedia_learning_performance

Table 4.3 Unstandardized Coefficients[a] between cognitive style and Wikipedia learning performance of students.

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	8.000	6.055		1.321	.223
	Extraversion	.762	.238	.749	3.200	.013
2	(Constant)	-5.107	2.487		-2.053	.079
	Extraversion	.276	.096	.272	2.892	.023
	Sensing	.971	.115	.792	8.423	.000
3	(Constant)	.983	2.927		.336	.749
	Extraversion	.301	.071	.296	4.261	.005
	Sensing	1.004	.085	.819	11.771	.000
	Thinking	-.344	.130	-.153	-2.657	.038
4	(Constant)	-.229	3.074		-.075	.943
	Extraversion	.290	.070	.286	4.154	.009
	Sensing	.976	.088	.796	11.151	.000
	Thinking	-.310	.131	-.138	-2.367	.064
	Feeling	.085	.077	.067	1.108	.318
5	(Constant)	1.208	1.932		.626	.566
	Extraversion	.344	.046	.339	7.472	.002
	Sensing	.983	.053	.801	18.398	.000
	Thinking	-.327	.080	-.145	-4.090	.015
	Feeling	.083	.047	.065	1.769	.152
	Judging	-.106	.035	-.115	-3.075	.037

a. Dependent Variable: Wikipedia_learning_performance

Table 4.1, Table 4.2 &Table 4.3 Hierarchical extraversion, sensing, thinking and judging regressed the Wikipedia learning performance. The model Extraversion (R= 0.747 R^2 =0.561 & adjusted R^2 =0.507 P<.05) is a significant (ß= 0.762 P<.05), where the (F value 10.240 p<.05).Similarly, the Model Sensing (R=0.980 R^2 =0.961 & adjusted R^2 = 0.949 P<.05) is a significant where (ß =0.971 & F=85.358 P<.05) was significant. Similarly, Thinking and judging model hierarchical regressed with the Wikipedia model. Thinking model (R=0.991 R^2= 0.982 & adjusted R^2=0.973 P<.05) was significant where (ß=0.344 & F value = 108.517 P<.05) was significant and Judging model (R=0.998 R^2 =0.996 & adjusted R^2 =0.990 P<.05) is significant where (ß =0.108 P<.05 & F= 184.392 P<.05) was significant relationship with Wikipedia learning but not significant with Feeling (R=0.993 R^2=0.985 & adjusted R^2 = 0.974 P>.05). It resulted that Extraversion, Sensing, Thinking, and Judging model are regressed with Wikipedia learning performance but not Feeling.

Hypothesis 5: There is a significant hierarchical relationship among science ability, learning style and Wikipedia learning performance.

Table 5.1 hierarchical regression analysis among science ability, learning style and Wikipedia learning performance

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.634[a]	.402	.327	3.016	.402	5.368	1	8	.049
2	.899[b]	.808	.753	1.826	.407	14.828	1	7	.006

a. Predictors: (Constant), Science_ability

b. Predictors: (Constant), Science_ability, Learning_style

Table 5.2 ANOVA[c] among science ability, learning style and Wikipedia learning performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.831	1	48.831	5.368	.049[a]
	Residual	72.769	8	9.096		
	Total	121.600	9			
2	Regression	98.263	2	49.132	14.737	.003[b]
	Residual	23.337	7	3.334		
	Total	121.600	9			

a. Predictors: (Constant), Science_ability

b. Predictors: (Constant), Science_ability, Learning_style

c. Dependent Variable: Wikipedia_learning_performance

Table 5.3 Unstandardized Coefficients[a] among science ability, learning style and Wikipedia learning performance

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	3.846	10.125		.380	.714
	Science_ability	.885	.382	.634	2.317	.049
2	(Constant)	15.674	6.856		2.286	.056
	Science_ability	1.284	.253	.920	5.068	.001
	Learning_style	-1.022	.265	-.699	-3.851	.006

a. Dependent Variable: Wikipedia_learning_performance

Table 5.1, Table 5.2 & Table 5.3 The regression model of Wikipedia leaning performance (R=0.634 R^2=0.402 and adjusted R^2 =0.327 P<.05) found significant positive relationship with science ability (ß =0.885 P<.05) and (F =0.5368 P<.05) was significant. But the learning Style model (R=0.899 R^2 =0.808 & adjusted R^2 =.0753 P<.05) was not significant (ß= -1.022 P>.05) .The F value 14.737 was significant. Hence, Science ability has significant relationship with Wikipedia learning performance but not learning style.

Findings

In the present study, hypothesis 1 assessed the significant effect of Wikipedia learning over traditional approach and it was found, both Wikipedia learning performance was better over traditional learning performance. The Wikipedia learning performance of students (m=27.20±3.676) was better over traditional learning performance (m=14.20±2.459). However, there was a significant difference found in between traditional learning and Wikipedia learning performance of secondary school student. Hypothesis 2 (a): tested the hierarchical relationship between cognitive Styles and learning performance of traditional group students and found that extraversion and sensing (Cognitive styles) has the significant relationship with traditional performance. Similarly, Science ability has significant relationship with traditional learning performance but not student learning style. In the testing of Hypothesis 3(a): (e.g. there is a significant hierarchical relationship between cognitive style and Wikipedia learning performance of students) it was found learners' cognitive styles (e.g., extraversion, sensing, thinking and judging) has hierarchically significant relationship with Wikipedia learning performance but feeling has no significant relationship with Wikipedia learning performance. However, science abilities and learning styles of student are hierarchically significant relationship with Wikipedia learning style.

Discussion

Cognitive styles and science ability affect the learning performance of the student (Jena,2014). It is resulted that Wikipedia learning performance was better over traditional approach. This result was supported by (Almekhlafi, 2006; Lund 2006, and Wang, 2005). In fact, Wikipedia learning was a self learning media has a significance effect over traditional approach (Ganapathy, Shaw and Kim, 2006) was supported by (Altun& Cakan 2006). Similarly, the study found science ability has a significant relationship with traditional learning performance, and this result was supported by (John & Ademla,2004). Nevertheless, cognitive styles (e.g. Extraversion, Sensing, Thinking & Judging) as the significance relationship with Wikipedia learning performance and this result was supported by (Carolina,2012: Bassey et.al,1986). In the presence study, it was resulted that the science ability and learning style has the significance relationship with Wikipedia learning performance and (Greenberg & Zanetis, 2012) supported this result. This result was supported by (Susan et. al, 1986). Finally, the presence study found that there was a hierarchical relationship among science ability and learning performance and this resulted was supported by (Cayari, 2011).

Conclusion

It was concluded that there is existed a significance effect Wikipedia learning over the traditional approach. Other researchers earlier supported this result and they argued that Wikipedia learning is the real and virtual learning medium to acquire knowledge significance relationship with traditional performance. Cognitive style is the independent variable found significant relationship with the dependent variable, the traditional learning performance. The traditional learning performance also hierarchical learning performance also hierarchically related with science ability and learning styles. In the presence study, science ability is a highly related with the traditional performance, rather learning style is not related with learning style. In the presence study, Wikipedia strategy was used. The cognitive style of learners was related with the Wikipedia learning performance. Out of 8 types of cognitive style (Extraversion, Sensing, Thinking and Judging) has the significance relationship with Wikipedia learning performance. Similarly, both science ability and learning style has the significance relationship with Wikipedia learning performance. Wikipedia is a virtual learning more where learners used the virtual learning instruction according to their cognitive styles. In the presence study the researcher has used Wikipedia learning, learning and Traditional approach to teach 'CELL'. It was resulted that Wikipedia learning performance.

Educational implication

1. Wikipedia, online animation, online flash model, online HTML, PDF files are the source of knowledge, the student can used in their learning processes.
2. Teacher should used virtual learning instruction during instruction he/ she should motivate the learners to learn through this virtual learning model.
3. Wikipedia learning needs internet, so, teacher should used to know internet and aware the learners to take the help of virtual learning mood during their knowledge acquisition.
4. Wikipedia is the virtual learning moods. Wikipedia provides static or stable pictures, note, or text for the learners. However, Wikipedia provides the dynamic concept that can clarify the doubt and misconception of students.

Recommendation

1. The researcher has used Wikipedia learning mood over the traditional approach. However, other researchers or world of researchers may used online animation and online flash model over the traditional approach.
2. The researcher recommended the world of researcher to study the relationship among intelligence, attitude and virtual learning performance of students.
3. It needs to investigate learner's aptitude performance and skill during the curriculum transaction through Wikipedia learning.
4. The effect of gender, age, skill. Basic computer knowledge on the Wikipedia learning performance.
5. The researcher has encouraged her world of colleagues to conduct experiment on virtual learning environment and learner academic performance.

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References

Ahmadzade, L &Shojae, M. (2013). Investigating the relationship between cognitive style (filed dependence/independence) and academic achievement in male and female students of Behbahan Islamicazad University. Journal of Life Science and Biomedicine, 3 (3), 245-249.

Almekhlafi, A.G. (2006). The Effect of Computer Assisted Language Learning (CALL) on United Arab Emirates English as a Foreign Language (EFL) School Students' Achievement and Attitude. Journal of Interactive Learning Research, 17(2), 121-142.

Al-Salameh, E.M.(2011). A Study of Al-Balqa' Applied University Students Cognitive Style. International Education Studies, Published by Canadian Centre of Science and Education. 4(3), 189-193.

Altun. A.and Cakan. M. (2006).Undergraduate students' Academic achievement, field dependent/independent cognitive styles and attitude toward computers. Educational technology & society, 9 (1), 289-297.

Ayotola, A. & Adedeji, T. (2009).The relationship between gender, age, mental ability, anxiety, mathematics self-efficacy and achievement in mathematics. Cypriot journal of educational sciences, 113-124.

Azher,M.,Khan,R.B., Salim,M., Bilal,M., Hussain,A., Haseeb,M. (2014). The Relationship between Internet Addiction and Anxiety among students of University of Sargodha, International Journal of Humanities and Social Science. 4(1), 288.

Bassey. S. W., Umoren.G.Udida. L. A. (1986).Cognitive styles, secondary school students' attitude and academic performance in chemistry in Akwaibom state – Nigeria.

Carolina. T., Sônia. M. L., Margarete. A., Ferraces.M. J., and Páramo, M. F. (2012).The influence of the cognitive style called field dependence-independence on academic achievement of Brazilian university students was explored as well as the mediating effect of learning strategies on that influence. Porto Alegre,25(1),16-24.

Cayari, C. (2011). The YouTube effect: How YouTube has provided new ways to consume, create, and share music. International Journal of Education & the Arts, USA, 12(6).23-45.

Finn,A.S., Matthew A. Kraft, M.A., West, M.R., Leonard, J.A., Crystal E. Bish,C.E., Martin,R.E., Sheridan, M.A., Gabrieli,C.F.O., and John D. E. Gabrieli, J.D.E.(2014). Cognitive Skills, Student Achievement Tests, and Schools. Psychol Sci. Learning, 25(3), 736–744.

Ganapathy ,C.,Kang, J.H., Shaw, E., Kim, J.(2006). Classification Techniques for Assessing Student Collaboration in Shared Wiki Spaces**,** International Conference on Educational Data Mining, Lecture. 6737, 456-458.

Greenberg, A.D & Zanetis, J.(2012).The Impact of Broadcast and Streaming Video in Education, Portion Cisco Systems Inc. and portion Wainhouse Research, LLC, 3-41.

Jena,A.K.(2014). Animation model to conceptualize ATP generation: a mitochondrial oxidative phosphorylation. European Journal of Science and Mathematics Education, 3(1), 61-76.

John, O.K., &Ademla, O.R. (2014). Scientific Attitude, Attitude to Science and Science Achievement of Senior Secondary School Students in Katsina State, Nigeria . Journal of Educational and Social Research, MCSER Publishing, Rome-Italy, 4(1),445-452.

Kenth, B. (2011**)**. Difference in the cognitive styles and learning skills due to gender and area-wise differences**.** Journal of Educational Studies, Trends & Practice, 11(2),34-56.

Lund,A & Smordal,O.(2006). Is there a space for the teacher in a wiki? Proceedings of the 2006 international symposium on Wikis, New York, USA, 37-46.

Narmadha, U. & Chamundeswari, S. (2013).Attitude towards Learning of Science and Academic Achievement in Science among Students at the Secondary Level. Journal of Sociological Research,4(2),23-34.

Pask, G. (1976) .Styles and Strategies of Learning. British Journal of Educational Psychology, 46, 128-148.

Rao, B. V. (2014). A Study of Academic Achievement in Mathematics in Relation to Cognitive Styles and Attitude Towards Mathematics. Gjra - global journal for research analysis, 3 (1), 7-8.

Ridding, R. & Cheema, I. (1991). Cognitive Styles: An Overview and Integration. Educational Psychology, 11(3/4), 193 – 216.

Roberts, M.J. & Newton, E.J. (2001). Understanding Strategy Selection. International Journal of Human-Computer Studies.54, 137 – 154.

Sahin, Y.G., Balta,S., Ercan,Y. (2010).The Use Of Internet Resources By University Students During Their Course Projects Elicitation: A Case Study, The Turkish Online Journal of Educational Technology,9 (2),234.

Sharma, N.(2013).Scientific Creativity in relation to Cognitive Style and Achievement in Science of Secondary School Students, journal for in disciplinary studies.1(6), 1354.

Sternberg, R.J. & Grigorenko, E.L. (1997). Are Cognitive Styles Still in Style? American Psychologist, 52(7), 700 – 712.

Susan Nolen-Hoeksema ,Martin E. P. Seligman Joan S. Girgus(1986). Learned Helplessness in Children: A Longitudinal Study of Depression, Achievement, and Explanatory Style. Journal of Personality and Social Psychology, 51(2),435-44.

Wang , H. C., Lu , C. H., Yang ,J.Y., Hu ,H. W., Chiou ,G.F., Chiang, Y.T.& Hsu, W.L (2005). An empirical exploration of using Wiki in English as a second language course.155-157.

Witkin, H. A.(1973). The role of cognitive style in academic performance and in teacher-student relations. New Jersey: Educational Testing Service Research Bulletin, 1973.

Xiao, Y., Lucking, R. (2008).The impact of two types of peer assessment on students' performance and satisfaction within a Wiki environment. Special Section of the AERA Education and World Wide Web Special Interest Group. 11(3-4), 186– 193.

COLLEGE STUDENTS' PERCEPTIONS OF ONLINE LEARNING: KNOWLEDGE GAIN AND COURSE EFFECTIVENESS

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Abstract: This paper reports the results of research into college students' perceptions of knowledge gain and reactions to their learning experiences in an online general education course. Statistical analyses on data from two types of questionnaires showed: (a) overall knowledge gain regardless of participants' backgrounds (age, gender, and ethnicity), which was unrelated to their instructional preference; (b) overall preference for online to in-class environment regardless of participants' backgrounds, except an age difference in rating on hypothetical in-class quizzes. Further quantitative analyses identified ease of participation and self-reflection as strengths of online delivery; these were together related to many important aspects of learning. These quantitative data were largely compatible with participants' comments. Based on these findings, future studies are suggested, and possible ways to improve online course design and delivery are discussed.

INTRODUCTION

With the rapid advancement of technology, the number of online courses and of students who take them have increased exponentially in the U.S. since 2002 (Allen & Seaman, 2013). Largely due to the availability of massive open online courses (MOOCs), Carey (2015) even predicts MOOCs and other online learning materials' takeover of American colleges and universities, except 15 to 50 of them, in his book *The End of College: Creating the Future of Learning and the University of Everywhere* (cited in Heller, 2015). Although this is unlikely in the immediate future (Heller, 2015), one of the benefits of online courses, particularly asynchronous ones, is a drastically increased accessibility to college courses for traditional and non-traditional students alike.

While measuring student learning outcomes is important in any college course, in online courses it is also important to measure students' perceptions of learning. This is because online course completion rates are low, particularly those of MOOCs, which are "generally in the single digits" (Heller, 2015). Certainly high motivation is needed to complete an online course (Dennis, Bunkowski, & Eskey, 2007), but students' perceptions of learning in an online environment can also influence their decision to complete the course, and upon completion, take additional ones. Moreover, given that those who complete MOOCs are "disproportionally well-educated men with office jobs" (Toyama, 2015), and that the college student population will be increasingly diversified in the U.S., it is also worthwhile to know whether the difference in students' backgrounds (e.g., age, gender, and ethnicity) makes any difference in their perceptions of online learning.

Previous studies on students' perceptions of online learning, however, seem to have narrow focuses in limited areas or disciplines. For example, Dixon, Dixon, and Siragusa (2007) investigated adult learners' perception of an online course in a training and development program, and Gibby (2007) examined the perception of learners of Spanish as a foreign language on different types of online interactions. The former found the adult learners' preference to work alone, and the importance of their sense of control over the learning material and environment for successful completion of the unit of study. The latter identified four important elements of effective interactions in an online foreign language course: "making regular announcements, helping learners draw connections between the interactions and their learning goals, maintaining and organizing archives and keeping response times as close to 24 hours as possible." While these are valuable findings, additional studies are necessary to answer more broad questions on perceptions of learning in an online environment as opposed to a traditional one, and their relationship to students' backgrounds if any. In addition, it would be valuable to know the relationship between perceived effectiveness of the two types of instruction and perceived knowledge gain.

Thus, the present study investigated college students' perception on knowledge gain and the efficacy of online delivery vs. hypothetical in-class delivery of an upper-division general education course offered at an urban American university. The course, which was 10-weeks long, was taken by students across disciplines who represent the diverse population of the university, and was offered asynchronously, except on the first day of instruction and the midterm and final exam days. On these three days, the class met physically for orientation and paper exams. Online activities required students to post their response to one of the discussion questions after studying each chapter of the main textbook with the instructor's notes, comment on another student's posting of his or her response, take online chapter quizzes, post a PowerPoint file to present a chapter from another textbook, comment on another student's PowerPoint file of a chapter presentation, submit a research paper to the instructor, post a PowerPoint file to present the research paper, comment on another student's PowerPoint file of his or her research paper, and submit a self-reflection of learning to the instructor at the end of the course. There was also an optional chat-room session to review the covered materials before the midterm and final exams, which was recorded for all students to use if needed.

In the present study, five research questions were asked: (a) Did the participants feel that they gained knowledge by taking the online course? (b) How did they perceive the effectiveness of online delivery of the course as opposed to a hypothetical in-class delivery of the same course? (c) Did their backgrounds make a difference in how they perceived the efficacy of the two types of instruction? (d) Was their overall perception of online learning as opposed to in-class learning related to their perceived knowledge gain? (e) Was there a positive perception on any specific aspects of the online learning experience? If so, how was it related to their backgrounds and other aspects of effective online instruction? By answering these questions with quantitative and qualitative data, this paper aims to draw a broad picture of online learning in a high-impact general education course at an urban American university.

It should be mentioned that in order to answer the first research question on perceived knowledge gain, the participants were asked to rate the level of pre-course knowledge and post-course knowledge on an anonymous questionnaire taken on the final exam day. Therefore, their pre-course knowledge was rated reflectively. According to Rockwell & Kohn (1989), compared to the traditional pretest, the reflective pretest is "more able to accurately reflect on the degree of change in knowledge or attitude" (cited in Davis, 2003), because "it is answered in the same frame of reference as the post-test" (Sevens and Lodl, 1999). When using the traditional pretest-posttest, "respondents oftentimes overestimate their level of knowledge on a particular subject" (Pratt, McGuigan, & Katzev, 2000, cited in Davis, 2003). Thus, with the retrospective pretest methodology (i.e., reflective rating of their content knowledge), the present participants were given an opportunity to more accurately assess their baseline level of content knowledge and the degree of change as a result of the course, and they provided the researcher with more meaningful data, as previously demonstrated by Davis (2003) in his study of program impact.

It should also be pointed out that the present study asked participants to comparatively rate the effectiveness of online delivery of the course and that of a hypothetical in-class delivery on another anonymous questionnaire taken on the final exam day. The rating on in-class delivery had to be hypothetical due to the impossibility of teaching the same course to the same participants in two different modes. Moreover, at the university at which this course was taught, once a curriculum with a specific mode of instruction is formally approved, that specified mode has to be used in instruction; thus, conducting in-class instruction to another group of participants from the same population was not possible, either.

METHODS

Participants

18 students in an urban university in Southern California volunteered to participate in the study. They were enrolled in an upper-division general education course entitled "Language Diversity in Urban America" delivered asynchronously on Moodle, a course management system used at the university. Six were male and 12 were female, aged 20 to 37. Eight had an Asian background, and 10 had a Hispanic background.

Materials

The materials were two types of anonymous questionnaires: one was the participants' self-assessment of the levels of content knowledge before and after taking the online course (see Appendix A); the other was their evaluation of the online delivery of the course verses a hypothetical in-class delivery of the same course (see Appendix B). Both questionnaires asked the participants to indicate their level of agreement with each statement using a six-point scale (1-strongly disagree and 6-strongly agree). As shown in Appendix A, the content knowledge questionnaire contained 16 statements, based on the content of each chapter of the main textbook used in the course (e.g., "I know roughly how many languages are spoken in the U.S."); on each statement the participants provided two ratings of their knowledge levels: one reflective rating of the knowledge before the course and another rating of the knowledge after the course. As shown in Appendix B, the course delivery questionnaire had nine statements (e.g., "I was able to interact with classmates"); on each statement they provided two ratings of their evaluations: one on the online delivery of the course, and another on a hypothetical in-class delivery of the same course. The participants were also asked to provide comments on the most and least beneficial aspects of the online course delivery, and their bio data (i.e., age, gender, and ethnicity) at the end of the questionnaire.

Procedure

Data were collected on the final exam day. Before distributing the stapled sets of questionnaires to each of the potential participants (i.e., all final exam takers in the classroom), the IRB (Institutional Research Board) briefing was orally given, including the purpose of the study (i.e., to better the instruction based on the data to be collected) and the procedure of the questionnaires (i.e., what the participants were expected to do), which were also shown in writing and projected on a large screen during the entire final exam period (150 minutes). The participants answered the questionnaires after finishing the final exam, and placed the completed questionnaires into a box located in the front of the classroom. It took them no more than 100 minutes to complete the final exam, leaving 50 minutes for data collection, which was more than sufficient for the briefing before the exam and completion of the questionnaires after the exam.

