

# Quality and Equity: Embracing learning styles in an organization's eLearning environment

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## Abstract

Just like any other teaching methodology, eLearning consists of different styles of learning and teaching. To create a better understanding, we express our view about eLearning styles in this paper. We believe that paying attention to learners' learning styles may improve the quality of and equity learning. A style in the context of eLearning is the way a person expresses himself or herself characterized by all features differentiating him or her from others. An individual's learning style is mostly influenced by his or her personality, way of thinking, and preferences of pictures, sounds or actions. In this paper we create a case at a telecommunication company, where we use qualitative methods to realize and understand styles of learning in the organization. We follow the activity theory as grounding theory for our study. Open ended questionnaires are used as data collection methods, while thematic content analysis is used as way to analyze data. The contribution is to raise an awareness to ComTek about the learning styles in eLearning, to give a picture on the overall learning styles in the organization, and to build a guideline as conceptual model to discover learning styles.

## Key words

Learning styles, eLearning, LCI, LSEQ

## Introduction

In this paper we emphasize that learning styles are imperative for eLearning, and has to be equally taken into consideration in every eLearning project. Before we carry on with the discussion, it is imperative to define what is meant by a learning style. A learning style is the way a person expresses himself or herself characterized by all features differentiating him or her from others (Sepic, Pogarcic, & Raspor, 2010). Now, to achieve different learning styles and be able to identify such styles per individual, we must design systems which address engagement, curiosity, simulation, remediation, coaching, peer learning and more (McNutt & Brennan, 2005). We also require adequate teaching methods, organizational forms, evaluation methods and new ways for participants to interact with the online educational process (Poulova & Simonova, 2012). The system must address a sense of curiosity to know and understand individual learning styles by engaging learners in pre-learning assessments.

With the understanding of learning styles per individual learner, a proper learning simulation must be prepared according to the relevant learning style. By providing a personalized type of learning or individual based learning, learners will take less time to complete a course, knowledge will increase, and also the satisfaction per learner will increase (Gaikwad & Potey, 2013). This will contribute to quality of education and efficiency of learning. It is imperative for learners to be aware of their learning styles, their strengths and weaknesses of learning, and it is also important to provide them with a variety of instructional methods to choose more suitable ones (Poulova & Simonova, 2012). It is said that people may vary in view on the same problem because they see and do things differently, and also see the world in a different way. Their perceptions, evaluation habits, judgement and decision making varies from one another. However, this doesn't mean that they are not capable of learning, they may actually

be right in their own manner (Poulova & Simonova, 2012). Now that a brief introduction to the research study has been given, next follows some literature about the study.

## **Literature Review**

McNutt & Brennan (2005) produced a research whereby an eLearning system was designed to differentiate between individual learners learning styles categorized as visual, auditory, and kinesthetic. In this research WebCT was used as a learning platform. The system used a questionnaire to evaluate learners on their individualized learning styles. This questionnaire was delivered using JavaScript, whereby a MySQL database was used to capture and store data. JSP pages were used to navigate through the website. McNutt & Brennan (2005) used pre and posttests to realize the impact of learning using individualized learning styles. The aim of the paper was to investigate a hypothesis which indicate that learners may perform better if learning content is presented to individuals in their preferred learning style.

Another research was done to introduce approaches of implementing individual-style-based learning in the engineering education. The aim of the research was to firstly adapt the learning combination inventory (LCI) to Czech university's education condition, to run experiments that proves the difference of learning outcome in using different learning styles and based on pre and posttests, to evaluate the process of course-offering using eLearning tools for learning, and to design an appropriate learning model based on individualized learning styles (Poulova & Simonova, 2012). The researcher used Blackboard as an LMS for the study. The LCI was used as a questionnaire learners had to fill in to discover their learning styles before attempting the actual course on the eLearning system. It was discovered that even if material and technical instruction requirements are satisfactory, a strong focus must be on didactic aspects of instruction. Further findings of the study were the importance of the learner to know their learning style, strength and weaknesses. This contributes to the equity of learning among all individual learners.