RESULTS

Students' perception of overall knowledge gain

Table 1 shows the participants' average ratings on their agreements with the 16 content knowledge statements, categorized by age, gender, and ethnicity, before (2.07) and after (5.43) the course. The data were first analyzed, using a one-way Analysis of Variance (ANOVA) for repeated measures with pre-and-post instruction as a within-subject factor. The result showed a main effect of instruction, $F(1, 17) = 234.91$, $p < .001$, indicating significant knowledge gain overall. To further investigate whether the age, gender, and ethnicity of the participants made any difference in perceived knowledge gain, correlational analyses were conducted. As seen in Table 2, age, gender, and ethnicity had no relationship with the participants' overall knowledge gain ($p > .05$).

Table 1

Average Ratings on the Content Knowledge Before and After the Course (N = 18)

	Before	After	Gain
Age			
Younger[a]	2.25	5.36	3.11
Older[b]	1.93	5.48	3.55
Gender			
Male[c]	2.45	5.36	2.91
Female[d]	1.88	5.46	3.58
Ethnicity			
Asian[e]	2.31	5.64	3.33
Hispanic[f]	1.88	5.26	3.38
GM	2.07	5.43	3.36

Note. [a]*n* = 8; [b]*n* = 10; [c]*n* = 6; [d]*n* = 12; [e]*n* = 8; [f]*n* = 10. Younger = 22 or younger. Older = 23 or older. *GM* = Grand Mean.

Table 2

Correlations of Bio Data and Overall Ratings on Knowledge Gain (N= 18)

	1	2	3	4
1. Age	1	.316	.325	.241
2. Gender		1	.316	.356
3. Ethnicity			1	.033
4. Knowledge				1

Note. Knowledge = Knowledge gain between before (reflective) and after the course.

Students' perception of the overall effectiveness of online delivery

Due to incomplete data provided by one of the 18 participants, 17 participants' average ratings on their agreements with the nine statements about the effectiveness of online (5.39) versus hypothetical in-class (4.66) delivery of the course (shown in Table 3) were analyzed, using a one-way ANOVA for repeated measures with instructional mode as a within-subject factor. The result showed a main effect of instructional mode, $F(1, 16) = 4.96$, $p < .05$, indicating the participants' overall preference for the online delivery instead of a hypothetical in-class delivery of the course.

Table 3
Average Ratings on the Effectiveness of Online vs. In-Class Delivery of the Course (N = 17)

	Online	In-class	Gap
Age			
Younger[a]	5.33	4.11	1.22
Older[b]	5.30	5.16	.14
Gender			
Male[c]	5.27	3.85	1.42
Female[d]	5.34	4.66	.68
Ethnicity			
Asian[e]	5.40	4.73	.67
Hispanic[f]	5.24	4.60	.64
GM	5.39	4.66	.73

Note. [a]*n* = 8; [b]*n* = 9; [c]*n* = 6; [d]*n* = 11; [e]*n* = 8; [f]*n* = 9. Younger = 22 or younger. Older = 23 or older. *GM* = Grand Mean.

In order to further investigate whether the age, gender, and ethnicity of participants were related to their overall preference for the online delivery of the course (i.e., the gap in ratings in Table 3), correlational analyses were conducted. As shown in Table 4, age, gender, and ethnicity had no relationship with the participants' overall preference for the online delivery of the course ($p > .05$).

Table 4
Correlations of Bio Data and Overall Ratings on Preference for Online vs. In-Class Instruction (N = 17)

	1	2	3	4
1. Age	1	.316	.325	-.108
2. Gender		1	.316	-.263
3. Ethnicity			1	-.386
4. Instruction				1

Note. Instruction = Gap on ratings between online and hypothetical in-class delivery of the course.

Relationship between overall knowledge gain and overall preference for the online delivery

Interestingly, when a correlational analysis was performed between the average knowledge gain (3.36 as shown in Table 1) and their overall preference for the online delivery (i.e., .73 as shown in Table 3), the result indicated no relationship ($r = -.147$, $p = .573$). Thus, perceived knowledge gain was found to have nothing to do with overall preference for the online delivery to a hypothetical in-class delivery.

Analyses of ratings on individual statements on the two types of instruction and their relationships with students' backgrounds

Next, the average ratings on each of the nine effectiveness statements on both types of instruction were separately examined to see whether age, gender, or ethnicity was related to the ratings on any item in the course effectiveness questionnaire. As seen in Table 5, the results showed that only age was significantly related to ease of taking quizzes in a hypothetical in-class instruction ($r = .547$, $p < .05$). The positive correlation found on this item (#5 in the effectiveness questionnaire in Appendix B) means that younger participants rated significantly lower on the ease of taking quizzes in a hypothetical in-class instruction than the older participants did.

Table 5
Correlations of Bio Data and Ratings on Taking Quizzes Online and In Class (N = 17)

	1	2	3	4	5
1. Age	1	.316	.325	-.348	.547*
2. Gender		1	.316	-.058	.005
3. Ethnicity			1	-.183	.035
4. Online Quiz				1	-.109
5. In-Class Quiz					1

Note. *$p < .05$. Online Quiz = Ease of taking quizzes online. In-Class Quiz = Ease of taking quizzes in a hypothetical in-class environment.

Interestingly, when one-way ANOVAs for repeated measures were run separately on the nine items in the course effectiveness questionnaire, there were only two aspects in which the mode of instruction made a significant difference: one was ease of participation, $F(1, 16) = 11.72$, $p < .01$, and the other was self-reflection of learning, $F(1, 16) = 6.96$, $p < .05$. These are items #2 and #8 in the effectiveness questionnaire (Appendix B), respectively, and the participants' average ratings on ease of participation (5.41 [online]; 3.70 [in-class]) and self-reflection of learning (5.41 [online]; 4.58 [in-class]) are shown in Table 6. The main effects found on these two items mean that the participants felt they were able to participate in discussions and reflect their learning to a greater degree in the online course than in a hypothetical in-class environment. As seen in Table 7, correlational analyses further indicated that the participants' backgrounds did not make any difference in these results ($p > .05$).

Table 6
Average Ratings on Participation and Self-Reflection of Learning in the Online vs. In-Class Delivery of the Course

	Online	In-class	Gap
		Participation	
Age			
Younger[a]	5.50	3.00	2.50
Older[b]	5.33	4.33	1.00
Gender			
Male[c]	5.50	3.66	1.84
Female[d]	5.36	3.72	1.64
Ethnicity			
Asian[e]	5.25	3.75	1.50
Hispanic[f]	5.55	3.66	1.89
GM	5.41	3.70	1.71
		Self-Reflection	
Age			
Younger[a]	5.37	4.25	1.12
Older[b]	5.33	4.33	1.00
Gender			
Male[c]	5.33	4.50	.83
Female[d]	5.45	4.63	.82
Ethnicity			
Asian[e]	5.50	4.62	.88
Hispanic[f]	5.33	4.55	.78
GM	5.41	4.58	.83

Note. [a]$n = 8$; [b]$n = 9$; [c]$n = 6$; [d]$n = 11$; [e]$n = 8$; [f]$n = 9$. Younger = 22 or younger. Older = 23 or older. *GM* = Grand Mean.

Table 7

Correlations of Bio Data and Ratings on Preference for Online vs. In-Class Instruction on Participation and Self-Reflection (N = 17)

	1	2	3	4	5
1. Age	1	.316	.325	-.376	-.228
2. Gender		1	.316	-.047	-.006
3. Ethnicity			1	.097	-.039
4. Participation				1	.641**
5. Self-Reflection					1

Note. $^{**}p < .01$. Participation = Gap on ratings between online and hypothetical in-class delivery of the course on ease of participation. Self-Reflection = Gap on ratings between online and hypothetical in-class delivery of the course on self-reflection of learning.

Relationships of ease of participation and self-reflection of learning with other aspects of online delivery

How were ease of participation and self-reflection of learning in which online delivery was preferred, related to other aspects of online instruction? This question was investigated by conducting correlational analyses. As seen in Table 8, the results indicated that item #2 (ease of participation) was significantly correlated with all but two items: ease of taking quizzes (item #5) and meaningful learning (item #9). Item #8 (self-reflection of learning) was significantly correlated with all but two items: ease of taking quizzes (item #5) and understanding of materials (item #1). These results mean that although these two positive aspects (items #2 and #8) of online delivery were not related to ease of taking quizzes, they were together related to all other important aspects of learning, including understanding materials and having a meaningful learning experience.

Table 8

Correlations of Ratings on 9 Items in the Course Effectiveness Questionnaire with Ratings on Participation and Self-Reflection in the Online Instruction (N = 17)

		1	2	3	4	5	6	7	8	9
Participation		.594**	1	.521*	.735**	.140	.647**	.542*	.734*	.453
Self-Reflection	.253	.734**	.756**	.969**	.285	.826**	.731**	1	.728**	

Note. $^{*}p < .05$. $^{**}p < .001$. 1 = helped understand materials; 2= easy to participate in discussions; 3 = easy to ask questions; 4 = easy to submit assignments; 5 = easy to take quizzes; 6 = received timely feedback; 7 = easy to interact with classmates; 8 = able to reflect on own learning; 9 = had a meaningful learning experience.

Students' comments

Finally, qualitative data from the participants' comments were examined. Positive comments expressed that they benefitted from "the notes instructor provided," "instructor feedback," "instant feedback," "the discussions and quizzes," "[ability] to interact with one another, to comment, and to see others comment," "[ability] to set own schedule," "to turn in assignments a little earlier," and "to view all work [and] grades." One student said: "It is much easier to participate online in forum discussion rather than in class. I felt like I participated in the discussions much more than I would have in class. It was very easy to turn in assignments/quizzes" (Asian female, age 23). This student further commented on gained knowledge, saying that she "[knew] particularly nothing about language diversity prior to this class." Another student expressed: "Working adults like myself appreciate all the online classes as they provide for time to continue to go to work, supporting our families, and still pursuing our aspirations of higher education. So thank you for being bold and providing an online class that is very needful in today's society" (Hispanic female, age 37).

Negative comments were on deadlines and technical problems that caused missed assignments and quizzes, lack of in-class lecture, insufficient feedback, shortage of time to discuss more, and "some confusion [at the] beginning." Three additional comments said: "[Y]ou need discipline to do an online course since you can get easily distracted with other websites"(Asian male, age 22); "Having something to turn in and do every week, though stressful was helpful in learning the material" (Hispanic female, age 23); "Amount of work in a week's span felt more intense than an in-class lecture would" (Asian female, age 20).

DISCUSSION

The present study attempted to answer five research questions in order to draw a broad picture of online learning in a high-impact general education course at an urban American university. The first question was whether participants felt that they gained knowledge by taking the online course, and the answer was affirmative regardless of their backgrounds when reflectively compared to the beginning of the course. The second question was how they perceived the effectiveness of online delivery of the course. Compared to a hypothetical in-class delivery of the same course, the participants expressed greater overall efficacy and thus preference for the online delivery. The answer was negative to the third question of whether their backgrounds made a difference in their perception of overall online learning experience. However, on the item of ease of taking quizzes in a hypothetical in-class environment, the younger students rated significantly lower than the older students, suggesting that the younger students would be more comfortable taking quizzes online. The answer was also negative to the fourth question of whether overall preference for online delivery was related to perceived knowledge gain. This result seems to indicate that student learning would occur regardless of the instructional mode (Blake & Delforge, 2004; Chenoweth, Jones, & Tucker, 2006; Means, Toyama, Murphy, Bakia, & Jones, 2009).

To answer the fifth question of whether there was a positive perception on any aspects of online learning experience specified in the questionnaire, this study found, regardless of participants' backgrounds, their strong preference for the online delivery on two items: ease of participation and self-reflection on learning. Moreover, these two aspects of online delivery were together related to all but one aspect of learning experience: ease of taking quizzes. Given that taking quizzes is a methodological (with or without technology) matter, it is understandable that this item was unrelated to ease of participation and self-reflection on learning. What is more significant is that ease of participation and self-reflection on learning were identified as the two strongest aspects of online delivery regardless of the participants' backgrounds; the more they participated in online discussions, and reflected on their own learning, the more they felt they were understanding the course material, and having a meaningful learning experience. Previous studies also reported "a tendency toward more equal participation" (Warschauer, 1996) and "conscious reflection" (Lamy & Goodfellow, 1999) as beneficial aspects of asynchronous online courses.

The participants' comments largely reflected these quantitative data. About quizzes, for example, ease was a positive comment made by many younger students, but some older students missed the deadlines due to their busy schedule or technical problems. Although the worst quiz score was dropped from grade calculations, apparently the strict deadlines required "discipline" and caused "stress," which might have caused students, particularly older ones who had a job or family obligation, to feel extra pressure when taking online quizzes. Perhaps longer than the provided 24-hour time frame should have been given to accommodate these students. Another area that should be improved is orientation on the first day of instruction. Because one class period (100 minutes) was dedicated to explain how to navigate Moodle and the assignments (including quizzes) and deadlines, as well as course goals, student learning outcomes, grading procedures, attendance and other policies, and netiquette, "some confusion" appears to have resulted, and those who were absent on the first day missed these explanations, even though the syllabus spelled out everything. Given the importance of orientation or "learner training" (Lai & Morrison, 2013), it would therefore be better to be videotaped, offered in a separate online tutorial, or extended to two class periods in the future.

As for positive comments, many participants felt it was easy to participate and submit assignments, and that they were able to interact with classmates, comment on others' postings, and see others' comments on their own postings. As evidenced in one student's comment, online discussion forums seem to have encouraged those who would speak less in class to participate. It is no wonder why ease of participation was quantitatively shown to be one of the strengths of this online course. Oddly, however, no one commented on self-reflection of learning, which was also one of the quantitatively identified strengths of the course. This might be due to the fact that participants were asked to comment on what were the most and least beneficial aspects of the online delivery of the course, and most participants said only one or two things about the technology (e.g., ease of participation, submission of assignments, and instant feedback). Self-reflection, which would not require use of technology, might not have come to their minds. Finally, one student's comment on the course content, saying that she "[knew] particularly nothing about language diversity prior to this class," seems to indicate that the retrospective pretest (i.e., reflective rating) accurately captured her perceived knowledge gain.

CONCLUSION

Although the present study drew a broader picture of the effectiveness of an online course than previous studies, due to the small number of participants, it is not possible to make a generalization about online courses. A larger sample size is necessary, for example, to run four-way ANOVAs to additionally analyze the main effects of participants' backgrounds as well as interactions between and among age, gender, and ethnicity. A more ethnically diverse sample is also needed, so that the data can be more applicable to increasingly diverse student populations in American colleges and universities. In addition, it is beneficial to investigate whether students' positive perception of online delivery is related to actual learning of the course materials, measured via traditional pretest and posttest (Hills & Betz, 2005). If it is unrelated, as it was with perceived knowledge gain in the present study, then knowledge gain can more definitely be said to occur regardless of mode of instruction. Furthermore, in order to further examine the exact effects of instructional modality on learning, outcomes of the same course taught in two different modes, online and in-class, should be compared.

Nonetheless, the findings of this study seem useful for future online course designers and takers. First, the participants' overall positive perception of knowledge gain and efficacy is good news for those who advocate online courses. Second, based on the results showing that ease of participation and self-reflection on learning are strengths of online delivery of the course, a recommendation can be made to ensure that future online courses stress these two aspects. Third, in order to ease online quiz taking practice, a suggestion can be made to future online course designers to further approximate online quizzes to in-class quizzes methodologically. It is the author's hope that future online courses, including MOOCs, will take advantage of the findings of this study and those studies suggested above.

REFERENCES

Allen, E., & Seaman, J. (2013). Changing courses: Ten years of tracking online education in the United States. Babson Questionnaire Research Group. Retrieved May 31, 2015, from http://www.onlinelearningquestionnaire.com/reports/changingcourse/pdf

Blake, R. J., & Delforge, A. M. (2004). Language learning at a distance: Spanish without walls. In D. Hiple & I. Thompson (Eds.), *Selected papers from the 2004 NFLRC symposium: Distance education, distributed learning and language instruction.* Retrieved on June 18, 2015, from http://nflrc.hawaii.edu/NetWorks/NW44/Blake.htm

Carey, K. (2015). *The End of College: Creating the Future of Learning and the University of Everywhere.* New York: Penguin Group.

Chenoweth, N. A., Jones, C. M., & Tucker, G. R. (2006). Language online: Principles of design and methods of assessment. In R. P. Donaldson & M. A. Haggstrom (Eds.), *Changing language education through CALL* (pp. 147-167). New York: Routledge.

Davis, G. A. (2003). Using a Retrospective Pre-Post Questionnaire to Determine Program Impact. Journal of Extension, 41(4). Retrieved August 25, 2014, from www.joe.org

Dennis, K., Bunkowski, L., & Eskey, M. (2007). The little engine that could – How to start the motor? Motivating the Online Student. *Insight: A Journal of Scholarly Teaching, 2*. Retrieved August 21, 2015, from http://www.insightjournal.net/Volume2.htm

Dixon, R., Dixon, K. & Siragusa, L. (2007). Individuals' perceptions of online environments: What adult learners are telling us. In *ICT: Providing choices for learners and learning. Proceedings ascilite Singapore 2007*. Retrieved September 4, 2014, from http://www.ascilite.org.au/conferences/singapore07/procs/dixon.pdf

Gibby, A. S. (2007). *Student perception of interaction in an online foreign language learning environment*. Doctoral dissertation. The University of Texas, Austin. Retrieved August 25, 2014, from gibbya98987.pdf

Heller, D. E. (2015). The end of college? Not so fast. *The Chronicle of Higher Education, LXI(30),* A64.

Hill, L. G., & Betz, D. L. (2005). Revisiting the Retrospective Pretest. *American Journal of Evaluaion, 26,* 501-517.

Lai, C., & Morrison, B. (2013). Towards an agenda for learner preparation in technology-enhanced language learning environments. *CALICO Journal 30(2),* 154-162.

Lamy, M.-N., & Goodfellow, R. (1999). "Reflective conversation" in the virtual Language classroom. *Language Learning & Technology 2(2),* 43-61.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of Evidence-Based Practices in Online Learning Studies*. Washington: U. S. Department of Education, Office of Planning, Evaluation, and Policy Development. Retrieved June 28, 2105, from https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Pratt, C. C., McGuigan, W. M., Katzev, A. R. (2000). Measuring program outcomes: Using retrospective pretest methodology. *American Journal of Evaluation, 21(3)*. Retrieved May 29, 2015, from aje.segepub.com

Rockwell, S. K., & Kohn, H. (1989). Post-then-pre evaluation. *Journal of Extension, 27(2)*. Retrieved May 29, 2015, from joe.org

Stevens, G. L., & Lodl, K. A. (1999). Community coalitions: Identifying changes in coalition members as a result of training. *Journal of Extension, 37(2).* Retrieved May 31, 2015, from joe.org

Toyama, K. (2015). Why technology will never fix education. *The Chronicle of Higher Education, LXI(37),* A26-A27.
Warschauer, M. (1996). Comparing face-to-face and electronic discussion in the second language classroom. *CALICO Journal 13(2),* 7-26.

Appendix A
Questionnaire on Knowledge Before and After the Course

Please indicate your level of agreement with each statement BEFORE (10 weeks ago) and AFTER (now) completing this course using a six-point scale (1-strongly disagree [SD] and 6-strongly agree [SA]).

1. I know roughly how many languages are spoken in the U.S.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

2. I know within how many generations immigrant communities typically shift entirely to English.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

3. I know the extent to which Native-American languages are endangered.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

4. I know since what century Spanish has been spoken in what is currently U.S. territory.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

5. I know the characteristics of the three waves of Chinese immigrants to the U.S.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

6. I know why the decline of non-English language use is particularly pronounced among Filipinos in the U.S.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

7. I know what two geographical areas maintain the highest concentration of French speakers in the U.S. (despite sharp declines in the use of French in these places).

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

8. I know the circumstances under which the first wave of Vietnamese refugees came to the U.S.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

9. I know what contributed to the loss of vitality of the German language in the U.S.

	SD	SA
a) AFTER (now)	1-----------2-----------3-----------4-----------5-----------6	
b) BEFORE (10 weeks ago)	1-----------2-----------3-----------4-----------5-----------6	

10. Other than pressure to switch to English, I know why maintenance of Korean is poor among the second generation.

	SD	SA

a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

11. I know why the majority of Russian-speaking immigrants do not live in an ethnic community.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

12. I know why many Italians shifted to English (instead of speaking Italian) in order to communicate with other Italians in the U.S.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

13. I know how the fact that Arabic is a *diglossic* language affects the maintenance of its dialects in the U.S.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

14. I know the characteristics of three Portuguese-speaking groups in the U.S.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

15. I know why Polish Saturday schools continue to thrive despite assimilation pressures.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

16. I know what societal multilingualism means.

SD SA
a) AFTER (now) 1----------2----------3----------4----------5----------6
b) BEFORE (10 weeks ago) 1----------2----------3----------4----------5----------6

Appendix B

Questionnaire on Course Delivery and Background Information

Please indicate your level of agreement with each statement using a six-point scale (1-strongly disagree [SD] and 6-strongly agree [SA]) about (a) the online course that you have just completed, and (b) the same course delivered hypothetically in class, instead of online. Please add comments and bio data at the end of the questionnaire.

1. The course helped me learn the covered materials.

SD SA
a) ONLINE 1----------2----------3----------4----------5----------6
b) IN CLASS 1----------2----------3----------4----------5----------6

2. It was easy to participate in discussions.

SD SA
a) ONLINE 1----------2----------3----------4----------5----------6
b) IN CLASS 1----------2----------3----------4----------5----------6

3. It was easy to ask the instructor questions.

SD SA
a) ONLINE 1----------2----------3----------4----------5----------6
b) IN CLASS 1----------2----------3----------4----------5----------6

4. It was easy to submit the assignments.

SD SA
a) ONLINE 1----------2----------3----------4----------5----------6
b) IN CLASS 1----------2----------3----------4----------5----------6

5. It was easy to take the quizzes.

	SD					SA
a) ONLINE	1	2	3	4	5	6
b) IN CLASS	1	2	3	4	5	6

6. I received timely feedback on my work.

	SD					SA
a) ONLINE	1	2	3	4	5	6
b) IN CLASS	1	2	3	4	5	6

7. I was able to interact with classmates.

	SD					SA
a) ONLINE	1	2	3	4	5	6
b) IN CLASS	1	2	3	4	5	6

8. I was able to reflect on my own learning.

	SD					SA
a) ONLINE	1	2	3	4	5	6
b) IN CLASS	1	2	3	4	5	6

9. Overall I had a meaningful learning experience with the course.

	SD					SA
a) ONLINE	1	2	3	4	5	6
b) IN CLASS	1	2	3	4	5	6

10. Comments: Please mention what aspect of the online delivery of this course was most beneficial and least beneficial.

11. Background information/bio data

Male: ______ Female: ______
Age: ______
Race/ethnicity: ____________________________

EXPLORING THE USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) IN EDUCATION FOR ADOLESCENTS IN URBAN POVERTY

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Abstract: Information and Communications Technology (ICT) is a technology tool to help and facilitate communication and processing besides information delivery through electronic means. The life of adolescents in urban poverty communities is usually associated with society in poor urban communities. Many problems and challenges are faced by the urban poverty community from the aspect of using ICT in terms of educational aspects. Hence, the youth in urban poverty are recommended to take various initiatives in using ICT based tools given that ICT use is able to change their lifestyle and wellbeing.

INTRODUCTION

Noor (2006) defined the term information and communications technology (ICT) as a technology tool for aiding in communications and processing and sending of information in electronic form. The era of information technology use began in latter part of the 1990s, developing rapidly until now. National development in Malaysia has undergone various changes beginning from the agricultural era to the industrial development and currently the transformation in theICT field. Walsham et al. (2007) stated that ICT use helps in the development and growth of a national economy especially in developing countries.

The emergence of the internet has contributed greatly to the rapid delivery and dissemination of information and indirectly has benefited social development in the community. With the rapid development of ICT in the development of a country, countries in the world have taken the opportunity to apply technology in raising the living standards of their population. Among the examples of ICT tools in use are the Internet, telephone, transaction systems, integrated devices, multimedia and so forth.Nayak et al. (2010) noted that ICT use can benefit users because it can help in disseminating information, enable social interaction, help in economic and trade development, politics, media, education, entertainment, health and so forth.

From the aspect of digital technology use in Malaysia, the use of telephone network had been introduced in 1874, followed by the introduction of computer technology in 1966. The Malaysian government had taken the step to inculcate ICT based economic development in the Eighth Malaysia Plan, followed by the Ninth and Tenth plans where ICT was seen as a key enabler and one of the components and major objectives in national development. Various steps were taken and efforts implemented inorder to achieve sustainability in programs and projects carried out such as Smart Schools, telehealth, research and development cluster, Multimedia Super Corridor, cyber city and so forth (Musa et al., 2012).

One of the elements that can facilitate economic development and social development in a country is by rapid development in information and communications technology (ICT) use. From the aspect of economic development of a country, Krizdan Qureshi (2009) state that ICT use is regarded as a tool contributing to economic development.This scenario shows thatmost countries all over the world have used various approaches to implement ICT usage in developing society. According to Elgar (2009), most countries all over the world have taken the opportunity to widen ICT usage in community development.

ICT USE AMONG ADOLESCENTS IN URBAN POVERTY

The term “youth” in general refers to those in transition between childhood and adulthood or aged in the range 12 years to more than 20 years. According to Wikipedia (2013),the term “youth” is from the Latin word meaning “heading for maturity” where this group always has the urge to try and is heading for adulthood.This group plays a very important role as the foundation of national prosperity and econopmic development. Youths who stay in the urban poverty areas form the urban poverty who usually are associated with the community living in poverty in urban areas. Although poverty is also happening in the rural areas, the urban locations are more often mentioned in any diuscussion on poverty. According to KamusDewan (2007), the term poverty is related to poor, lack and indigence. Mohamed Zaini Omar (2010) stated that to measure the level of poverty of a household, one guideline is the poverty level.

The National Statistics Department of Malaysia (2013) stated that the poverty level income is the minimum basic food needed by the household members, meaning that it is the non-food requirement for each member. The basic household income or basic needs obtained allows them to function in society. Based on the Poverty Level Income (PGK) the household is regarded as poor if its monthly income falls below the PGK. Hence, if the monthly household income is lower than the PGK, for example the household is only able to fulfilthe basic needs from the aspect of minimum nutritional needs of the household members to have a healthy body, they will be regarded as the absolute poor.

The issue of digital divide emerged when there exists disparity between the areas using technology and those areas lacking in technology use. This term paints a picture related to the disparity between urban and rural areas (World Youth Report, 2003). According to Kemly (2006), digital divide can be categorized into several aspects such as access to ICT facilities, the level of ICT use as well as quality or awareness in using the technology. Norfatimah (2013) stated that in the use of broadband in 2013, Malaysia is in the second place in terms of broadband usage in the Asean region. However, there are some challenges and problems faced by the urban poverty in ICT usage. According to Siti Masayu (2014), among the problems and challenges faced are limited infrastructures, incapability to buy ICT equipment, lack of knowledge on ICT use, lack of skills, lack of training in ICT use and so forth. This clearly shows that focus on the urban poverty is needed in ICT usage. The appropriate focus should be given in order to help the urban poverty raise their standard of living.

Giligan (2006) emphasized that the location aspect of an area also influences ICT use whereby for rich or modern areas, the rate of Internet use is higher than that in poor and backward areas. Studies by Owo (2010) support Giligan (2006) by revealing that users of ICT are more likely among the rich and well educated as opposed to the poor. This clearly shows that the urban poverty community is made up of the marginalized and those dropouts from the mainstream development unless positive steps are taken to narrow the digital divide.

Adolescents who live in urban poverty areas are often associated with social ills and environmental lifestyle factors that are unhealthy because youth are often influenced by peers, relatives and the local community.ICT also plays a role in affecting in a positive or negative way the life of youth. Access to the world without borders has influenced the life of adolescents with modernization and globalization these days.

Mohd Dahlan A. Malek and Ida Shafinaz (2010) state that the cyber world does not only have positive effect but also exposes adolescents to negative effects subsequently leading to criminal activity. They will be easily influenced by negative elements and could be involved in wrongdoing, bad behavior and so forth. Developments in technology mean that the sources of information transcend borders and adolescents will be easily exposed to all types of information whether good and true or false.

ICT USE IN EDUCATION TO HELP ADOLESCENTS IN URBAN POVERTY

Malaysia targets to be a developed nation by 2020 and also has taken the initiative to widen ICT usage in societyin order to bridge the digital divide and in efforts to expand the knowledge based economy. In 1994, the Malaysian government introduced the National Telecommunications Policy to enhance the capacity to use ICT in society. The national Vision 2020 envisages a society based on information and knowledge. In efforts to achieve Vision 2020, the Government has carried out several programs and prepared the requisite infrastructure.

Siti (2009) stated that poverty encompasses multiple elemnents such as lack of nutrition, and low health status, low education and low income, unemployment, unsafe housing, not having modern necessities, having unstable job prospects, negative attitude to life and outdated thinking.The findings in Hamidah and Siti Hajar (2015) stated that poverty status encompasses issues in aspects of health and nutrition forming one of the factors contributing to juvenile delinquency among the urban poverty.

According to Ruth (2007), ICT usage also is an element that can help in overcoming poverty in a country. Furthermore, according to Ruth (2007), the areas taking advantage of ICT use will attain many benefits from ICT tools. Musa Hassan (2002) sates that ICT plays an important role in community life because it is capable of improving effectiveness and raising the daily standard of living of the community. Mohd Yassir (2010) agrees that ICT plays a key role in the life of society at every level.

Among the roles of ICT in education among adolescents in urban poverty is the use of technology as a channel that can:

a) Channel and deliver information related to education issues. For example, the use of web and blog can help to disseminate to adolescents information related to educational aspects.
b) Give awareness to adolescents regarding the importance of education in their life.
c) Dealing with social issues such as adolescent involvement in drugs, vandalism, theft and so forth. Through ICT use, adolescents can be encouraged to attend training and short courses on mastering ICT skills. This can help to lessen the cases of juvenile delinquency.
d) Encouraging communication and interaction among adolescents, teachers in school and the community by using social media such as Facebook, Twitter and so forth. From the social and psychological aspect, adolescents will be prepared to share their problems with others more effectively. This good relationship can help to create a more happy existence and better understanding among the adolescents.
e) Mass media should not just report widely on the social ills and bad behavior of adolescents in the electronic media. The mass media has a role in showing the examples that can motivate adolescents toward more positive attitudes.

CONCLUSION

All parties must play their part in ensuring they cooperate so that ICT use in urban poverty areas is beneficial and maximized in line with developments in urban areas. This will help bridge the digital divide in ICT use between rural and urban society. Adolescents living in urban poverty areas need to make full use of various initiatives to use ICT based tools considering that ICT use is capable of changing their lives. It is suggested that guidelines be developed as well as working plan for evaluating the effectiveness of ICT use to help develop the economy of the urban poverty community.This is because ICT practice and use can enhance productivity as well as the living standards of the urban poverty

The well-being in life practiced by urban adolescents can be achieved if every level of society adopts a healthy lifestyle.Attention must be given to the pattern of ICT use among adolescents especially adolescents in urban poverty in terms of purpose of ICT use, factors influencing ICT usage and effectiveness of using such tools among the urban poverty adolescents; this will ensure ICT usage in education can help develop their healthy lifestyle practices among adolescents in future.

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REFERENCES

Edgar, F. (2009). ICT Policy and Perspectives of Human Development in Latin America: the Peruvian Experience. *Journal of Technology Management andInnovation*,*4*(4), 1-11.

Gilligan,R. (2005). Questioning. *Journal of Computer Science*, *32*(5), 1-12.

Hamidah Sulaiman, & SitiHajarHalili. (2015). *Issues in urban poverty and its relation to juvenile issues identification.*The 2015 International Congress on Economics, Social Sciences and Information Management (ICESSIM 2015), Sheraton Kuta Bali, Bali, Indonesia, 28 - 29 March 2015.

Jabatan Perangkaan Malaysia. (2013).*Booklet Impak Pembangunan Berkesan:Pendapatan Isi Rumah Meningkatdan Taraf Kemiskinan Menurun*. Bahagian Penerbitan Dasar Negara, Jabatan Penerangan Malaysia. Putrajaya: Malaysia.

Kamus Dewan. (2007).*Kamus Dewan*(Edisi Ke-4).Kuala Lumpur, Malaysia: Dewan Bahasa danPustaka.

Kemly Camacho. (2006).*Digital Divide*.Retrieved from http://vecam.org/article549.html

Kriz, K., & Qureshi, S. (2009) *The Role of Policy in the Relationship between ICTAdoption and Economic Development: A Comparative Analysis of Singapore and Malaysia.* Retrieved from http://aisel.aisnet.org/globdev2009/13

MohdDahlan A. Malek,& Ida Shafinaz Mohamed Kamil.(2010) .Jenayah Dan Masalah Sosial Di Kalangan Remaja: Cabaran Dan Realiti Dunia Siber. Retrieved from Http://Eprints.Ums.Edu.My/117/1/Conf2010004.Pdf

Mohamed Zaini Omar. (2010).*Pembasmian kemiskinan di Malaysia: Pengalaman AmanahI khtiar Malaysia.* PenerbitUniversiti Sains Malaysia.Pulau Pinang: Malaysia.

MohdYassirJaafar. (2010).*Kerajaan sediakan 1.2juta laptop percuma bagi keluarga dengan pendapatan<RM3000 dengan syarat langgan jalur lebar dengan Telekom Malaysia Berhad (TM).*Retrieved from http://zamankini.wordpress.com/2010/05/29/kerajaan-sediakan-1- 2-juta-laptop-percuma-bagi-keluarga-dengan-pendapatan-rm3000-dengan-syarat-langgan-jalur-lebar-dengan-telekom-malaysia-berhad-tm/).

Musa, A.H. (2010). Information and Communication Technology and community development. *IPSAS Intellectual Discourse 2010*, 22 Oktober 2010, Selangor, Malaysia.

Musa, A.H., Bahaman A.S., &HayrolAzril, M. (2012).Usefulness of ICT Usage Among JKKK members in Peninsular Malaysia. *AsianSocial Science*,255-266.

Nayak, S.K., Thorat, S. B., & Kalyankar, N.V. (2010). Reaching the unreached: A Role of ICT in Sustainable Rural Development. *International Journal of ComputerScience and Information Security (IJCSIS).*Retrieved from http://sites.google.com/site/ijcsis/1-14

Noor Sharifah. (2006). ICT Management Centre for Rural Community in Peninsular Malaysia, pp: 21-26. *Inaugural Lecture Series, Technology University of Malaysia.*Skudai, Johor: UTM Press.

Nor Fatimah Ahmad.(2013).*Pencapaian Ekonomi Konsisten*. Dilayari daripada: http://www.bharian.com.my/bharian/articles/Pencapaianekonomikonsisten/Article/

Owo, N.J. (2010). Gender and development: Nigeria as a case study.*Journal ofSustainable Human Development Revision, 2,* 81-91.

Ruth, C. (2007). Exploring the ICT and Rural Poverty Reduction Link: Community Telecenters

And Ruralina. The Live lihoods. *Electronic Journal of Information Systems in Developing Countries,32*(6), 1-18.

SitiMasayuRosliah Abdul Rashid. (2009). *Peluang dan cabaran pendidikan dalam kalangan masyarakat luar bandar: Satu kajian kes isi rumahMelayumiskin di jajahanBachok, Kelantan.* TesisSarjana, UniversitiSains Malaysia,Pulau Pinang.

SitiMasayuRosliah Abdul Rashid.(2014). *Perkembangan teknologi maklumat dan komunikasi (TMK) atau Information and Communication Technology (ICT) di luar Bandar serta isu-isu yang berkaitan.*Tesis Kedoktoran, UniversitiSains Malaysia,Pulau Pinang.

Walsham, G., Robey, D., & Sahay, S. (2007).Special issue on information systems in developing countries.*MIS Quarterly,31*(2), 317-326.

Wikipedia.(2013). Remaja.Retrieved fromhttp://ms.wikipedia.org/wiki/Remaja

World Youth Report.(2003). *Youth & Information and Communication Technologies(ICT).*Retrieved from http://www.un.org/esa/socdev/unyin/documents/ch12.pdf

GIS FREEWARE AND GEOSCIENCE EDUCATION IN LOW RESOURCE SETTINGS

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Abstract: The development of Geographic Information System (GIS) has played very important role in understanding and communicating geoscience in the last couple of decades around the world. Now a days Geoscience teachers and students make extensive use of spatial data, spatial data base management, spatial data retrieval, visualization and spatial data analysis. GIS software tools are playing an important role in geoscience education and hence considered an integral part of geoscience teaching and learning. Commercial or proprietary GIS tools such as ENVI, ArcGIS and ERDAS are highly useful but despite of their demonstrated utility these tools have perceived problems in low resource settings. Commercial GIS software are often very expensive and highly complex for free available spatial data which is often low quality data. Free and open source software tools such GRASS, SAGA, ILWIS are now available which are impacting and have potential to impact further the geoscience education in low resource settings.
The aim of this paper is to enlist the available free and open source GIS software tools and present our experience with these tools to assist teachers at low budget institutes towards understanding the potential of GIS free and open source software tools in geoscience education in low resource settings. This paper also explores the possibility presented by the free and open source GIS software tools, provides categorizes and describes their use in geoscience education. Our search on the availability and utility of free and open source GIS tools reveals that for all categories of commercial and proprietary software used in geoscience education a free and/or open source tool is available. In low resource settings these free and open source tools have huge advantage over commercial and proprietary software tools because these tools are available without any cost and mostly fit for handling low quality freely available spatial data.
Keywords: Freeware, Open Source Software, GIS, Proprietary, Low Resource Settings

Introduction

Geoscience is the study of Earth. Understanding the Earth's past, investigating how it changes over time, understanding what stages of development it is in now, what may happen to it in future and how we need to care for our planet and live in balance with it, is important for our survival. Geoscience teaching and learning involves the investigation of the Earth and how its systems work. Geoscience is the study of the Earth in space in relationship with our solar system and the wider universe. It is the study of the thin and finely balanced atmosphere, its solid surface, its water and the components and structures that lay deep inside (Nawaz and Shaw 2011). Geoscience is also about the study of the change of the Earth over time, from the begging of the planet 4.6 billion years ago through all the ages of geologic time to the present and beyond (Patyk-Kara, Bykhovsky et al. 2001).

Geoscience education has benefited significantly through the application of contemporary pedagogy, and in particular the use of ICT (Manduca, Mogk et al. 2010). Through computer-generated animations students who study geosciences today are able to see the un-seeable. For example, the Earth's crust from side view or from above and through the use of computer generated imaging technology, students can see how former ice ages might have looked, if they have been to be there to see them. Students of geoscience see how rock is used as source of minerals and how catastrophic events in the past have had dramatic effects on the landscape that we see today, and they can virtually go where nobody has gone before, to study what happens underground. The use of computer-generated animations is also useful in other undergraduate teaching, such as in agriculture (McGregor, Griffeth et al. 2008).

Geoscience is combination of sciences and draws upon all other sciences to unlock the Earth's mysteries. It surrounds us and includes us, a world in which everyone is affected by Earth's processes and is guardian of assets now and generations to come. We know that there are some significant issues that humans need to address, such as climate change (Mirza and Ahmad 2005) natural hazards such as earthquake (Tapponnier, King et al. 2006; Monalisa, Khwaja et al. 2007) and the increasing pressure on natural resources, and their availability, such as energy, clean water and soil to grow food. In order to address and manage these issues, and to continue to discover new geoscience knowledge we need to continue to produce new generation of geoscientists.

Geoscience teaching and learning covers a broad range of topics related to earth and its landscape including mountain building, structure of earth, the erosion of continents, and the location of natural resources, volcanoes, paleoclimate and evolution. Geoscience teaching and learning involves understanding how our planet works, which is essential to properly manage our environment and predict how the environment will change in future. Through Geoscience education students can understand and appreciate our complex planet (Nawaz and Shaw 2011).

Geoscience today is a space-age science making extensive use of remote sensing data, high performance computing, and state of the art data visualizations. Geovisualization is attracting widespread attention in the geosciences (Andrienko, Andrienko et al. 2008; Elwood 2008; Kowalczuk 2010). Geoscience students need to access and visualizes data related to the Earth and its landscape and systems and software that provide spatial data analysis, organization and visual representations provide tools for learning and understanding (McAdams and Nikov 2011).

Commercial or proprietary GIS software tools are available to assist in the understanding of geoscience; its processes, systems and components. Such software provides teachers with tools to construct learning environments that provide significant advantages to learning beyond traditional knowledge dissemination techniques. For learners, GIS software tools often provides the break through link for understanding the complexities being studied. Some examples of the software used by geoscientiests, geoscience teachers and geoscience students are: ENVI, Autodesk, Intergraph, ArcGIS and ERDAS IMAGINE. However, most of this software is expensive and this creates problems for the institution, teacher or student when the software is out of reach because of lack of financial resources. This is typically the case in developing countries where institutions are poorly resourced. However, free and open source GIS software tools such as ILWIS, GRASS, SAGA, Open Jump and several others (see: http://tinyurl.com/freeGISsoft) offer an alternative to expensive proprietary software in geoscience teaching and learning.

Free and Open Source GIS Software Tools

Free software also known as ‘software libre’ or ‘libre software’ is software that can be used, modified, copied and redistributed either without any restriction or with restrictions allowed by the manufacture and are generally available without any charge (Subramanyam and Xia 2008). Open source software (OSS) is software that is available in source code under a software license that permits the users to study, modify, improve and distribute to other users (Hauge, Ayala et al. 2010). Some open source software is available within the public domain and it is very often developed collaboratively by individuals who have expertise in software development and an interest in its free distribution. Free and open source software does not necessarily mean inferior or substandard software. There are some very significant open source software that have revolutionized many areas of activity. Probably the most famous open source software is the operating system UNIX. Using open source software can provide some advantages, the most significant being usually a cost advantage (Ven, Verelst et al. 2008).

One of the problems faced by teachers who are interested in using free and open source software as alternatives to commercial software for geoscience education is first identifying what alternative software is available, what the software does, and where it can be accessed from. Currently there is no one place with information on free and open source software for geoscience education. In undertaking the research for this paper, to identify appropriate free and open source software, 6 categories of software were identified. These are: Desktop RS and GIS Software, Spatial Database Management System (SDBMS) Tools, Spatial Data Viewers, Virtual Browsers, Mapping Applications, and Miscellaneous RS and GIS Tools. Desktop RS and GIS software are used for spatial data creation and map generation; SDBMS for storage of spatial data; spatial data viewers for viewing satellite and aerial photo imagery; virtual browsers to map the earth by superimposition of images obtained from satellite imagery and aerial photography. Miscellaneous RS and GIS tools category includes the small applications useful for manipulation and visualization of various kinds of spatial data.

The software that has been identified is displayed in tables from the following location: see: http://tinyurl.com/freeGISsoft. This site provides a range of useful software, free and open source, with a brief description for each including the current version and a web link to the site where the software can be obtained.

In general, these free and open source software offer many of the data handling, visualization and mapping basics needed for geoscience teaching and learning. Some of the software has been extensively used for a wide variety of spatial data handling and analysis. Applications of these software fit many aspects of geoscience teaching in geology, hydrology, and environmental mapping requirements. For example, application guide (http://www.itc.nl/ilwis/documentation/version_2/aguide.asp) of the ILWIS 2.1 contains 25 geoscience discipline-oriented case studies. ILWIS 2.1 is freeware, which provides the core functionality data acquisition, management, analysis and display and handles both raster and vector data sets. The case studies available in support of the software show advanced procedures in working with ILWIS and also demonstrate some specific questions from various research disciplines that can be solved with ILWIS software.

We have taught various postgraduate GIS courses at different universities over 15 years including Charles Darwin University, Australia, Faculty of Geo-Information Science and earth Observation (ITC), University of Twente, Netherlands and GIS Centre, University of the Punjab, Pakistan and has used many tools including commercial propriety software, such as Erdas Imagine and ArcGIS and also freeware tools such as ILWIS and GRASS. At Charles Darwin University Erdas Imagine and ENVI and ArcGIS (state of the art GIS software) are being used for teaching RS courses. We have taught the same RS and GIS courses at GIS Centre, Punjab University, Pakistan using the open source product ILWIS 2.1 to achieve very similar learning outcomes.

Literature shows successful application of various GIS free and open source software in geoscience teaching and learning. Fisher and Myers (2011) have shown the successful application of the free and simple GIS software ‘Open Jump’ for teaching health mapping in eastern Indonesia. Guenther (2009) described the use of Google Earth (free browser) for teaching geoscience. Husa (2009) elaborates on the visualization capabilities and use of Goggle Earth as geoscience teaching tool.

Geoscience teaching mainly involves spatial data (both raster and vector) management, analysis, visualization and mapping. This is what propriety software such as ArcGIS and Erdas Imagine are designed for. However, various free and open source software often provide the same functionalities. Free and open source software may not have all the features of more expensive systems. However, and very often they are more than adequate in achieving the outcomes desired and at the least deserve examining as an alternative to buying or using complex software.

We have already indicated one of the main adventures in using open source software that is they are generally free. However, the cost of operating and using software is not always just to do with the purchase of that software, but may also include maintenance and support of the software installation, and indeed, may require the purchase of additional hardware. Any teacher or institution considering implementing an open source solution, will need to weigh up all of the advantages and disadvantages of doing so. In any case, a full evaluation of an installation should be undertaken before opening up software to staff and students.

A further advantage of using open source software is that it ensures that users are compliant with copyright. Copyright is an important consideration in the application of any software within education institutions. However, quite often in institutions in developing countries, administrators and teachers are less concerned about copyright issues and there have been instances where pirated copyrighted software have been used illegally. The use of open source and free software, clearly makes issues of copyright less a problem.

In addition to the software tools listed that are useful for teaching and learning in geoscience, there are other useful and often quite sophisticated open source software available for education purposes. For example, Moodle is an open source Learning Management System used by many universities throughout the world including some of the largest universities (for example, UK Open University). Also, the open source office suite of programs provided by OpenOffice.org are an excellent free substitute to the Microsoft Office suite.

Conclusions

Almost all free and open source GIS software tools have potential value in one way or other but that value can only be realized if we use these software tools. Our review shows that for all areas where GIS software is used for geoscience teaching and learning, the free and / or open source software tools are available. Several free and open source GIS software tools are able to compete with proprietary software, in particular for raster and vector data processing, visualization and mapping. However, if an institute chooses to use free and open source tools for geoscience teaching and learning then the appropriateness of the particular software tool needs to be assessed. The licenses used by free and open source tools typically ensure that there is no cost for the software itself and low or no cost for its acquisition and installation. Much open source software is customizable and adaptable to different teaching and learning context. In short, we believe that the use of free and open source GIS software can provide a viable alternative to proprietary software – and we hope that this review helps to increase access and use of free and open source GIS software for geoscience teaching and learning particularly in low resource settings.

References

Andrienko, G., N. Andrienko, et al. (2008). "Geovisualization of dynamics, movement and change: key issues and developing approaches in visualization research." Information Visualization **7**(3): 173-180.

Elwood, S. (2008). "Geographic Information Science: new geovisualization technologies; emerging questions and linkages with GIScience research." Progress in Human Geography.

Fisher, R. and B. Myers (2011). "Free and simple GIS as appropriate for health mapping in a low resource setting: a case study in eastern Indonesia." International Journal of Health Geographics **10**(1): 15.

Guenther, C. (2009). "Teaching Geoscience with Google Earth, Viewed 20 Aug 2011, http://sites.duke.edu/tlge/2009/11/19/teaching-geoscience-with-google-earth/."

Hauge, O., C. Ayala, et al. (2010). "Adoption of open source software in software-intensive organizations - A systematic literature review." Information and Software Technology **52**(11): 1133-1154.

Husa, D. (2009). "Google Earth in Geoscience, Viewed 25 Aug 2011, http://sites.duke.edu/tlge/2009/11/19/google-earth-in-geoscience/."

Kowalczuk, R. (2010). Plotting a route to effective web-based avalanche education tools using geovisualization principles, SIMON FRASER UNIVERSITY.

Manduca, C. A., D. W. Mogk, et al. (2010). "On the cutting edge: teaching help for geoscience faculty." Science **327**(5969): 1095.

McAdams, M. A. and A. Nikov (2011). "Education in Geographic information systems usability and user-adaptivity."

McGregor, K. W., S. L. Griffeth, et al. (2008). Using computer-generated animation as additional visual elaboration in undergraduate courses-student perceptions.

Mirza, M. M. Q. and Q. K. Ahmad (2005). "Climate change and water resources in South Asia." Taylor & Francis Group plc, London, UK.

Monalisa, A. A. Khwaja, et al. (2007). "Seismic hazard assessment of the NW Himalayan fold-and-thrust belt, Pakistan, using probabilistic approach." Journal of Earthquake Engineering **11**(2): 257-301.

Nawaz, M. and Shaw G. (2011) "Free and Open Source Software for Geoscience Teaching and Learning" IDIAS International Conference on International Higher Education (IHE 2011), Dec 10-12, Shanghai , China, Vol.1, pp 75-79 , ISBN: 978-972-8939-56-4

Patyk-Kara, N. G., L. Z. Bykhovsky, et al. (2001). "Economic deposits: geological history, demand today and environmental aspects." Quaternary International **82**(1): 117-127.

Subramanyam, R. and M. Xia (2008). "Free/Libre Open Source Software development in developing and developed countries: A conceptual framework with an exploratory study." Decision Support Systems **46**(1): 173-186.

Tapponnier, P., G. King, et al. (2006). Active faulting and seismic hazard in the Western Himalayan Syntaxis, Pakistan. In

A.B. Kauser, T. Karim, and T. Khan (eds.). International Conference on 8 October 2005 Earthquake in Pakistan: its implications and hazard mitigation.Extended Abstracts, Islamabad.

Ven, K., I. Verelst, et al. (2008). "Should you adopt open source software?" Software, IEEE **25**(3): 54-59.

MENTORING ONLINE DOCTORAL STUDENTS THROUGH A COMMUNITY OF PRACTICE MODEL

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Abstract: Numerous educational theorists have researched the question of why doctoral learners leave their programs and numerous hypotheses abound. Online doctoral learners have unique needs not always adequately addressed. As a result of these unmet needs, attrition in doctoral programs is alarmingly high nationwide. In this study, we examine one particular online community of practice (CoP) to understand more completely how and why, after four years of being in existence, it remains robust. Based on interviews and analysis of data, the authors have determined that three elements make the CoP so successful: camaraderie, commitment, and cognition. Within the sanctuary of this highly structured CoP, learners are free to ask questions of peer members and develop friendships. Members in the CoP are dedicated to learning and mastering a particular qualitative methodology and assist less-experienced students whenever possible. Established experts are invited to talk about various components of the methodology. These elements have far-reaching implications not only for the CoP in question but also for learners in other fields of study who wish to develop their own CoPs.
Keywords: Community of Practice, mentoring, online virtual mentoring, Professional Learning Communities

Background

The proliferation of online learning programs has provided many schools with significant income-generating opportunities. Many schools are appealing to potential students eager for education but not able to come to a campus (Allen & Seaman, 2011). Little attention has been given the infrastructure necessary to support these students, however. This oversight results in decreased enrollments and demoralizing attrition rates from online programs (Allen & Seaman, 2011).

Doctoral students enrolled in online programs have higher rates of attrition than doctoral students who study on campus (Terrell, Snyder, Dringus, & Maddrey, 2012). Educational theorists (de los Arcos, Coleman, & Hampel, 2009; Yalof, 2014) have indicated that online students may experience frustration, isolation, and a sense of disconnect from their institution because they often do not receive help when needed. Many online learners feel stalled and unable to progress in their educational goals. To keep these students enrolled, institutions need sophisticated educational and interpersonal methods to support engagement and to sustain motivation.

The questions of why online doctoral learners leave their programs and what can be done to prevent this attrition have been asked by numerous educational researchers (Willging & Johnson, 2009; Sutton, 2014). Educational theorists (Fetzner, 2013; Sutton, 2014; Willging & Johnson, 2009) have suggested various causes for attrition including: (a) poor time management, (b) personal or family issues (Ali & Kohun, 2006; Berkholder, 2012), (c) dislike of the online format, style of instruction, or duration of the courses (Shaw, Chametzky, Burrus, & Walters, 2013), (d) overwhelming technical issues, (e) isolation (or lack of physicality and lack of socialization (Ali & Kohun, 2006), or (f) a misalignment of "expectations between the student and the department" (Berkholder, 2012, p. 7).

Online doctoral learners do not fit the demographic of students who attend school on campus (Allen & Seaman, 2011). Online students are often geographically diverse and have a different sort of graduate experience from the traditional, on-campus student. While programs conducted on campus rely on promoting student interaction through face-to-face classroom discussions or departmental get-togethers, an online student cannot form a social community in this manner (Terrell et al., 2012). Loneliness (Patton, 2014) and isolation have permeated the learning milieu of doctoral students (Ali & Kohun, 2006) and certainly are problematic for online students who struggle to feel they belong in the absence of any physical proximity (Yalof, 2014).

Numerous educational researchers (Ali & Kohun, 2006; Council of Graduate Schools, 2009; Patterson & McFadden, 2009; Sutton, 2014) found that attrition at the doctoral level is approximately 50% (Di Pierro, 2012). Berkholder (2012) suggested a wider range of 40% to 70% nationwide; Terrell et al. (2012) supported the statistics presented by Berkholder (2012), noting that attrition in all doctoral programs is roughly 40% to 50% but slightly higher (10%-20%) for online doctoral programs. Such statistics are alarming, highlighting the importance of understanding the causes of this attrition.

The Role of Peer Interaction

The authors of this paper focus on one of the most cited causes of attrition of doctoral students: lack of contact with peers and mentors (Terrell et al., 2012). In a face-to-face environment, faculty members guide learners. However, in an online environment, such close interaction might not be possible. Isolation and loneliness (Ali & Kohun, 2006; Janta, Lugosi, & Brown, 2014) are rarely felt in face-to-face programs—at least not to the degree that online students report them (Terrell et al., 2012).

Terrell et al. (2009) found the sole source of information for doctoral students is their faculty mentor. Thus, many things hinge on the competence and willingness of this mentor to provide support. Because these students have only one resource, they often feel frustrated and isolated. Slow response times, lack of structure, or faculty seen as "overburdened with the number of students in the program" (Terrell et al., 2012, p. 7) have contributed to student frustration and sense of disempowerment.

In their research, Terrell et al. (2012) illuminated the disturbing fact that peer interaction, though important, is not very prevalent at the doctoral level. Further, faculty educators are not as responsive as learners would like. Both elements contribute to learner attrition at the doctoral level (Sutton, 2014). Berkholder (2012) opined, "Students want something intentional, like an ABD support group meeting, with a faculty member . . . some mechanism . . . but the bottom line? They wanted faculty to be involved" (p. 17). Because students see only the work of faculty only on their comments, they might believe that the instructor is not working hard enough to assure their success.

To minimize "loneliness and isolation" (Janta, Lugosi, & Brown, 2014, p. 553), doctoral learners must accomplish two tasks. First, they must immediately voice any concerns or problems they have. Because of the limited experience online doctoral students have with being "self-directed," (Janta, Lugosi, & Brown, 2014, p. 556), and because of the pedestals on which they place faculty members, learners often remain silent (Janta, Lugosi, & Brown, 2014). They believe that silence demonstrates that they do not need assistance (Cortazzi & Jin, 1997; Janta, Lugosi, & Brown, 2014).

Second, to reduce negative feelings, doctoral students must ask their peers questions on topics on which they need help (Janta, Lugosi, & Brown, 2014). To calm the learner (Chametzky, 2013a), stability and the reduction of loneliness and anxiety may be cultivated through a community of practice (CoP) (Lave & Wenger, 1991) as a venue in which to feel comfortable to ask questions. Systems of encouragement, support, and guidance serve a vital role in online and traditional education especially when learners find that "the educational institution is unable to provide for all of their needs" (Yalof, 2014, p. 18). Learners "who study online must master both program material and their emotions to move smoothly through a curriculum. Support from their peer group empowers both of these areas" (Yalof, 2014, p. 21).

The authors of the current study will add support to Terrell, Snyder, Dringus, and Maddrey (2012) through endogenous, evidentiary data that an online cohort or CoP (Lave & Wenger, 1991) helps online doctoral learners (and online learners in general) reduce feelings of disconnection and isolation as well as regain some stability in their academic lives (Chametzky, 2013b) as they position themselves to succeed (Yalof, 2014).

Setting

The authors examined the following three components of setting: (a) the post-secondary learning institution (b) the locations of the students and guest lecturers in a specific cohort, and (c) the cohort itself. Only by examining each of these components were the authors able to obtain a fuller, more comprehensive perspective.

The Post-Secondary Learning Environment

The setting for our experiential study is a regionally accredited, online post-secondary school physically located in the southwestern United States. The school was founded in 1996 and offers undergraduate and graduate degrees in business and technology management, education, psychology, and marriage and family sciences. One important selling point of the school is the absence of a physical residency requirement. It is reasonable to believe that not having to travel periodically to complete a residency requirement is a convenience and a benefit. Yet, one clear downside to a no-residency requirement is that students often work in isolation with little chance to meet in-person the people with whom they share a curriculum.

Community of Practice (CoP)

Throughout this article, we refer to our cohort as a CoP (Lave & Wenger, 1991). A CoP is characterized by certain attributes that make it more valuable to its members than a club or group of friends. Members of a CoP are practitioners in a similar field. Each person shares a commitment to the success of his or her peers and believes that without mentoring, he or she would have great difficulty succeeding.

The CoP (Lave & Wenger, 1991) in question was conceived in 2010 by two faculty members and one doctoral student to understand the complicated qualitative methodology of Classic Grounded Theory. Other learners who needed assistance soon joined this individual student. The original idea for creating the group developed through success of the two faculty members when they studied the methodology. Since its inception, the CoP has grown to approximately 25 people. Of those 25 people, six have successfully defended their doctoral dissertations with three people each earning Doctorate of Philosophy and Doctorate of Education degrees. Six or seven members are in the final stages of their writing; the remaining members are working on their milestone documents.

Investigations and Practice

In this experiential study, the authors will analyze the CoP, now in existence for four years, from an endogenous perspective. By examining the makeup and function of this particularly effective online cohort, the authors will offer reasons why such a cohort is beneficial for online doctoral learners and for learners in general.

To understand the unusual success of the particular cohort in question, an analysis of four years of data totaling over 1000 pages of Skype chat records from January 2011 through September 2014 was conducted. The data were categorized. Then, interviews were conducted with cohort members. It was important to understand more clearly why cohort members willingly answered other members' questions, sometimes before attending to their own tasks. What were the participants gaining from the group that made them willing to invest so much time and effort?

The small, faculty-initiated project generated a positive role modeling experience for the students who, prior to graduation, served a similar mentoring leadership role with other students. Through strong scaffolding and ongoing support of this solid group, each member felt appreciated for what he or she contributed.

Without forcing the data from the Skype chats to fit into any predetermined categories (Glaser & Strauss, 1967), it was discovered the emergence of three overriding concepts: camaraderie, commitment, and cognition. These dimensions formed the foundation for the success of the cohort. It is through cognition (how members of the CoP acquired the skills necessary to learn the Classic Grounded Theory method), camaraderie (the comfort of the members to share ideas and ask questions whenever necessary), and commitment (the knowledge that each member is not alone in his or her journey) that a CoP and its members are successful.

Camaraderie and Commitment

The researchers found members of the cohort invested a great deal of energy into assuring their group members were successful. For many senior members of the cohort, a strong sense of commitment existed. It was this obligation underpinning feelings of "paying it forward" as several participants have mentioned. When help is needed, anytime, anyplace, for as long as necessary, members must know they are not alone. After their studies are completed, the satisfaction that learners gained through being part of such a tight group encourages them to support those learners who are still in need.

Students do not want to create impediments for themselves in the doctoral process. They believe that their limited time with their chair and committee should deal only with important issues. Online students often do not know whom to ask about concerns. Answers they seek may be complex, and it may take time to locate an individual familiar with the school policy. A peer in the cohort, who is less emotionally involved, may be able to offer advice on how to work through or around barriers. Further, peer interaction lessens anxiety. With lower anxiety level (Chametzky, 2013a), learners are better able to grasp the complex concepts of the methodology. This ease generates camaraderie among members. Building expertise is facilitated without anxiety.

Cognition

Each member of the cohort joined to learn how to conduct research in the Classic Grounded Theory method. The CoP is highly structured so that each person can find answers quickly and learn as much as possible. Each member helps other members (a) locate hard-to-find references in seminal literature; and (b) practice the established techniques and components of the Classic Grounded Theory method. This research methodology must be followed in a careful manner; otherwise the researcher will not reach the objectives of the study. The cohort members have devised numerous ways to ensure information is disseminated, understood, and practiced. Because the Classic Grounded Theory method is complex and experiential, each of the components must be explained clearly to less-experienced members.

Building a repository for information sharing. The members of our CoP created and continue to maintain a comprehensive wiki page, which contains relevant information accessible to everyone. One example is an intricate diagram posted by one member outlining the components of how the Classic Grounded Theory method works and what resources are available on the Internet concerning this complicated research methodology. Another example is a sample transcript of a coded interview. During one of the planned collaborative group Skype sessions, the coding was discussed and analyzed for teaching purposes. All members are encouraged to post information for the group to discuss and critique. In addition, peer-reviewed articles are shared via crocdoc, which allows students to make annotations and offer comments. The repository functions as a FAQ for doctoral students. The sharing and creating of this storehouse of information is essential to the continuity and relevancy of the CoP. During meetings, cohort members continually refer one another to where the information is posted.

Guest experts in the field. Our faculty members have contacts with eminent researchers in the field of Classic Grounded Theory. Experts from Canada, England, and the United States visit our group (virtually) and offer a master-class. Cohort members present works-in-progress to these scholars for feedback.

After the master class with the guest presenter, assignments are created for the group to practice what was learned. The continuous hands-on practice of the intricacies of the method allows the members to experience what they have learned.

Skype meeting recordings. Each virtual meeting is recorded and placed on the wiki for members. Important meetings and other group literature are indexed by a volunteer group member. Recording and posting meetings allows anyone to visit or revisit important sessions including meetings with experts and sessions where homework was assigned and analyzed.

The Skype chat area allows cohort members to post questions about anything related or tangential to group knowledge. A member may post a question about an obscure Classic Grounded Theory concept, or need a certain quotation, and receive an answer within a very short period of time. One area often discussed is technology.

Analysis

Within this supportive cohort venue, members provide information to peers in a quasi-teaching role thereby enhancing their own "feelings of self-worth" (Yalof, 2014, p. 18). Though learning has an individual aspect to it, various educational researchers (Decker, Dykes, Gilliam, & Marrs, 2009; Mezirow, 1971, 2000) commented that it is through interaction and collaboration that learning is stimulated and fostered. In the CoP, each person can consult with another member without being judged. Roles can reverse at any time, as one person might have expertise in a topic in which another person is a novice. Tutoring relationships become the basis for personal relationships. This fluidity of roles characterizes the practice of the network (Yalof, 2014). Starting from a small unit of three members—two faculty members and one doctoral student—the group grew into a much larger group of learners and professionals who shared the same passion.

Transitioning from Novice to Expert

In the early days of the cohort, information was presented by the faculty member leader(s). As members joined the cohort and as the students gained knowledge, the transfer of knowledge occurred through peer teaching. While under the tutelage of the faculty leader, the more advanced peer learners transitioned from novice to expert. Such transition allowed the advanced learners to assist those lesser-experienced learners with greater ease and conviction. In fact, in an attempt to be overly helpful, but not in a negative way, the more experienced learners often provided much information before it was needed. Because of this additional sharing, group members were available to guide the less-experienced student. For example, one member reviewed the literature of Classic Grounded Theory and created an index where none had been available. One member said:

> So the cohort became a place where I found specific knowledge of the methodology but also compassion from others who also had their own journey of understanding. You all were happy to put up with my newbie comments that often missed the mark, and you tried to guide me towards a better understanding. So then, love developed in my heart for the team in the cohort.

Strengths and Weaknesses of The CoP

Because of the highly structured procedures of this CoP, a key strength is the almost immediate availability of help. Members of the CoP provide clarification of the most intricate details related to the Classic Grounded Theory method. One weakness of the practice affects all CoPs. Not all participants are willing and able to put in the extra hours necessary to practice the techniques employed. A substantial time commitment, in addition to the time already invested in school, is necessary to remain a contributing and active member of the CoP. If members of the CoP are not able or willing to put in the extra time necessary, they need to make a decision. Sometimes, these people become inactive members of the cohort and use it only as a tangential resource. More often, though, members decide that learning the Classic Grounded Theory method in an isolated environment is too challenging; they choose an easier methodology.

Scaffolding

The fact that the members are attuned to the needs of each other exemplifies the way a good CoP should function (Holley & Caldwell, 2012). Members of the cohort are online nearly 24/7. Should someone have a question, people often respond in a very short time. Developing a shared knowledge base happens in conjunction with a growing feeling that cohort members are available for each other in *any* capacity, at *any* time. As one member wrote,

> I am not alone anymore . . . not just you and the computer . . . we share and have classes with mentors who give freely of their time and knowledge to see us succeed. It has been an amazing experience.

An example of our scholarship is the numerous discussions on coding raw data in a Classic Grounded Theory method study. Often, members of the cohort conducted mini-grounded theory studies consisting of mock 5-minute interviews followed by group conceptual coding and memoing. Such teaching exercises help minimize anxiety (Chametzky, 2013b). One participant commented: "this board is great too; at any time someone is here to help out." The same participant opined, In the beginning . . . I had no idea what was going on, I just knew [sic] that I wanted to be a part of it. I listened and read a lot. I really believe that all of you have helped me get my CP [Concept Paper—first milestone in the dissertation process] through the GS [Graduate School] and for that I'm really thankful.

Each member of the CoP is learning the Classic Grounded Theory method and is freely able to scaffold with other members; such valuable interaction is encouraged and welcomed. According to one participant, “You and this group are a great encouragement! I hope that you continue to stay as active. You are always available, it seems :-].” Another participant mentioned “You guys are all resources for each other.”

Applications for Other Areas

On-campus doctoral students may feel just as isolated and sad (Janta et al., 2014) as students who study online. Recently, Patton (2014) interviewed black doctoral students for an article in the Chronicle of Higher Education (Sept 26th). The article detailed the difficulty of being black and maintaining momentum towards earning a Doctorate of Philosophy. Despite being an on-campus student, one student, Vincent Bastile, noted he reached out to “his own informal community of graduate students and faculty of color for support” (p. A10). The coping mechanism of this student was to seek help outside the mainstream sources of help for doctoral students. The need to create supportive groups may be even greater for online students.

What a CoP creates is an “advisor-advisee relationship” (Sutton, 2014, p. 17). In reality, the CoP goes far beyond what might be a formal, business-like relationship. Yalof (2014) explained how “active members of an online support group credited the group with not only intellectual stimulation but also emotional support to continue to completion despite obstacles” (p. 23) thus supporting the comment that “it takes a community of scholars to build, retain, and graduate a community of scholars” (Di Pierro, 2012, p. 32).

One of the most significant outcomes of our investigation was the realization that institutions of higher education begin too late, or not at all, to help students find the scaffolding they need to succeed. A CoP should exist beyond one or two classes, as so often the practice in graduate education.

Setting up CoPs that meet and provide information online can be effective for all students, regardless of whether they meet on campus. Many students would benefit from having a group of like-minded students to share their methods of working with doctoral committees.

CoPs are effective ways to share knowledge and build community outside of education as well. CoPs can be very effective in business and medicine. Using the highly structured cohort described in this paper as a model for sustained success might benefit physicians and medical students who share sustained interest or research in one area. An ongoing conversation among experts and those who seek information would be invaluable to facilitate global research efforts. Members of a CoP could constantly review best practices in medicine.

Recommendations

We believe the power of this cohort to prevent doctoral program drop out lies in a few different areas. The emotional power of knowing someone is there who can answer perplexing questions is critically important. We suggest that a cohort that supports the needs of online doctoral students for an extended period, rather than from course to course, is vital to the emotional, social, and educational well-being of the learner. Members bring in newer potential group members who build expertise and may, in turn, provide their knowledge and support. The following is a short list of our recommendations to institutions of higher learning and to students:

- Promote CoPs to students and encourage faculty to create or join existing CoPs
- Provide a means for members to communicate and see each other via various face-to-face technologies
- Record virtual meetings
- Use a wiki or other online system to support posting of relevant materials and communications
- Bring experts to meetings to provide their scholarship and feedback
- Keep an ongoing chat available for members to ask questions and receive help
- Invite interested students to join the meetings
- Assign “homework” for group meetings-and make members accountable for contributing to group knowledge

- Encourage members to lead and take responsibility for group meetings
- Encourage members to continue involvement after graduation

Implications for Practice

Our field study showed that successful online students recognize that if they feel disengaged they must build their own supports. Through building relationships, they generate new resolve. Sutton (2014) observed that "the seminal research of Tinto (1975, 1993) on student persistence revealed that the greater the level of academic and social integration, the greater the student's chances of persisting until graduation" (p. 6).

Institutions of higher learning should become more aware of and supportive of the attempts of their own instructors and students to form cohorts to support each other's learning. Efforts to form online communities within a particular course are admirable. More effective, however, are cohorts supporting students throughout their doctoral journey. CoPs should become a vital part of the education of each student so that online students will not suffer. Efforts to keep a CoP vital, relevant, and continually self-generating are facilitated if the CoP itself anticipates student needs. The social discourse is important, but the need for knowledge is more important to ensure successful completion of an online program. An effective CoP gathers practitioners and disseminates information. The CoP described in this paper does this and also creates an atmosphere of acceptance, the best combination for success.

Future Research

Future research is needed in development of CoPs in online programs. It would be valuable to assess the effectiveness of online CoPs towards preventing attrition in both on-campus and virtual programs. It is important to understand how best to set up and support communities of learning for students who do not meet face-to-face.

References

Ali, A., & Kohun, F. (2006). Dealing with isolation feelings in IS doctoral programs. *International Journal of Doctoral Studies 1*, 21–33. Retrieved from http://www.informingscience.us/icarus/journals/ijds/

Allen, E., & Seaman, J. (2011). *Going the distance: Online education in the United States*, 2011. Retrieved from http://sloanconsortium.org/publications /survey/going_distance_2011

Berkholder, D. (2012). Returning counselor education doctoral students: Issues of retention, attrition, and perceived experiences. *Journal of Counselor Preparation and Supervision, 4*(2), 6-23. http://dx.doi.org/10.7729/42.0027

Chametzky, B. (2013a). Offsetting the affective filter and online foreign language learners. Retrieved from http://www.igi-global.com/open-access/paper/offsetting-affective-filter-classic-grounded/7

Chametzky, B. (2013b). Generalizability and offsetting the affective filter. *Grounded Theory Review, 12*(2). Available from http://groundedtheoryreview.com/2013/12/22/generalizability-and-the-theory-of-offsetting-the-affective-filter/

Council of Graduate Schools. (2008). Ph.D. completion and attrition: Analysis of baseline program data from the Ph.D. completion project. Washington, DC: Author. Retrieved from http://phdcompletion.org/resources/CGSNSF2008_Sowell.pdf

Decker, A., Dykes, M., Gilliam, J., & Marrs, S. (2009). Being students again: Balancing ambiguities, expectations, and responsibilities. In *annual meeting of the Southern Regional Council on Educational Administration, Atlanta, GA*.

de los Arcos, B., Coleman, J., & Hampel, R. (2009). Learners' anxiety in audiographic conferences: A discursive psychology approach to emotion talk. *ReCALL, 21*(1), 3-17. doi:10.1017/S0958344009000111

Di Pierro, M. (2012). Strategies for doctoral student retention: Taking the roads less traveled. The Journal for Quality & Participation. Retrieved from http://www.aspq.org/pub/jqp

Fetzner, M. (2013). What do unsuccessful online students want us to know? *Journal of Asynchronous Learning Networks, 17*(1), 13-27. Retrieved from http://onlinelearningconsortium.org/publications/olj_main?page=1

Glaser, B. (2009b). The novice GT researcher. *The Grounded Theory Review, 8*(2), 1-22. Retrieved from http://groundedtheoryreview.com

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Mill Valley, CA: Sociology Press.

Holley, K., & Caldwell, M. (2012). The challenges of designing and implementing a doctoral student mentoring program. *Innovative Higher Education, 37*, 243-253. doi:10.1007/s10755-011-9203-y

Janta, H., Lugosi, P., & Brown, L. (2014). Coping with loneliness: A netnographic study of doctoral students. *Journal of Further and Higher Education, 38*(4), 553-571. http://dx.doi.org/10.1080/0309877X.2012.726972

Kiliç-Çakmak, E., Karatas, S., & Ocak, M. (2009). An analysis of factors affecting community college students' expectations one-learning [sic]. *Quarterly Review of Distance Education, 10*(4), 351-363. Retrieved from http://www.infoagepub.com/quarterly-review-of-distance-education.html

Lave, J. & Wenger, E. (1991): *Situated learning: legitimate peripheral participation.* Cambridge, Cambridge, UK: University Press.

Mezirow, J. (1971). Toward a theory of practice. *Adult Education Journal, 21*(3), 135-147. doi:10.1177/074171367102100301

Mezirow, J. (2000). Learning to think like an adult. Core concepts of transformation theory. In J. Mezirow and Associates (Eds.), *Learning as transformation. Critical perspectives on a theory in progress* (pp. 3-33). San Francisco, CA: Jossey-Bass.

Patton, S. (2014, September 26). After Ferguson, black students ask: Does a Ph.D. still matter. *The Chronicle of Higher Education, LXI*(4), p. A10. Retrieved from http://chronicle.com/section/Home/5

Shaw, M., Chametzky, B., Burrus, S., & Walters, K. (Winter 2013). An evaluation of student outcomes by course duration in online higher education. *Online Journal of Distance Learning Administration, 16*(4). Available from http://www.westga.edu/~distance/ojdla

Sutton, R. (2014). Unlearning the past: New foundations for online student retention. *Journal of Educators Online, 11*(3). Retrieved from http://www.thejeo.com/index.html

Terrell, S., Snyder, M., Dringus, L., & Maddrey, E. (2012). A grounded theory of connectivity and persistence in a limited residency doctoral program. *The Qualitative Report, 17*(Art. 62), 1-14. Retrieved from http://www.nova.edu/ssss/QR/QR17/terrell.pdf

Willging, P. & Johnson, S. (2009). Factors that influence students' decision to dropout [sic] of online courses. *Journal of Asynchronous Learning Networks, 13*(3), 115-127. Retrieved from http://onlinelearningconsortium.org/publications/olj_main

Yalof, B. (2014). Marshaling resources: A Classic grounded theory study of online learners. *The Grounded Theory Review: An International Journal, 13*(1), 16-28. Retrieved from http://groundedtheoryreview.com

PLANNING TO DESIGN MOOC? THINK FIRST!

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Abstract: Over the last years, educators have been forced to rethink about the whole education system. In 2005, Connectivism, a new learning theory, was emerged. Consequently, Massive Open Online Courses (MOOCs) have been presented as an alternative powerful educational system. Money was invested and tens of for-profit and non-profit companies involved in producing MOOC. However, integrating and adopting MOOC in educational institutions worldwide is still questionable. This literature review paper addressed and discussed the issues that higher education institutions should consider before adopting MOOC. The findings showed eight considerable, interrelated and controllable MOOC issues: high dropout rate, accreditation, business model, reputation, pedagogy, research ethics, student assessment and language barrier. Policy makers in higher education institutions should be aware of these issues before including MOOC in their development plans. In addition, the paper presented a number of possible future studies.

INTRODUCTION

Humanity lives today what some people call a knowledge explosion. What was considered to be robust knowledge yesterday, is in doubt today, and may disappear tomorrow. The cycle of emerging, discussing, adopting, questioning, and disappearing of knowledge not only continues but also accelerates. As AlDahdouh, Osório and Caires (2015) say, "The time should be considered as a dimension of knowledge" (p. 12). Such observation has encouraged Arbesman (2012) to study the half-life of facts, having concluded that the half-life of knowledge is shorter than ever. That also has motivated Siemens (2006) to discuss soft knowledge, the freedom of knowledge, and eventually introduce Connectivism as a new learning theory. According to Siemens (2006), earlier learning theories are no longer able to interpret learning activities of learners in the digital age. Connectivism, on the other hand, interprets learning occurring outside the learners and describes networked learning. In Connectivism, "the structure of the knowledge is described as a network... Learning, according to Connectivism, is a continuous process of network exploration and patterns finding; it is a process of patterns' recognition" (AlDahdouh et al., 2015, p. 14). In 2008, George Siemens, Stephen Downes and Dave Cormier developed a concept for a course portraying the connectivism (Downes, 2012, p. 536). The first course was Connectivism and Connective Knowledge (CCK08) offered by Siemens and Downes (Downes, 2008). The course succeeded to attract 2200 students worldwide (Downes, 2008). It has since become known as Massive Open Online Course (MOOC) (Jacoby, 2014; Weller, Siemens & Cormier, 2012). The idea of MOOC found allies among other academic institutions and rapidly became a potential solution in the context of educational reforms. In 2011, more than 160,000 students enrolled in an online Artificial Intelligence course offered by Stanford University (Jacoby, 2014; Pérez-pena, 2012). The course launched the second phase of MOOC development. Several companies have been built to support MOOC development. Eventually, learning shifted from universities to companies. Udacity, Coursera, and edX are some of those leaders of MOOC providers. MOOC in this phase is somehow different from the original one. Some researchers present it as xMOOC to be distinguished from connectivist MOOC, cMOOC (Daradoumis, Bassi, Xhafa & Caballé , 2013; Downes, 2013).

While evolving, MOOC has been criticized by many educators and researchers (Auyeung, 2015; Bartolomé & Steffens; 2015). High dropout rate, accreditation, and business model are some of the most discussed issues. In addition, there are other sensitive issues such as MOOC reputation, research ethics, pedagogy, assessment, language barrier, and impersonation-and-fraud. Considering these issues, higher education institutions have developed different stances toward adopting MOOC: some are producing MOOCs (producers), some are using MOOCs developed by others (consumers), some are waiting to see the results, and others decided against any form of official adoption (Hollands & Tirthali, 2014b, p. 49). Among the list of those who decided not to participate are some of Europe's best schools: Oxford and Cambridge (Auyeung, 2015). Moreover, in a report of 2014 that tracks the online education in the United States, 39.9% of American higher education institutions have not decided whether to adopt MOOC or not (Allen & Seaman, 2014). And this proportion seems to be larger for other countries (Jacoby, 2014), while little has been done to address the issues of MOOC and clarify their impacts (Auyeung, 2015).

This paper may serve those academic institutions to identify MOOC issues when seeking to use MOOC in their development plans. The paper addresses these issues, clarifies and presents the recent developments in each issue.

MOOC

As previously mentioned MOOC stands for Massive Open Online Course(s). Therefore, MOOC is an online course with two additional features: openness and massiveness. Openness is one of the core concepts of Connectivism. As Downes (2012) said, "The topic of 'openness' in education was sufficiently large as to require a separate work" (p. 11). In general sense, openness in Connectivism means a freedom of participation and engagement; a transparency of content and design; and a freedom of learners to teach and learn (Jacoby, 2014; Downes, 2012; Weller et al, 2012). From learners' perspective, the course is entirely accessible with no constraints. No tuition fees, no identification and no previous conditions or certifications are required to enrol into the course. Thus, the course may have a heterogeneous spectrum of students with different backgrounds, languages, ages, and cultures. Massiveness refers to the possibility to scale up the course in terms of the number of students (Weller et al, 2012). It can be seen that the massiveness is the result of presenting a course with no constraints in a networked environment. Consequently, it is normal to see a single MOOC with a number of students exceeding the entire number of students enrolled in some universities (Markoff, 2011). One important feature which is not clearly stated in the MOOC title, although it is implicitly included in openness keyword, is participation. In fact, participation is the key feature of MOOC which distinguishes it from Open Courseware (OCW) and Open Educational Resources (OER) (Littlejohn, 2013). MOOC is not just content presented online for free; it is a matter of actions, connections, and activities. Connections and activities of the learners themselves are what Connectivism is all about. Learning occurs while connecting nodes; "The pipe is more important than the content within the pipe; simply because the content changes rapidly" (Siemens, 2006, p. 32).

Hereby, MOOC can be defined as a course aiming a large-scale interactive participation and open access via Web (Littlejohn, 2013).

METHODOLOGY

This study employed a qualitative content analysis approach. In qualitative content analysis, researchers start with purposefully selected and relatively small content samples, looking for deep meaning, themes and patterns of connections. Then, during data analysis, the researchers immerse themselves in data and allow themes to emerge (Zhang & Wildemuth, 2009). The aim of the current study is to find as many considerable issues as possible. Therefore, the study investigated other participants' and researchers' feedbacks on MOOC. It is important to know that researchers in Connectivism depend heavily on openness of information and use blogs, social networking websites and YouTube to share their research results (Jacoby, 2014), which are not the regular scholarly publication channels. In addition, MOOC is a fast growing phenomenon (Bali, 2014; Jacoby, 2014); for example, in late December 2015 a Google Scholar showed 978 articles when searching for 'MOOC' term in the title (excluding 'citations' and non-English language results) in contrast the search results showed 200 articles in early October 2013 (Jacoby, 2014). This added a difficulty to the current research.

The study passed through two phases. The first phase started by investigating Connectivism theory and then searching for MOOC. The main purpose in this phase was to understand Connectivism and MOOC, identify MOOC types, and detect MOOC issues. Abstract and conclusion sections in research reports, blogs and journal articles were the main target. In some cases, the whole text was read in order to reach a full understanding of the issue presented in the article. The keywords used in search engines and digital libraries were George Siemens, Connectivism, MOOC, Massive Open Online Courses, and MOOC issues. By the end of the first phase, Connectivism theory, MOOC concept, types, and a list of MOOC issues were organized. Understanding of Connectivism was presented in other work (Aldahdouh's et al., 2015). The second phase began by searching for the issues one by one. The keywords used in this stage were closely related to the issue name and its synonyms. The results were filtered to the last seven years and then filtered upon relevance to the topic. Abstracts, discussions, results, and conclusions were the main target, while the whole text was read in some cases. The main purpose in this phase was to identify the issue, understand it, and see the latest developments in the field. By the end of this phase, all issues were detected and clarified.

ADOPTION MODELS

MOOC issues can't be addressed without identifying the adoption models of MOOC because those models depend on different theoretical frameworks and therefore have different interpretations of the same issue. Many adoption models were identified while only three can be considered as influential models: cMOOC, xMOOC and SPOC:

cMOOC
cMOOC stands for Connectivist Massive Open Online Course(s). This is the model that was initially suggested by Downes and Siemens (Downes, 2008). The course structure depends on Connectivism principles as a guide for its pedagogy. In this structure, two kinds of students' participation are presented: (1) in-classroom participants - those who are paying and registering in the traditional educational system and taking the course as part of accredited degree; (2) online participants - those learners who are taking the course searching for knowledge without accredited degree. From in-classroom students' perspective, this structure may be seen somehow like blended learning rather than online/distance learning.

In this structure, the university initiates the course as any traditional course. A teacher handles the course schedule, builds a virtual course environment, in a Wiki page or in a Learning Management System (LMS), and invites students from all over the world to participate. In-classroom students normally register in the course at the university as part of an accredited degree, and participate in the online course. Online participants, who probably were searching for such courses over the Internet, accept the invitation and participate in the online course without credit at the end. While a Wiki page or LMS represents the common node for all learners, most of the learners' learning activities happen outside it (Saadatmand & Kumpulainen, 2014; Downes, 2012). Each learner has a Personal Learning Environment (PLE), which consists of a subset of available Web 2.0 technologies such as Facebook, Twitter, blogs, wikis, RSS, etc. Learners are encouraged to use their own tools to post and comment on the course and to collaborate with others but with a common tag. To keep themselves aware of other students' activities, the aggregator (a tool that gathers students' activities) sends a daily newsletter to each student. In each week, a course author raises a topic for discussion. The learners regulate their activities and interact with other learners, sometimes in smaller sub-networks. Thus, the content is distributed and built upon participation (Downes, 2012; Masters, 2011).

Hereby, cMOOC is defined as "an online course with the option of free and open registration, a publicly-shared curriculum, and open-ended outcomes. MOOCs integrate social networking, accessible online resources, and are facilitated by leading practitioners in the field of study" (McAuley, 2010, p. 10). Some examples of courses carried out on this model are: CCK08, PLENK2010, MobiMOOC, EduMOOC, Change11, DS106 and LAK12 (see Rodriguez, 2012). Although it does not identify itself as cMOOC platform, Peer 2 Peer University (P2PU) may participate in creating cMOOC environment (Cole & Timmerman, 2015, p. 190) where it "allows any member to design and create an educational course, which can then be taken by any other member in the online community" (Ahn, Butler, Alam & Webster, 2013, p. 3).

xMOOC
xMOOC stands for eXtension of other educational stuff as MOOC. Course structure depends on online/distance learning model rather than on blended learning. Only online participants are presented in xMOOC. xMOOC follows instructivist course design in which learning goals are predefined by instructor (Littlejohn, 2013). Rodriguez (2013, 2012) argues that xMOOC relies on cognitive-behaviorist pedagogical practices while Conole (2013) argues it mainly adopts a behaviorist learning approach. This model got a lot of criticisms from the connectivists (Parr, 2013).

In this structure, an online platform is built by company which is called MOOC provider. The platform presents a set of discrete courses. Each course is offered by one or more instructors or academic institutions. The course content consists mainly of short movies, links to related resources, short quizzes, multiple-choice questions, projects, and discussion forums (Bali, 2014). Depending on the subject, some courses may have auxiliary applications such as in-browser programming environments and simulation programs (Ben-Ari, 2011). The assessment of student's progress mainly depends on the AutoGrader system with limited peer evaluation. Although the learners can participate in discussion forum or external sub-networks (a group in Twitter for example) (Bali, 2014), the course is still centralized on the MOOC provider where the teacher *teaches* and the learner *learns*. Moreover, the definition of openness is constrained in xMOOC (Rodriguez, 2013). For instance, some MOOC providers impose additional fees to use the material presented in their courses by other academic institutions (Hollands & Tirthali, 2014a; 2014b).

Some examples of MOOC providers are: edX, Coursera, Udacity and FutureLearn (Downes, 2013; Auyeung, 2015). Each MOOC provider presents hundreds of courses, for example Aerodynamics XSeries (offered by Massachusetts Institute of Technology on edX) and Python for Everybody (offered by University of Michigan on Coursera).

SPOC

SPOC stands for Small Private Online Course. Fox (2013) presents a new model to adopt xMOOC. In this model xMOOC is used as a supplement to classroom teaching rather than being viewed as a replacement for it. Thus, SPOC is residing under the blended learning umbrella. SPOC consists of two or more detached courses, one which is running at the traditional academic institution and the others running on xMOOC. The courses' titles may be similar, but each one may have different instructors, students, and content.

In this model, the traditional university initiates the course. Teacher sets the course goals and reviews xMOOC providers to find out other similar courses. When the on-campus course begins, a teacher invites the students to join similar courses running on xMOOC. In-classroom students learn the basics concepts, interact with international online students and solve the quizzes on xMOOC, while spending more time working on the lab and solving real problems in classroom time. Fisher and Fox (2013) suggest a wrapper-MOOC structure which is similar to SPOC but where on-campus courses are 'synchronized' with xMOOC and the xMOOC's requirements should be a subset of the campus course. Some researchers (Auyeung, 2015) reported, based on BBC News article, that SPOC means imposing a restriction on the number of participants in xMOOC. However, we didn't see this claim congruent with Fox's SPOC model.

MOOC ISSUES

There are eight considerable issues of MOOC. Some issues are significant for one model but not for the others. Therefore, it is important to address these issues, figure out where they apply, discuss, understand and solve them, so we can move on.

High Dropout Rate.

Dropout rate refers to the ratio of students failing to complete the course, to the total number of enrolled students. Dropout rate is sometimes referred as attrition rate or by its complement ratio, the completion rate. Dropout rate is a point of concern of online education in general, not just in MOOC (Allen & Seaman, 2014). In MOOC, however, the dropout rate is extremely high. While thousands enrolled into MOOC, hundreds – or, sometimes, tens - show up at the end of the course. Jordan (2013), who gathered unofficial completion rates of many MOOCs, reported that most MOOCs have completion rates of less than 13%. Even worse than that, Kolowich (2013) stated that the completion rate in MOOCs is believed to be around 10%. In a recent report of 64 certificate-granting courses offered by Harvard and Massachusetts Institute of Technology (MIT) on edX platform, the certification rate increases slightly from 7% to 8% (Ho et al., 2015). This issue has a great impact on all MOOC types, but it is critical for xMOOC, since online students are the only students they have. The issue is widely mentioned and discussed among researchers (Auyeung, 2015; Cole & Timmerman, 2015; Bali, 2014; Kolowich, 2013; Ahn et al., 2013). Coursera co-founders, Daphne Koller and Andrew Ng said that "most students who register for a MOOC have no intention of completing the course, their intent is to explore, find out something about the content, and move on to something else" (Kolowich, 2013). However, the data shows that the percentage of explorers, who access half or more of course chapters presented on edX, forms only 14% to 19% of the total participants (Ho et al., 2015, p. 8). Yang et al. (2013) explored students dropout behavior in xMOOC ran on Coursera. They ended up with a survival model of three predicators: (1) Authority - students with a good authority scores are those who engage other students in discussions; (2) Cohort 1 - a set of students who began work within the first week; (3) Post Duration - the time difference between the first post and last post in selected week. Thus, students who linked to these predicators are the most likely to complete the course. Deeper analysis on edX platform shows that completion rate is higher among those who pay for certificates which makes the researchers (Ho et al., 2015) asking:"Should payment be mandatory" (p. 31)? They, however, recognize that this would compromise the core principle of the MOOC of being open access. Further research may be required to find out the factors and procedures that MOOC provider should take to foster student engagement. In cMOOC context, connectivists developed a new philosophy of success and completing the course; success is simply defined as when the learners complete what they defined for themselves as goals for participating in the course (Jacoby, 2014; Weller et al., 2012). Therefore, the high dropout rate is not seen as an issue in cMOOC. However, some researchers in cMOOC (Milligan et al., 2013) studied the pattern of learners' engagement in cMOOC and identified passive participant, who does not complete the course and develops frustration and dissatisfaction with the course, as an issue.

MOOC Accreditation.

MOOC Accreditation refers to the process of giving an online-MOOC student credit or recognition upon completing the course requirements. In general, the online students who are enrolling, studying, and successfully completing MOOC requirements get nothing but a letter of completion (Bergeron & Klinsky, 2013). Although some MOOC providers offer handful courses with verified certificates (Ho et al., 2015; Cole & Timmerman, 2015), more clarification is needed. Accreditation is a complicated process. Bergeron and Klinsky (2013) highlighted the complexity of MOOC accreditation. In traditional education, the student is granted a credit upon successfully completing a degree. The degree, not a single course, is accredited by the academic institution. The academic institution itself is accredited by an accreditation agency. In most countries, the official accreditation agency is the Ministry of Education. In MOOC, the accreditation is quite different. The online student registers into a single course. There is no study plan of a degree to follow, although some MOOC providers start offering series of related courses. Therefore, the accreditation needs to be done upon a course, not a degree. Also, if the student successfully finished a group of selected and interrelated MOOCs, wouldn't (s)/he deserve to have a certified degree? Moreover, even if a student granted an accreditation on a course/degree, is it possible to consider this course/degree to continue in traditional education and vice versa? These and many other questions should be answered for MOOC accreditation. Auyeung (2015) claims that MOOC providers fail in the process of accreditation. From on-campus students' perspective, accreditation seems to be one of their concerns regarding MOOC (Cole & Timmerman, 2015). This is also shown in edX courses where 57% of participants reported their intent to earn a certificate (Ho et al., 2015). In cMOOC context, it is clear that formal accreditation is not in their agenda where participants are expected to be searching for knowledge, not certificate, and the educators volunteer their time and interact with participants (Rodriguez, 2013; McAuley et al., 2010).

MOOC Business Model.

MOOC Business Model is sometimes referred as Money Model (Dellarocas & Van Alstyne, 2013) or MOOC sustainability (Sangrà & Wheeler, 2013, p. 290; Yuan & Powell, 2013). MOOC business model concerns about building a successful functional and financial design of MOOC. In xMOOC context, to understand MOOC business model, the reader should be aware of the key players in the model which are (1) the students, (2) the MOOC provider who builds and encapsulates the online infrastructure of the MOOC, and (3) the MOOC partners who are interested in providing the course for the public, usually academic institutions, museums and governments. From learners' perspective, MOOC is free, except if they want to have a credit, but from the MOOC provider's perspective, it is really costly. It includes: (1) installation cost such as building course materials, creating videos, creating online quizzes and, in some cases, creating programming or simulating environments; and (2) running cost such as tech-support and hardware infrastructure maintenance. Developing high quality courses with interactive features may cost between $39,000 and $325,000 per course (Hollands & Tirthali, 2014a; 2014b). As usual, someone should pay the bill. Although some researchers (Cole & Timmerman, 2015) have fears that MOOC will serve only a handful universities and private companies to generate many at expense of other academic institutions, Yuan and Powell (2013) report that "it is not entirely clear how the MOOC approach to online education will make money" (p. 10). In addition, the proportion of US academic leaders who do not believe that MOOCs are sustainable is almost doubled in two years (from 26.2% in 2012 to 50.8% in 2014) (Allen & Seaman, 2014). Dellarocas and Van Alstyne (2013) studied the proposed money model for MOOC. They argued that the current Open Source Money Models can be implemented for MOOC. In these Models, there are two main tracks:

- Charge for complements: Red Hat Linux offers Linux software for free and charges for consulting and technical support. From a MOOC's perspective, teaching a man how to fish allows us to sell him a boat. We can also sell the fish he caught while learning.
- Charge a different group with interdependent demand. LinkedIn offers many free services to job seekers and charges recruiters. Teaching a man how to fish, we can charge fleet captains who hire him.

Most of MOOC providers charge fees for verified certificate which may be considered their main source of revenue (Yuan & Powell, 2013). For example, edX charges fees for certificate ranges from $25 to $250 where most fees are $100 or less (Ho et al., 2015). Some xMOOC providers impose fees for using their materials from other academic institutions (Bartolomé & Steffens, 2015; Hollands & Tirthali, 2014a; 2014b). Re-run the course will certainly reduce the cost (38% lower in cMOOC and even lower in xMOOC) (Hollands & Tirthali, 2014b). However, MOOC sustainability is still a critical issue for both xMOOC and cMOOC. Ultimately, sponsors' and supporters' funds will run out. Open Source Money Models are options, but more investigation may be needed to find out the best combination.

MOOC Reputation

MOOC reputation refers to the beliefs or opinions that are generally held about MOOC. It is well known that a successful MOOC depends to a large extent on active participation (Bali, 2014; Saadatmand & Kumpulainen, 2014; Milligan et al., 2013). Participation, in turn, depends mainly on academics' and students' beliefs and their opinions toward MOOC. In a study using Twitter posts examining the public opinions of Open Educational Resources (OER) and MOOC (Abeywardena, 2014), MOOC gains more interest over OER. However, the average positive public opinion of MOOC is still around 25%. MOOC reputation issue is not new; it is inherited from online learning. During 2008-2009, a survey (Seaman, 2009) was conducted to examine academics' attitudes and beliefs toward online learning. About 10,700 faculty staff from 69 colleges and universities in the USA participated. The results show a paradox among the faculty views; the majority has serious reservations about the quality of online learning outcomes and in the same time they recommend online courses to students!

In 2014 report, Allen and Seaman show that "a continuing failure of online education has been its inability to convince its most important audience – higher education faculty members – of its worth" (p. 21). Since and over ten years, the rate of US academic leaders who say that their faculty accept the value and legitimacy of online education is fluctuating where it nearly returned to where it started, 27.6% in 2003 and 28% in 2014 (Allen & Seaman, 2014). Interestingly, the data from different MOOC providers show that a considerable portion of MOOC participants is adults (Pope, 2015; Macleod et al., 2015; Ho et al., 2015). For example, in six courses offered by University of Edinburgh on Coursera, 70% of participants are well-educated and in employment (Macleod et al., 2015). Moreover, in edX platform, 39% of the participants are identified as a past or present teacher (Ho et al., 2015). This suggests that MOOC is for teaching teachers, not for teaching college students (Pope, 2015). This also implies that faculty members have paradoxical opinions toward MOOC, since they are using MOOC to learn for themselves, but not to teach their students. From college students' perspective, MOOCs are seen useful for lifelong learning but are inferior to traditional college courses (Cole & Timmerman, 2015). Although the paradox in faculty and student attitudes toward MOOC may suggest an opportunity to change their opinions, their current opinions are largely negative and must be resolved before online learning is widely accepted. Further research may still be needed to track the change of their perceptions over time.

MOOC Research Ethics

Research ethics refer to principles of protecting research participants from direct or indirect harm that a research intervention might cause (Esposito, 2012). The research ethics concept, therefore, resides in between ethics and legal regulations. On one hand, it depends on philosophical definition of identity, ownership, rights-and-duties, and public-and-private. On the other hand, it depends on regulations, which should be strict and sharp. Research ethics has always been a controversial issue, but Internet emergence made it complicated (Marshall, 2014). On the Internet environment, the distinction between public and private is foggy and identity is sometimes misleading. Furthermore, social networking sites and MOOC make a disclosure of social activity feasible. For example, Facebook social network stores users' typing in posts or comments, even if they are never published. They called it self-censorship. This information has been disclosed and used as research material (Das & Kramer, 2013). From xMOOC's perspective, using student profiles and using their accomplishments are among ethical questions that need to be answered according to the research ethics. Marshall (2014) refers to some MOOC's ethical concerns; for example, the academic institutions should avoid harming students and wasting their times by offering trivial academic experiences. Nash (2015) adds grade inflation under the same issue in where students get A's easily and therefore they gain a false sense of their achievement. While Hollands and Tirthali (2014a) show that 41% of institutions are offering MOOC for marketing and maintaining their brand; and they succeeded in receiving media attention. These institutions succeeded in their goals in which student care is not included. Bali (2014) already experienced one of those poor courses that "neither intentionally develops higher order thinking, nor promotes student interaction" (p. 52), makes her wondering how such prestigious institution offers like this course. Tension and even rudeness among students in discussion forums (Bali, 2014) in the absence of teacher's care (Marshall, 2014; Churchill, 2014) is another example of MOOC ethical issues. In cMOOC context, Marshall (2014) argues that cMOOCs offer more ethical approach by disrupting the power relationships between teachers and learners; where teachers, researchers, students are all learners (Aldahdouh et al., 2015). In general, research ethics studies in MOOC are scarce (Marshall, 2014; Churchill, 2014) and more should be done to clarify the best practices in MOOC context.

MOOC Pedagogy

MOOC pedagogy refers to teaching and learning practices in MOOC. MOOC types are different in their pedagogy. cMOOC follows connectivist practices of student participation and self-orientation where it seems that the pedagogical practices follow more specifically Downes' (2010) four principles: autonomy, diversity, openness and interactivity. The knowledge is hectic, networked, and complex; "it is a jellied creature" (AlDahdouh et al., 2015, p. 15). It is built upon students' activities (Siemens, 2006). xMOOC follows instructional practices, where the materials are designed and prepared in advance. The students watch series of video (lectures), read recommended articles, and solve quizzes (Bali, 2014). From students' perspective, Ben-Ari (2011) reported he is completely disappointed due to the absence of pedagogical innovation in xMOOC. "I see no pedagogical difference between these courses and the programming course I taught as a teaching assistant over 30 years ago" (p. 60), he said. Bali (2014) participated in four different xMOOCs presented on Coursera platform and found significant differences in their pedagogical practices; while some develop higher order thinking, others depend merely on recall quizzes. Yet some researchers (Glance et al., 2013) reported that there is no reason to believe that MOOC are any less effective as a learning experience than their face–to–face counterparts. But the fact is that the high dropout rate in xMOOC could be, in one way or another, due to its pedagogical practices. Romero and Usart (2013) suggested integrating the use of serious games as a key part of the methodology for teaching and learning. In cMOOC context, Saadatmand and Kumpulainen (2014), tracked participants who attended at least one cMOOC and found that a great majority "believed the cMOOC environment helped enhance student autonomy and improve self-directed learning by defining their learning goals and organizing learning activities and interactions" (p. 22). However, the researchers acknowledged that autonomy and self-regulation were overwhelming experience for some other learners who adopted lurking and peripheral participation. Milligan et al (2013) further distinguished between lurkers and passive participants where although they both did not participate in the course, passive participants developed dissatisfaction with the course and most probably did not get benefit from it. Of course, more research may still be needed to enhance MOOC pedagogical practices.

MOOC's Student Assessment
Student assessment refers to the continuous process in which we get evidence if students met course goals and expectations in order to improve their learning. The assessment process in MOOC depends on two things: MOOC types and whether the course is offered for credit. In cMOOC, there is no rigid assessment process as it known in conventional institutions (Levy, 2011). Success and failure definitions are left for the learners who suppose to set their goals and test whether they were met after the course. However, learners are encouraged to evaluate their progress and understanding through interaction with other learners. In xMOOC, the assessment follows the instructional practices. The course has many quizzes and projects. AutoGrader systems are the main technique used to assess student's performance in conjunction with a limited peer-assessment (Bali, 2014; Ben-Ari, 2011). Although most xMOOCs are similar in the techniques used for assessments, Bali (2014) argues that they are different in the level of thinking they measure according to Bloom's Taxonomy and no generalization can represent their diversity. It is understandable how difficult it is to assess thousands of students enrolled in one course using traditional assessment techniques (Nash, 2015). At the same time, the current techniques may work fine if the online student won't get a credit, but if the course offered for credit, these techniques may not work. After all, the institutions that accredit the course need to have an evidence of students' learning. The evidence should take care of fraud and impersonation problems related to online environments. Some efforts have already been done to limit fraud and impersonation, like using face recognition and writing pattern to uniquely identify the participant. Further researches on this area are appreciated.

Language Barrier
The language barrier can be seen from two sides: from the student side and from the MOOC partner side. From the student side, language may limit the participation chances to the MOOCs available in his/her spoken language. For those who can communicate in English, this may not be a problem, but for others who can't, it indeed does.

Table 1: xMOOCs offered by Coursera platform categorized by different subject areas and languages.

Catalog	English	Arabic	Portuguese
Arts and Humanities	178	0	2
Business	292	0	6
Computer Science	224	0	9
Data Science	150	0	1
Life Sciences	208	0	0
Math and Logic	42	0	1
Personal Development	52	0	2
Physical Science and Engineering	161	2	1
Social Sciences	280	0	5
Total	1587	2	27

In the time of writing this paper, Coursera offers 1587 MOOCs in English in comparison to 2 and 27 MOOCs in Arabic and Portuguese respectively. In addition, when some non-native speakers try to take courses in English, they prefer to use transcripts and presentation slides instead of listening to lectures (Bali, 2014), which is also a sign of difficulty.

From the MOOC partner's perspective, the language barrier is also critical. If the university offers MOOC in Konkani language for instance, which is spoken by a very limited people around the world, the course may not be massive at all. In the process of solving the language barrier, some MOOC providers start using subtitles for different languages (see Coursera for example). Another solution is to develop local platforms that support other languages. For example, Saudi Arabia established its own platform Rwaq and Jordon established Edraak in which they support Arabic language (Macleod et al., 2015).

DISCUSSION
This paper was drove by the researchers' doubt about many unconfined MOOC issues. By investigating all considerable issues regarding MOOC, the researchers argue that these issues are (1) countable, (2) interrelated

and (3) controllable. The issues didn't exceed a man hands' figures. They are not as uncountable as they were imagined by many researchers. Secondly, they are interrelated; one issue can lead to others. For instance, high dropout rate is related to MOOC accreditation, reputation, and pedagogy. If a MOOC accreditation was solved and offered for exchangeable credit with traditional education, this would boost the completion rate. Moreover, enhancing online courses reputation, in general, and MOOC, in specific, among students and educators may increase the possibility of completion rate among student seeking for appreciation of a society; and so on. Interrelationship between issues is better interpreted by a tree. For example, high dropout rate depends on accreditation issue. Accreditation issue depends on student assessment issue. Therefore, the solution should follow the reverse path: assessment, accreditation, and then high dropout rate. In other words, the solution should be from leaf to root and from bottom to top if applicable. Thirdly, the issues are controllable; there is no reasonable ground to think that these issues are unsolvable. Accreditation, for example, which seems to be one of the most challenging issues for xMOOC, can be managed by (1) start solving dependent issues such as student assessment, and (2) support a comprehensive cooperation between accreditation agency and MOOC partners. Finally, we shall not forget that MOOC is a young project. It didn't exceed the 8 years old! The time is critical to learn and enhance its performance.

In our searching for MOOC issues, we recognize conflicting ideas between researchers. For example, Bartolomé and Steffens (2015) do not see any value of massiveness of MOOC and argue that "there are no pedagogical or psychological reasons why a course with 100.000 students should foster learning better than a course with 100 students" (p. 97). On exactly the opposite, Milligan et al. (2013) argue that "without a critical mass of active participants, a connectivist course would fail" (p. 152). While Bali (2014) makes it clearer; a massiveness of the course allows the interaction between participants to be 24/7, mainly because the time difference between international students. We also recognize a big difference between connectivists' and instructivists' interpretation of the same issues; while instructivists see one issue as threat, connectivists see it as opportunity (AlDahdouh et al., 2015). Connectivism attempts to not fighting e-learners usual activities and choosing the easiest way to look at the issue. Although, some researchers in xMOOC begin to follow connectivists approach and questioning the current criteria of evaluating xMOOC upon the completion rate; "A narrow theory of MOOCs holds that certification indicates learning, and every participant that has not earned a certificate has not learned" (Ho et al., 2015, p. 33).

Despite all issues listed in this paper, MOOC significantly impacts higher education in general, and distance education in specific. Jacoby (2014) examined whether MOOC is a disruptive innovation and concludes that cMOOC is indeed disruptive. Bartolomé and Steffens (2015) compared traditional online course, xMOOC, and cMOOC models where their theoretical analysis shows that cMOOC is better learning environment than xMOOC and traditional online course. Trestini and Rossini (2016) show that previous models of distance learning are showing their limits to interpret massiveness feature of MOOC and therefore suggest new paradigm based on systemic modeling of complexity.

CONCLUSIONS

MOOC is built on solid educational foundations and ideals: at this stage, MOOC are providing a valuable educational service for free, they have a vital connection to distinguished universities (Clarke, 2013). Fact of the matter is, MOOCs are here to stay, in some form or another (Siemens, 2014). They will not only stay: they will grow! More and more countries in Europe, Latin America, Australia and Asia have launched local initiatives in open online learning (Siemens, 2014). The eight issues described in this paper may be seen as part of a normal development of MOOC. These issues are listed in order to help solving them instead of being taken as a pretext for criticism. Our job as educators is to make judgments about where that value lies (Fox, 2013). The value of this paper appears in its holistic view of MOOC issues which in turn may help policy makers to take a proper decision in their way of adopting MOOC. For the universities planning to adopt MOOC, this paper may help them rethink. High dropout rate and MOOC business model are among the critical issues which have to be considered as soon as possible. Research ethics and MOOC pedagogy are long term open research. Language difficulties are important issues for non-English speakers. MOOC reputation needs more efforts from governments as well as universities. The accreditation needs more steps toward a solid solution. These issues listed in this paper are not the only issues regarding MOOC. Students' and educators' competences of computer and internet usage should be considered. The digital gap between who afford the cost of this technology and who are not is another issue to take into account (Hollands & Tirthali, 2014a; Bali, 2014). How bad these issues may be seen, it would be much worse if we pretended not to look at them carefully.

REFERENCES

Abeywardena, I. S. (2014). Public Opinion on OER and MOOC: A Sentiment Analysis of Twitter Data. In *Proc. of International Conference on Open and Flexible Education (ICOFE 2014)*. Hong Kong. Retrieved from http://www.researchgate.net/publication/259496892_Public_Opinion_on_OER_and_MOOC_A_Sentiment_Analysis_of_Twitter_Data/file/60b7d52c4c117a5602.pdf

Ahn, J., Butler, B. S., Alam, A., & Webster, S. a. (2013). Learner Participation and Engagement in Open Online Courses: Insights from the Peer 2 Peer University. *MERLOT Journal of Online Learning and Teaching*, *9*(2), 160–171.

Aldahdouh, A. A., Osório, A. J., & Caires, S. (2015). Understanding knowledge network, learning and connectivism. *International Journal of Instructional Technology and Distance Learning*, *12*(10), 3–21.

Allen, I. E., & Seaman, J. (2014). *Grade Level: Tracking Online Education in the United States*. Retrieved from http://www.onlinelearningsurvey.com/reports/gradelevel.pdf

Arbesman, S. (2012). *The half-life of facts: Why everything we know has an expiration date*. New York: Penguin.

Auyeung, V. (2015). Review : To MOOC or not to MOOC : Issues to consider for would-be MOOC academic leads. *Higher Education Research Network Journal*, *9*, 64–71.

Bali, M. (2014). MOOC Pedagogy: Gleaning Good Practice from Existing MOOCs. *MERLOT Journal of Online Learning and Teaching*, *10*(1), 44–56.

Bartolomé, A., & Steffens, K. (2015). Are MOOCs Promising Learning Environments ? *Media Education Research Journal*, *44*(22), 91–99. doi:10.3916/C44-2015-10

Ben-Ari, M. M. (2011). MOOCs on introductory programming: a travelogue. *ACM Inroads*, *4*(2), 58–61.

Bergeron, D., & Klinsky, S. (2013). Debt-Free Degrees. Retrieved May 5, 2014, from http://www.insidehighered.com/views/2013/10/28/essay-need-new-innovation-focused-accreditor#sthash.d7WItdcC.xTjj00g5.dpbs

Churchill, R. P. (2014). The Ethics of Teaching and The Emergence of MOOCs: Should Philosophers Support the MOOC? *Philosophy in the Contemporary World*, *21*(1), 26–40.

Clarke, T. (2013). The advance of the MOOCs (massive open online courses): The impending globalisation of business education? *Education+ Training*, *55*(4/5), 403–413.

Cole, A. W., & Timmerman, C. E. (2015). What Do Current College Students Think about MOOCs ? *MERLOT Journal of Online Learning and Teaching*, *11*(2), 188–202.

Conole, G. (2013). MOOCs as disruptive technologies: strategies for enhancing the learner experience and quality of MOOCs. *Revista de Educación a Distancia*, *39*, 1–17. Retrieved from http://www.um.es/ead/red/39/conole.pdf

Daradoumis, T., Bassi, R., Xhafa, F., & Caballé, S. (2013). A review on massive e-learning (MOOC) design, delivery and assessment. In *P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC), 2013 Eighth International Conference on* (pp. 208–213). IEEE.

Das, S., & Kramer, A. (2013). Self-censorship on Facebook. *Proc. of ICWSM 2013*, 120–127.

Dellarocas, C., & Van Alstyne, M. (2013). Money models for MOOCs. *Communications of the ACM*, *56*(8), 25–28.

Downes, S. (2008). Places to Go: Connectivism & Connective Knowledge. *Innovate, Journal of Online Education*, *5*(1), 1–6. Retrieved from http://www.innovateonline.info/index.php?view=article&id=198

Downes, S. (2010). What is democracy in education. Retrieved February 1, 2016, from http://halfanhour.blogspot.pt/2010/10/what-is-democracy-in-education.html

Downes, S. (2012). Connectivism and Connective Knowledge: essays on meaning and learning networks. *Stephen Downes Web*.

Downes, S. (2013). What the “x” in “xMOOC” stands for In case you were…. Retrieved May 5, 2014, from https://plus.google.com/109526159908242471749/posts/LEwaKxL2MaM

Esposito, A. (2012). Research ethics in emerging forms of online learning: issues arising from a hypothetical study on a MOOC. *Electronic Journal of E-Learning*, *10*(3), 315–325.

Fisher, D. H., & Fox, A. (2013). *Report on the CCC-CRA Workshop on Multidisciplinary Research For Online Education*. Washington, DC. Retrieved from http://cra.org/ccc/wp-content/uploads/sites/2/2015/05/CCC-MROE-Report.pdf

Fox, A. (2013). From MOOCs to SPOCs. *Communications of the ACM*, *56*(12), 38–40.

Glance, D. G., Forsey, M., & Riley, M. (2013). The pedagogical foundations of massive open online courses. *First Monday*, *18*(5).

Ho, A. D., Chuang, I., Reich, J., Coleman, C. A., Whitehill, J., Northcutt, C. G., … Petersen, R. (2015). HarvardX and MITx : Two Years of Open Online Courses Fall 2012-Summer 2014. *SSRN Electronic Journal*, (10), 1–37. doi:10.2139/ssrn.2586847

Hollands, F. M., & Tirthali, D. (2014a). Why Do Institutions Offer MOOCs? *Online Learning*, *18*(3), 20. Retrieved from http://search.proquest.com/docview/1651850915?accountid=14624

Hollands, F., & Tirthali, D. (2014b). *MOOCs : Expectations and Reality*. New York. Retrieved from http://cbcse.org/wordpress/wp-content/uploads/2014/05/MOOCs_Expectations_and_Reality.pdf
Jacoby, J. (2014). The disruptive potential of the Massive Open Online Course: A literature review. *Journal of Open, Flexible, and Distance Learning*, *18*(1), 73–85. Retrieved from http://journals.akoaotearoa.ac.nz/index.php/JOFDL/article/viewFile/214/168
Jordan, K. (2013). MOOC completion rates. Retrieved May 5, 2014, from http://www.katyjordan.com/MOOCproject.html
Kolowich, S. (2013). Coursera takes a nuanced view of MOOC dropout rates. Retrieved May 5, 2014, from http://edf.stanford.edu/readings/coursera-takes-nuanced-view-mooc-dropout-rates
Levy, D. (2011). Lessons learned from participating in a connectivist massive online open course (MOOC). In *Proceedings of the Chais conference on instructional technologies research 2011: Learning in the technological era* (pp. 31–36).
Littlejohn, A. (2013). Understanding massive open online course. *CEMCA EdTech Notes*. Retrieved from http://cemca.org.in/ckfinder/userfiles/files/EdTech Notes 2_Littlejohn_final_1June2013.pdf
Macleod, H., Haywood, J., Woodgate, A., & Alkhatnai, M. (2015). Emerging patterns in MOOCs: Learners, course designs and directions. *TechTrends: Linking Research & Practice to Improve Learning*, *59*(1), 56–63. Retrieved from 10.1007/s11528-014-0821-y
Markoff, J. (2011). Virtual and artificial, but 58,000 want course. *The New York Times*, *15*.
Marshall, S. (2014). Exploring the ethical implications of MOOCs. *Distance Education*, *35*(2), 250–262. doi:10.1080/01587919.2014.917706
Masters, K. (2011). A brief guide to understanding MOOCs. *The Internet Journal of Medical Education*, *1*(2).
McAuley, A., Stewart, B., Siemens, G., & Cormier, D. (2010). *The MOOC model for digital practice*. Canada: University of Prince Edward Island. doi:10.1016/j.im.2011.09.007
Milligan, C., Littlejohn, A., & Margaryan, A. (2013). Patterns of Engagement in Connectivist MOOCs. *MERLOT Journal of Online Learning and Teaching*, *9*(2), 149–159.
Nash, J. A. (2015). Future of Online Education in Crisis : a Call To Action. *The Online Journal of Distance Education and E-Learning*, *3*(2), 53–62.
Parr, C. (2013). Mooc creators criticize courses lack of creativity. *Times Higher Education*, *17*(03), 2013.
Pérez-Pena, R. (2012). Top universities test the online appeal of free. *The New York Times*, A15.
Pope, J. (2015). What Are MOOCs Good For? *Technology Review*, *118*(1), 68–71. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=100243729&site=ehost-live&scope=site
Rodriguez, C. O. (2012). MOOCs and the AI-Stanford Like Courses: Two Successful and Distinct Course Formats for Massive Open Online Courses. *European Journal of Open, Distance and E-Learning*.
Rodriguez, O. (2013). The concept of openness behind c and x-MOOCs (Massive Open Online Courses). *Open Praxis*, *5*(1), 67–73. doi:10.5944/openpraxis.5.1.42
Romero, M., & Usart, M. (2013). Serious Games Integration in an Entrepreneurship Massive Online Open Course (MOOC). In *Serious Games Development and Applications* (pp. 212–225). Springer.
Saadatmand, M., & Kumpulainen, K. (2014). Participants' Perceptions of Learning and Networking in Connectivist MOOCs. *MERLOT Journal of Online Learning and Teaching*, *10*(1), 16–30.
Sangrà, A., & Wheeler, S. (2013). New Informal Ways of Learning: Or Are We Formalising the Informal? *RUSC. Universities and Knowledge Society Journal*, *10*(1), 107–115.
Seaman, J. (2009). Online Learning as a Strategic Asset. Volume II: The Paradox of Faculty Voices--Views and Experiences with Online Learning. Results of a National Faculty Survey, Part of the Online Education Benchmarking Study Conducted by the APLU-Sloan National Commissi. *Association of Public and Land-Grant Universities*.
Siemens, G. (2006). *Knowing knowledge*. Lulu. com.
Siemens, G. (2014). The attack on higher ed — and why we should welcome it | ideas.ted.com. Retrieved May 5, 2014, from http://ideas.ted.com/2014/01/31/the-attack-on-our-higher-education-system-and-why-we-should-welcome-it/
Trestini, M., & Rossini, I. (2016). MOOC IN THE PARADIGM OF SYSTEMIC MODELLING OF COMPLEXITY : SOME EMERGING PROPERTIES. *The Online Journal of Distance Education and E-Learning*, *4*(1), 44–49.
Weller, M., Siemens, G., & Cormier, D. (2012, October). MOOCS: An interview with Dave Cormier and George Siemens [Video file]. Retrieved from https://www.youtube.com/watch?list=UUyxGjHJz2S-b5DHDVPkMu-w&v=l1G4SUblnbo&feature=player_embedded
Yang, D., Sinha, T., Adamson, D., & Rose, C. P. (2013). Turn on, Tune in, Drop out: Anticipating student dropouts in Massive Open Online Courses. *NIPS Data- Driven Education Workshop L@S 2014*. Retrieved from http://lytics.stanford.edu/datadriveneducation/papers/yangetal.pdf

Yuan, L., & Powell, S. (2013). MOOCs and Open Education: Implications for Higher Education. *Cetis*, 19. doi:http://publications.cetis.ac.uk/2013/667

Zhang, Y., & Wildemuth, B. M. (2009). Qualitative analysis of content. *Applications of Social Research Methods to Questions in Information and Library Science*, 308–319.

THE DIALOGICAL AUTHENTIC NETLEARNING ACTIVITY (DIANA) MODEL FOR COLLABORATIVE KNOWLEDGE CONSTRUCTION IN MOOC

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Abstract: The ways in which we work and learn are changing rapidly. These changes require research and competencies that are not only new, but which also respond to the requirements of the digital age. The extensive social phenomena and pressures that are a result of digitalisation also call for more careful consideration. Digitalisation requires us to renew educational structures. Massive open online courses (MOOC) and their associated pedagogical decisions can promote the development of digitalisation. Open online courses necessitate a stricter pedagogical structure that enables authentic learning and dialogue based on collaborative knowledge creation. This article presents a case study showing how the DIANA (Dialogical Authentic Netlearning Activity) pedagogical model was used to support collaborative knowledge construction in a micro open online course titled “Making learning personal”. A questionnaire and interviews were used to collect data from fourteen participants, and qualitative content analysis was used to analyse the data. Various phenomena of MOOCs are evident in the results, however, the results also reveal the challenges of dialogical, authentic learning and collaborative knowledge creation in an open online course. The results indicate that sufficient guidance is required to gain a thorough understanding of a pedagogical model, and that collaborative knowledge creation requires time, shared learning objectives, and a substantial knowledge of dialogical participation.

INTRODUCTION

In recent years, ongoing digitalisation has required us to renew our educational structures and learning environments. Many e-learning courses are designed in a linear format, with the assumption that the students begin and finish a course at certain pre-defined points (Herrington et al., 2010). The developments in digitalisation have caused us to change our understanding regarding learning environments. However, these changes also create new possibilities. Massive open online courses (MOOC) and their pedagogical decisions can promote the development of digitalisation on both national and international levels. Open online courses necessitate a stricter pedagogical structure that enables authentic learning and dialogue based on collaboration. Laurillard (2009) states that digital technologies create new opportunities for change and support new ways of working. Digital technologies open a wide range of possibilities for education, but also create a need for a pedagogical framework. Online learning environments need to include more student-centred activity and collaboration, yet there are too many open online courses that are excessively technology driven.

According to Wheeler (2015), when we consider the digital learning of the future, pedagogy ought to come first and technology only second. To foster development, we need digital wisdom. It is said that information has become more democratic, and for learning it has become more open and communal. Wheeler suggests that blogging is one of the most effective ways of informal learning, especially when it includes some form of dialogic knowledge creation. Sangran and Wheeler (2013) view that every college ought to offer MOOCs and that new technologies are the key to the development of informal learning models. However, the possibilities of digital Open Educational Resources (OER) have not been properly utilised, nor have the quality criteria of open online courses been recorded. In addition, the content of such courses has not been evaluated from the perspective of learning. Learning is becoming more informal, and this change is enabled by MOOCs. In the modern world, MOOCs form an important way of learning and of acknowledging learning, and also serve to challenge our pedagogical thinking. Means et al. (2014, p. 69) argue that many MOOC designers have neglected to use the basic knowledge acquired by learning science, that is, how people actually learn.

According to Scanlon et al. (2015), the impact of technology on pedagogy (the manner or structure of teaching) is complex. Only a small amount of direct research exists on the ways that technological possibilities and their associated pedagogical responses operate to benefit learners. They further point out that the area of formal learning is undergoing a period of rapid change, and that due to these changes, needs for alternative modes of delivery arise.

The Häme University of Applied Sciences (HAMK UAS), School of Professional Teacher Education (Finland) in cooperation with Coleg Cambria (United Kingdom) has created and implemented a mOOC that is based on dialogical, authentic learning and collaborative knowledge creation. The course was titled "Making Learning Personal: How to develop individualised approaches in Vocational Education and Training", and its value was 2 ECTS. This pedagogical pilot was developed in a Mapping project (Leonardo Da Vinci, Transfer of Innovation), and the Canvas Learning Management System was chosen as the learning environment. The key element in the course was formed by study groups and also the sense of a learning community that they perceive. Learning and knowledge were created collaboratively by focusing on a certain theme. The learning process was structured following the principles of the DIANA (Dialogical Authentic Netlearning Activity) pedagogical model (Aarnio & Enqvist, 2001), and in this context, implementation of the model requires a genuine dialogical learning community, a commitment on the part of learners and the teacher, and a solid presence on the net (Aarnio & Enqvist, 2001; 2002).

This article reports a case study for designing and implementing dialogical, authentic and collaborative knowledge creation based on a MOOC format, and investigates how the DIANA model construes the learning process. In addition, the article focuses on the realisation of a practical pedagogical process, and shows how the DIANA model supports collaborative knowledge construction in the mOOC context. The data for this study was collected by using an online questionnaire and in-depth online interviews, and analysed using a qualitative content analysis approach. This article is structured as follows: First, the topic is reviewed through theoretical concepts. Second, the study case and content analysis are described. Finally, the results are presented and discussed. The respondents' answers are presented verbatim in their original form. In those cases where participants answered in Finnish, the quotation has been translated and marked separately.

THE OVERALL COCEPT OF MOOCS

MOOCs (massive open online course) originate from American universities where the first course was launched in 2008. The words describing this new form of online courses have specific meanings. *Massive* means that the number of participants is unlimited, and *open* means that there are no entry requirements or tuition fees. Haber (2014, p.83) gave a concise interpretation that open means a free of cost or entrance requirement and with no barriers to entry and everything else are variant on eLearning. The courses function entirely as online courses and are structured in the form of goal-directed teaching (McAulay et al., 2010).

Massive open online courses are defined by various prefixes whose purpose is to describe the realisation methods or pedagogical approach of a particular course. One of the MOOC pedagogy branches is the cMOOC, and is based on collaborative and community oriented learning where learning is viewed as a social and collaborative learning event enabled by technology (Haavind & Sistek-Chandler, 2015; O´Toole, 2013). Siemens (2005) notes that connectivism as a learning theory is driven by the understanding that decisions are based on rapidly altering foundations, and that new information is continually being acquired. This concept has adapted to the digital age, an according to Grünewald et al. (2013), it describes learning as the creation of connections between information, and Web 2.0 functionalities lend support for this process. Connectivist knowledge and connectivism (Downes, 2012; Siemens, 2005) include insight of the cycle of knowledge development. In practice this means that individuals provide the community with knowledge, and also gain knowledge from the community. This kind of collaborative knowledge creation is seen as one aspect of the Web 2.0 philosophy. Means et al. (2014, p. 55) describe cMOOCs as endeavoring to generate online discussion and collaboration, through which the networked community of learners will build their knowledge and understanding. For example, on such courses the lectures and exercises are traditionally presented in the form of videos or text, but the learners are expected to create communities, to engage in discussions, and to give each other feedback on the exercises.

In addition to MOOCs, there are so-called micro open online courses (mOOC) which are based on the same principles as massive open online courses, but where the number of participants is limited. Instead of tens of thousands of participants, for example only 500 participants can enrol on the course. Amongst other things, the reason for this may be that the methods of discussion, guidance and feedback used are simply not feasible for a massive course. Additionally, the percentage of participants who pass the course tends to be higher when the number of learners is limited (Hiidenmaa, 2013).

According to some researchers, the MOOC pedagogy is based on the principle of learner centricity. In this, the learners decide, for instance, what, when and where they study, and to what extent they commit themselves to the learning community (Grünewald et al., 2013; McAulay et al., 2010). However, our experience shows that online learning that is based on collaborative knowledge creation requires carefully planned structures and a guiding process, i.e. the facilitation of learning. Only when a learning community has learned to learn together, can processes such as helping other learners, giving them advice and interacting in an online environment take place naturally.

DIALOGICAL, AUTHENTIC LEARNING AND COLLABORATIVE KNOWLEDGE CONSTRUCTION ONLINE

Aarnio and Enqvist (2001; 2002) emphasise that the key concept in online learning is dialogue. They further specify that in everyday speech, the term dialogue is used to refer to a discussion or conversation. Isaacs (1999) also notes that dialogue involves thinking together, although as a phenomenon, dialogue is altogether more extensive and complex. Dialogue requires equal participation, which is based on thinking together and familiarising oneself with a particular topic, matter or activity. According to Enqvist and Aarnio's (2004) definition, dialogue is based on an equal co-construction of understanding. They further point out that dialogue is seen as a tool for the co-construction of knowledge. Their offer that: "Dialogue is based on equal co-construction of understanding. It is shared thinking and getting well acquainted with a certain subject and activity." Herrington et al. (2010, p. 27–28) state that the opportunity for learners to collaborate is an important design element, especially when it comes to distance learning. Collaboration and collaborative knowledge creation are important elements of authentic online learning and can be encouraged though various tasks. Aarnio and Enqvist (2001, 19) note that dialogical participation consists of active and equal participation, engagement and reciprocal reaction, and the letting go of egocentricity.

According to Resnick (1987), personal authenticity arises when an activity is seen as meaningful (cf. Keskitalo et al., 2011) and when the learning target is defined and interpreted from the point of view of the students. The concept of authenticity is extensive and complicated, and the term is generally used to refer to something which is real, true or genuine, or something that is not fake or a forgery. A learner's commitment and the feeling that they own their learning is strongly linked to how the feeling of authenticity is born and maintained during a learning process.

The definition of authentic learning by Herrington et al. (2010, p. 1) is that learners are engaged in an inventive and realistic task which provides opportunities for complex collaborative activities. Additionally, designing and implementing authentic learning requires teachers to take risks, so an authentic approach requires more effort than standard academic lectures. Authentic learning and its approaches are often based on open-ended and learner-centred constructivist learning. Authentic learning becomes deeply meaningful, inspiring and energising when the learners ask the questions and when the learning process is shared. In their study, Kim and Bonk (2006) predict that when it comes to teaching, then elements of authentic learning will gain more significance in the future. According to Herrington et al. (2010, p. 18), the nine elements of authentic learning are 1) authentic context that reflects the way knowledge is used in real life; 2) authentic tasks; 3) access to expert performances and the modelling of processes; 4) multiple roles and perspectives; 5) collaborative knowledge construction; 6) reflection to enable abstractions to be formed; 7) articulation to enable tacit knowledge to be made explicit; 8) coaching and scaffolding by the teacher at critical times, and 9) authentic assessment of learning with tasks. These elements require skills in both dialogical learning and collaborative knowledge creation.

Authentic, dialogical online learning and collaboratively constructed professional expertise can be described in a model which clarifies the components of learning and also the dynamics of the model. The DIANA (Dialogical Authentic Netlearning Activity) model is comprised of four cornerstones that promote authentic, dialogical and collaborative learning (Enqvist & Aarnio, 2004.) Authentic dialogical learning on the net and community-based, constructive professional expertise can be segmented into an operational model that makes it easy to discern the components of learning, as well as the dynamics of the model. The cornerstones of the DIANA model support authentic, dialogical learning. (Aarnio & Enqvist, 2001; 2002.) The developers of the model (Aarnio & Enqvist, 2001; 2002) refer to net-based teaching, but the model is equally well-suited to modern, flexible and mobile learning environments. In the model, peer learning groups have an important role. Moreover, there was a desire to link the dialogical learning process to collaborative thinking and knowledge creation (cf. Downes, 2012; Siemens, 2005).

Fig. 1. The DIANA model for learning on the net (Aarnio & Enqvist, 2001, p. 67).

According to Aarnio and Enqvist (2001), operations compliant with the four cornerstones (Fig. 1) organise and structure the learning process. Cornerstone A creates the common ground for collaborative and dialogical learning. Cornerstone B deepens the process of finding and formulating authentic questions that are connected to the learning objectives of the study module. Cornerstone C offers deep-oriented learning through dialogical actions which take place in conjunction with other students' work and create knowledge about the subject being studied. Cornerstone D links theory to practice. The students weave a collaborative synthesis and search for missing pieces (new questions) pertaining to the learning goals of the study module. Dialogical evaluation is another part of the final cornerstone, and enables dialogical reflections and develops new contextual understanding.

STUDY BACKGROUND AND CONTEXT

The starting point of the mOOC discussed in this paper was the pedagogical applicability of the course to a dialogical and authentic learning process, and the building of a collaborative learning community. The course was a combination of a mOOC and a cMOOC. The course was designed for vocational education and further education teachers who wished to deepen their knowledge of individualization and individual study plans (ISP). HAMK UAS, School of Professional Teacher Education in cooperation with Coleg Cambria created and implemented the "Making learning personal" course. This 2 ECTS course proceeded from one module to the next according to the course topics.

The seven-week course was carried out in the Canvas learning environment. This environment was also used as the course platform, but the study groups were free to choose among various social media platforms that foster dialogical and collaborative knowledge creation (e.g. Facebook, Google Drive, Padlet, Hackpad). According to Daniels (2012), a distributed environment is an essential element of cMOOCs in supporting autonomy, connectivity and interaction. Throughout the process, the facilitators and expert teachers could be contacted via the learning environment and at a Facebook clinic, so enabling learners to deepen their knowledge of dialogical guidance and scaffolding. Active, dialogical and collaborative participation was expected from the students. A total of 155 participants enrolled on the course and were divided into 14 study groups of 8–10 people. The course consisted of four modules.

The first week of the course was used for bonding within study groups (creating common ground, cornerstone A). The topics of the modules were 1) Basics of individualisation, 2) Dialogical guidance and scaffolding, 3) Synthesis of ISP practices, and 4) Sharing new ideas and ways to embed them into practice. The pedagogical script was structured into modules on the basis of the learning objectives and the guidelines of the DIANA model.

The first two modules progressed according to the DIANA model (Figure 1). The first step included individual assignments where authentic questions were generated. After this, the authentic questions were gathered on the collaborative platform of each study group and arranged thematically (cornerstone B). This was followed by collaborative knowledge creation that focused on these themes. Studying and data acquisition centred on the learning materials handed out to the students. In addition, the studying and data acquisition process required learners to actively examine things in practice (cornerstone C). The answers students offered were used to create a synthesis of the topic in question by combining theory and practice (cornerstone D).

After the course, the Mozilla Open Badge Factory was used to acknowledge the acquired competence. A learner was able to apply for a digital badge whenever he/she knew how to demonstrate his/her competence as required in the criteria of the MOOC. In the application form, students were asked to demonstrate their competence by including a synthesis of the ISP model that their study group had created. In addition, the students had to add an explanation for using the model in practice. They were also asked to briefly describe their own dialogic participation and knowledge creation in their study group (cornerstone D).

Following completion of the course, a study was conducted to all of those enrolled on the course (n=155) received a request to complete the research questionnaire, but only 10 % responded. The participants in the study (*n* = 14*)* were teachers from seven different countries. The participants represent teachers interested in developing their individualisation and personalisation knowledge in a world-wide learning community. Participation in the study was voluntary.

Research questions and methods

The main research question was: How does the Dialogical Authentic Netlearning Activity (DIANA) model support collaborative knowledge construction in a mOOC?

The research question was divided into the following sub-questions:

1) What is the significance of group formation for a learning community in a learning process?
2) How did the participants experience the formulation of authentic questions?
3) How does dialogical participation work in an open online course?
4) Which factors facilitate collaborative learning and knowledge creation?
5) How does a pedagogical model structure learning on a micro open online course?

The study represents a single case study (Yin 2009, p. 46–47). The method used for collecting data was a semi-structured questionnaire with open and closed questions. In addition, semi-structured in-depth interviews were used to deepen the meaning structures (Salmons 2015, p. 9–10). This article presents the results of the online questionnaire (*n* = 14) and the semi-structured in-depth online interviews (*n* = 4) provided by the voluntary participants of the study. The data was collected at the end of the course in June 2015 and the in-depth online interviews were carried out in early September 2015. The analysis of the qualitative data began immediately after the second phase of the data collection. In this paper, only the answers which pertain to the research questions (outlined above) will be analysed.

The questionnaire was based on the background theory that supports the research questions, and consisted of open-ended questions about building a learning community, learning outcomes and dialogical participation. In addition, the questionnaire featured closed-ended questions concerning the participants' background, motivation, number of hours used for course work, group formation, use of collaborative tools, formulating authentic questions, organising authentic questions thematically, creating syntheses, online meetings, the dialogical attitude of the study group, creating an individual study plan and learning from each others' models/plans. The questionnaire was created in collaboration with the course designers. It was sent to all participants via the Canvas LMS news forum. Sixteen of the 155 enrolled participants completed the course, and fourteen (response rate 9.03 %) responded to the questionnaire. Low completion rates seem to be a regular phenomenon on MOOCs. Of the respondents, ten were women and four were men. The majority of the teachers who completed the questionnaire (*n*= 6) were from vocational schools. There were teachers from universities of applied sciences (*n*= 4), from adult/further education sector (*n*= 2) and from university level (*n*= 2).

The online interviews were semi-structured in-depth interviews. According to Salmon (2015, p. 18), an in-depth interview is a qualitative research technique which involves questioning a participant in order to elicit information, perspectives, insights or behaviours that cannot be observed. Four participants volunteered to take part in-depth interviews, and were teachers from Brazil, Mexico, Slovenia and Finland. Interviewees were given the five main questions in advance. The Webex video meeting program was used to conduct the online interviews, and ach interview was recorded and later transcribed.

Data analysis

The questionnaire answers were collected by two first authors, and the online interviews were carried out by first authors. Content analysis was used to analyse the data. According to Schreier (2012, p. 7), qualitative content analysis based on theory. The analysis process began by reading through the data to gain an overview of participant responses. In the second phase, the data was read through a second time and important sentences in the responses were underlined and roughly codified in relation to the research questions. After this, the data was interpreted and then compared to the cornerstones of the DIANA model (Aarnio & Enqvist, 2001; 2002).

When evaluating the reliability of a study, attention must be paid to the relationship that the researches have to their research topic (Yin, 2009). The first authors of this study were involved in designing and implementing the course, as well as in interpreting the data. Therefore, the researchers' assumptions and actions may have influenced the research process. However, the researchers have endeavoured to adopt a scientific research approach and to overlook their initial assumptions. Due to the small number of participants, the findings of this study are somewhat limited.

RESULTS

When the responses were analysed, the aim was to understand the point of view of the participants. It must be mentioned that all participants participated voluntary in this open in this mOOC as part of their professional development.

Group formation in a learning community

The first research question looked to pinpoint the participants' perspective on the significance of group formation for a learning community, during a learning process. The purpose of cornerstone A of the DIANA model (Figure 1) is to create a solid foundation for collaborative and dialogical learning. According to their responses, the respondents perceived the purpose of group formation as getting to know the other participants and making collaborative learning more interesting. "*It was very important at the beginning, helped us make much progress, and made everyone commit to working together*" (Teacher 3, translated). When asked to evaluate their success in group formation, none of the respondents rated their group formation as excellent. Those participants who rated their success as average or poor thought that the reason for this was unsuccessful timing that failed to support collaborative knowledge creation with unfamiliar participants: "*I had bad luck and ended up in an inactive group, and it took a couple of weeks before I was transferred into an active group*" (Teacher 4). Few of the participants encountered problems with understanding the learning environment and tools, although some expressed a wish that the students could have formed their study groups more freely: "*It would have been useful to form groups with teachers with a similar background*" (Teacher 2).

Therefore, according to the results of this study, group formation is seen as an important phase for the learning process. However, technical barriers, timing and the lack of active enrolled participants created challenges in many study groups.

Authentic learning

The second research question evaluated how participants experienced the formulation of authentic questions. Phase B of the learning process focussed on enabling authentic learning (Figure 1, cornerstone B). During this phase, each participant individually formulated authentic learning questions based on the module's learning objectives. According to the analysis, formulating authentic questions is not regarded as a clear and easy way to enable authenticity in learning: "*It took time to realize what an authentic question is and how I have to do this* [sic]" (Teacher 2). In a learning process based on the DIANA model, once authentic learning questions have been formulated, the learning community (study groups) then organises the questions thematically, thus creating themes to be studied. According to six participants, the authentic questions formulated in the first module were organised into themes by one member of the group. Almost half of the participants mentioned that the group had engaged in a dialogue concerning how the questions ought to be thematically arranged. Challenges for authentic activity sprang from the innovative nature of the model, the strict schedule, and the difficulties that online studies created for achieving an understanding of the concept of authenticity. It must be noted however that students may experience difficulties with authentic online learning, especially at the beginning of the learning process. Formulating authentic learning questions was not experienced as being easy. Therefore, there is a need to enhance the pedagogical approach, and the learner-centred scaffolding and guidance.

Dialogical actions

The third question of this study evaluated how dialogical participation works in an open online course. Dialogical participation as a part of a learning process requires learners to become competent in collaborative knowledge creation and to adopt a dialogical approach (Figure 1, cornerstone C). Open-ended questions were used to identify how dialogical participation works in an open online course. The participants were asked to reflect on their dialogical activity and participation in their learning community during modules one and two of the course. Regarding the first module, three participants considered dialogical participation to be difficult because of the online environment and long distances. Almost half of the participants stated that they found the dialogical model inspiring, that the approach had opened their eyes, and they were consequently encouraged to work in a more dialogical manner in the future. When the same open-ended question was asked regarding the second module, the participants reflected less on their own actions and dialogical approach, and they concentrated more on explaining how their group had performed in their tasks. This was also apparent in the in-depth interviews: the participants had difficulties perceiving dialogical activity as a part of their community learning. *"Well, using Skype it was kind of difficult. I couldn't hear one person very well and everyone speaks English differently and I was wondering how dialogical it really was [...] and then, what with the time constrains of the conversation, well I mean to really proceed and to be heard [...]"* (Teacher 3, translated).

The results revealed that dialogical actions and dialogical participation were regarded as a difficult approach on this online course. However, the DIANA model was considered to be a motivating feature.

Collaborative knowledge creation

The fourth research question focused on the factors that facilitate collaborative learning and knowledge creation. Active participants understood that co-construction of knowledge is a key element of dialogical and authentic learning. According to six participants, every member of their study group participated in collaborative knowledge creation and weaving a synthesis, while two participants stated that one or two members of their group had created the syntheses on behalf of the entire group. The difficulties of collaborative knowledge creation were expressed along the following lines: "*I was not just being there - we have to learn and the facilitator had to guide us toward the right track and we have to take the right direction* [sic]" (Teacher 1). The entire group was needed in order to create shared knowledge about a given topic and the strict schedule made this process difficult: "*If you consider the DIANA model where you're supposed to create [knowledge] together, a terribly rushed schedule did not do much to foster collaborative knowledge creation*" (Teacher 4). Thus, among the respondents, the online environment, long distances and language barriers were considered to hinder collaborative knowledge creation.

The key factors for facilitating collaborative learning and knowledge creation are the engagement of each member of the study group, shared responsibilities and learning goals, time for shared thinking and knowledge building, as well as participants from similar backgrounds and time zones.

Pedagogical model in structuring learning

The fifth question of this study considered how participants felt the pedagogical model to structure the deep learning process of collaborative knowledge creation: "*The aspect of the model is quite helpful and promising to change ways of learning* [sic]" (Teacher 2). However, the DIANA model was also considered challenging to use on an open online course. A model such as this requires a learning environment that is coherent and comprehensible, functions well, and fosters collaborative learning. "*Teachers have to provide scaffolding and help students. DIANA is the key element to make effective learning* [sic]" (Teacher 1). It must be noted that nearly half of the participants stated that the pedagogical model of the course had opened their eyes and inspired them to act in a more dialogical manner in the future. The findings further suggest that a clear representation of a pedagogical model at the beginning of the learning process is important, for if the process remains unclear, it is difficult for course participants to understand the path of learning and collaborative knowledge creation. In addition, the model requires more active facilitation processes and should further support learning by using various channels of online tutoring.

The timing of the course was criticised and the Canvas learning environment was considered to be complex and confusing. Several participants mentioned that the course took place at a hectic time, and that teachers were busy as their semester was just about to end. Participants also stated that the topics covered in the course were too numerous considering the time that was available.

Nearly all of the participants mentioned that the online environment chosen for the course was neither easy to use nor very well organised. Thus, a platform suited to dialogical and collaborative learning ought to be used to provide an appropriate learning environment. Familiarising oneself with the featured work environment was time-consuming, and therefore the remaining time was insufficient for collaboration and collaborative learning. The fact that participants lived in different time zones also presented a challenge, for example when arranging online meetings: *"It would be better to have national groups to help each other and communication would be more easier, the time zone was the problem"* (Teacher 3, translated). In addition, the participants wished for more facilitation, online tutoring and weekly online clinic meetings to support their study. McAulay et al. (2010) note that time zones can be concerns in MOOCs, if regular live sessions are planned. The number of topics covered in the course must be in proportion to the available time, and therefore the possibilities of synchronised studies across various time zones must be taken into account.

DISCUSSIONS AND IMPLICATIONS

The aim of this study was to investigate how the Dialogical Authentic Netlearning Activity (DIANA) model supports collaborative knowledge construction in an open online course. The results revealed that a clear representation of a pedagogical model at the beginning of the learning process is important to aid understanding of the path of dialogical and authentic learning, along with promoting collaborative knowledge creation. The results of this study correspond with the results of previous studies by Aarnio and Enqvist (2002) and Aarnio (2006), which indicate that particular skills and finesse are needed to create and understand collaborative, learner-centred learning processes. This study suggests that before a pedagogical model can be implemented, skilful pedagogical work and a sufficient command of technical online environments are required (cf. Grunwald et al., 2013). MOOCs are open, and voluntary, and participants engage in them selectively, for example by paying closer attention to topics that correspond to their needs. In this context, participants may not find the level of scaffolding and support they require in order to orient themselves because support structures are not formalized (McAulay et al., 2010).

The study groups needed a considerable amount of support and advice before they were able to start studying (cf. Aarnio & Enqvist, 2002, p. 255). The results of this study indicate that the group formation processes might have been more successful had the participants been given more freedom when forming the groups, and if the tutoring in online environments been timed more efficiently (cf. Keskitalo et al.2011). Based on the results of this study, it must be noted that students may experience difficulties with authentic online learning, especially at the beginning of the learning process (cf. Aarnio, 2006).This strongly suggests a need to enhance both the pedagogical approach and learner-centred scaffolding. Teräs and Myllylä (2011) stress that the principles of authentic learning have offered a useful framework for designing social online learning. One of the principles of authentic learning is formulating open questions pertaining to the learning objectives of the module. On the basis of the results of this study, it is recommended that the key factors in learning authenticity ought to be made more transparent in order for the students to understand the significance of authenticity at the very beginning of the learning process. As Aarnio (2006) states, the principles of dialogical and authentic learning require more efficient guidance at the beginning of the learning process. According to Teräs and Herrington´s (2014) study, authentic online learning differs in many ways from traditional educational approaches. Learners' authentic questions form a basis for dialogical knowledge creation (Aarnio & Enqvist, 2002), and at this point, a tutor has a significant role in ensuring that the learning process is based on authenticity (Herrington et al. 2010). In our study, challenges for authentic activity sprang from the innovative nature of the model, the strict schedule of the course, and the difficulties that online studies created for understanding the concept of authenticity.

It is a well-known fact that the pedagogical approach applied in MOOCs requires more extensive and deep oriented research by way of scientific discussion. Redefining MOOC pedagogy is a challenging task. Every online teacher has their own opinion, which is usually based on their own experience and the knowledge they have gained during their teaching careers, and the same applies to the new generation of online teachers. Even though a pedagogy based on collaborative learning was chosen, it did not motivate and encourage all of the students to study during the course. Collaborative knowledge creation entails problem solving and addressing meaningful issues, and the entire learning community must be involved. Scanlon et al. (2015, p. 7) point out that the greatest benefits of learning design, learning analytics and open education resources can be attained through an integrated approach where design, technology and pedagogy are combined. In our study, one of the first challenges was the discrepancy between the number of those who had enrolled on the course, and those who actually started their studies. Even though it was believed that a sufficient number of participants had been assigned to each study group, only two thirds of the study groups started their studies according to the syllabus. The course completion rate was about ten percent (10, 3%). When offering MOOCs in the future, the demand for such courses ought to be taken into account, and according to Onah et al. (2014), it is important to pay closer attention to the completion rates of MOOCs. Although thousands of participants enrol on MOOCs, the completion rate for most courses is below 13 %, and this was the case in the course examined in this study.

Amongst the reasons for these considerable drop-out percentages, Onah et al. (2014) list a lack of motivation or time, difficult course topics, lack of support, lack of (online) learning skills, unpleasant experiences, expectations that differ from reality, starting the course late, and also peer evaluation.

Since the number of participants in our featured study was rather small, no wider or general conclusions can be drawn on the basis of the study results. The data remained rather scant due to the significant number of drop-outs, and the course in question was a micro open online course, not a massive open online course. Therefore, the results of this study should be deciphered and applied with care. Although a need for continuing pedagogical development, piloting and research can be seen in this area, our extensive experience as online teachers has revealed one indisputable fact: the learning results and the degree to which the studies are considered as meaningful are connected to the issues of collaborative work and knowledge creation.

CONCLUSION

The results of this study show that dialogical, authentic learning and collaborative knowledge creation require more practical scaffolding, guidance and tutoring. Structuring a learning process based on the DIANA model is challenging, because it is precisely the authentic, dialogical and collaborative knowledge creation that is in danger of being lost in the process if the required activities and support structures remain insufficient. The results of this study clearly revealed these critical issues. The pedagogical model itself provided no solutions to the main problem typical of MOOCs, namely the substantial drop-out percentage. The key question is one of the underlying pedagogy, which will inevitably affect the learning experience and the learning itself. In the future, a stronger pedagogic approach is needed to develop MOOCs and to ensure their quality of teaching. When choosing a pedagogical model, one must take into account the learning objectives, the number of participants, the learning environment, and also the way the course is implemented. As promising as they are, MOOCs are only as strong as their design. Therefore MOOC designers need to consider the balance between course completion and deep-oriented learning.

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References

Aarnio, H. (2006). Oppijalähtöisyyttä ja yhteisöllisyyttä tietoverkkoja ja verkostoja hyödyntävään oppimiseen – Tutkimustuloksia DIANA-klinikalta [Enchancing Learner-centredness and collaboration in Learning Online and in Networks – results from DIANA clinic]. Saarijärvi: Saarijärven Offset Oy.

Aarnio, H., & Enqvist, J. (2001). Dialoginen oppiminen verkossa – DIANA-malli ammatillisen osaamisen rakentamiseen [Dialogic Learning on the Net - DIANA model for construction of professional competence]. Helsinki: Hakapaino Oy.

Aarnio, H., & Enqvist, J. (2002). DIANA-toimintamallin soveltaminen ja kehittäminen [Development and Application of the DIANA Model]. In H. Aarnio, J. Enqvist, & M. Helenius (eds.) Verkkopedagogiikan kehittäminen ammatillisessa koulutuksessa ja työssäoppimisessa: DIANA-toimintamalli [Developing net pedagogy for vocational education and for on-the-job learning: The DIANA model]. (pp. 5–272). Helsinki: Hakapaino Oy.

Daniel, J. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media on Education*, 3.

Downes, S. (2012). Connectivism and connective knowledge. Essays on meaning and learning networks. National Research Council Canada.

Enqvist, J., & Aarnio, H. (2004). Crucial Dialogic Actions in Co-constructive Knowledge Creation in Online Learning Environment. In L. Cantoni & C. McLoughlin (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2004* (pp. 2576–2583).

Grünewald, F., Mazandarani E., Meinel, C., Teusner, R., Totschnig, M., & Willems, C. (2013). openHPI - a Case-Study on the Emergence of two Learning Communities. *Global engineering education Conference Berlin 2013* (pp. 1323–1331). doi: 10.1109/EduCon.2013.6530277

Haavind, S., & Sistek-Chandler, C. (2015). The emergent role of the MOOC instructor: A qualitative study of trends toward improving future practice. *International Journal on E-Learning*, 14 (3), 331–350.

Haber, J. (2014). MOOCS. MIT Press. Retrieved from http://www.jstor.org/stable/j.ctt9qfb6r
Herrington, J., Reeves, T., & Oliver, R. (2010). A guide to authentic e-learning. London: Routledge.
Hiidenmaa, P. (2013). Jos vastaus on MOOC, mikä on kysymys? [If the answers is the MOOC, what is the question?] Koulutus- ja kehittämiskeskus Palmenia. University of Helsinki. Retrieved from http://ok.helsinki.fi/wp-content/uploads/2014/01/Jos_mooc_on_vastaus.pdf
Keskitalo, T., Pyykkö, E., & Ruokamo, H. (2011). Exploring the Meaningful Learning of Students in Second Life. *Educational Technology and Society*, 14 (1), 16–26. Retrieved from http://www.ifets.info/journals/14_1/3.pdf
Kim, K.-J., & Bonk, C. J. (2006). The Future of Online Teaching and Learning in Higher Education. *Educause*, 4, 22–30.
Laurillard, D. (2008). The pedagogical challenges to collaborative technologies. *International Journal of Computer-Supported Collaborative*, 4 (1), 5–20. doi: 10.1007/s11412-008-9056-2
McAulay, A., Stewart, B., & Siemens, G. (2010). The MOOC model for digital practice. University of Prince Edward Island. Retrieved from http://www.elearnspace.org/Articles/MOOC_Final.pdf
Onah, D. F. O., Sinclair, J., & Boyatt, R. (2014. Dropout rates of massive open online courses: behavioural patterns. *International Conference on Education and New Learning Technologies* (pp. 5825–5834).
O´Toole, R. (2013). Pedagogical strategies and technologies for peer assessment in Massively Open Online Courses (MOOCs). Discussion Paper. University of Warwick, Coventry, UK: University of Warwick.
Resnick, L.B. (1987). Learning in school and out. *Educational Researcher* 16, 13–20.
Scanlon, E., McAndrew, P., & O'Shea, T. (2015). Designing for Educational Technology to Enhance the Experience of Learners in Distance Education: How Open Educational Resources, Learning Design and Moocs Are Influencing Learning. *Journal of Interactive Media in Education*, 1, 1–9.
Salmons, J. (2015). Qualitative Online Interviews. California: SAGE Publications Ltd. Sangra, A., & Wheeler, S. (2013). New Informal Ways of Learning: Or Are We Formalising the Informal? *Universities and Knowledge Society Journal (RUSC)*, 10, 286–293.http://dx.doi.org/10.7238/rusc.v10i1.1689
Schreier, M. (2012). Qualitative Content Analysis in practice. London: SAGE Publications Ltd.
Siemens, G. (2005). Connectivism: A Learning Theory for the Digital Age. *International Journal of Instructional Technology & Distance Learning*, 2(1).
Teräs, H., & Herrington, J. (2014). Neither the Frying Pan nor the Fire: In Search of a Balanced Authentic e-Learning Design through an Educational Design Research Process. *International Review of Research in Open and Distance Learning*, *15*(2), 232–253.
Teräs, H., & Myllylä, M. (2011). Educating Teachers for the Knowledge Society: Social Media, Authentic Learning and Communities of Practice. In S. Barton, J. Hedberg & K. Suzuki (Eds.), *Proceedings of Global Learn 2011* (pp. 1012–1020).
Wheeler, S. (2015). Learning with ´e ´s. Educational theory and practice in the digital age. Llandysul: Gomer Press.
Yin, R.K. (2009). Case Study Research. California: SAGE Publications.