## **Learning styles**

Gaikwad & Potey (2013:149) elaborates on three factors of learning in their study. They talk about learning style preference, motivation to learning, and the knowledgeability of a learner. Style preferences are attained by recording the time spent by learners on learning objects based on a given period and then calculate the ratio of the learning styles. Motivation to learning is estimated through the use of discussion forums, assignments, quizzes, feedbacks, bonus points, and multimedia learning materials. The number of learning activities the learner is involved in indicates a high or low motivation. Finally, knowledgeability of a learner is estimated by calculating the number of correct answers to decide the class of knowledgeability, whether poor (0-50), average (50-74) or good (75-100).

There are numerous tools in the market to help unlock the will to learn. One of these tools is the learning combination inventory (LCI) (Poulova & Simonova, 2012). The LCI focuses on the process to learn and not on the product used to learn. The process to learn is more focused on unlocking the learner's motivation and ability to learn. In line with using the LCI questionnaire, Poulova & Simonova (2012) used books, professional literature, electronic study material, presentations, video recordings, animations, self-assessments, hands-on activities and examples, and other material, like dictionaries etc.

When seeking for ways to enhance learning styles we also look at learning objects. The different types of these learning objects are active, reflective, sensing, intuitive, visual, verbal, sequential, and some are global (Gaikwad & Potey, 2013). The active learning objects are those made up of self-assessment exercises, and multiple question guessing exercises. Reflective learning objects are those which are made up of examples, outlines, summaries, and result pages. Sensing learning objects are made up of examples, explanations, facts, and practical material. Then we have intuitive learning objects which are made-up of definitions and algorithms. Visual learning objects are made-up of graphics, images, charts, videos, and animations. Verbal learning objects on the other hand are simply comprised of text and audio. Sequential learning objects comprises of step-by-step exercises, and constrict link pages. Lastly global learning objects are made up of outlines, summaries, and all-link pages.

McNutt & Brennan (2005) indicates among others the following learning styles: reading, listening, seeing, speaking and doing. The reading learners are those who are comfortable with reading text using a visual kind of learning mechanism, they see text and build pictures in their minds as they read through the text. While reading this text there is also pictures in the reading content. The listening type of learners respond better to audio and other auditory mechanisms of learning. They like to learn by being told. Among the different types of learners, we also have those who prefer to see content and make sense out of it. These are the visual kind of learners. They prefer to see images, videos and other visual type of content. Other learners are those who learn better from speaking. These prefer speech

better than anything else. Speech is an auditory type of learning. The last set of learning styles from (McNutt & Brennan, 2005) are those learners that learn by doing. These kind of learners are referred to as kinesthetic learners.

From the variety of learning styles from different researchers, a few more are mentioned next. Bousbia, Balla, & Rebai (2009) elaborates on an educational preferences layer which refers to attributes like preferred learning time, environmental preference, information representation and encoding methods. Preferred learning includes individual or group learning, learning by project, or simulation, while information representation includes verbal, or image learning, and encoding includes verbal, visual and auditory learning. The learning process layer refers to attributes like learning strategy, information processing, comprehension and progression approach. The cognitive abilities layer refers to attributes like motivation and concentration capacity. Below follows an eLearning model with learning style dimensions.

## Module Content

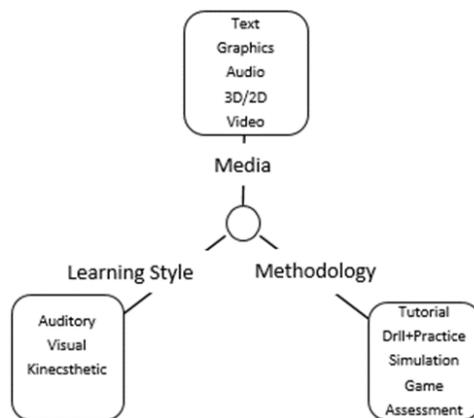


Figure 1. eLearning with learning styles dimensions (McNutt & Brennan, 2005)

Since there are two types of visual learners (textual and graphical learners), the eLearning system adapts to different learning styles as in the above figure. The style dimensions' figure above illustrates that visual learners must be supplied with audio content with text as well as graphs, charts, or pictures/diagrams as they attempt the course. For auditory learners the eLearning system supplies learning content with audio background, online-chat which uses the learners' familiar language, or real-time talking. The kinesthetic learners carry out physical tasks and experiments.

Table 1. Learning styles design structure (McNutt & Brennan, 2005)

Learning Style \ Media	Text	Audio	Graphics	2D/3D	Video	Simulation/ Games
Visual	✓		✓	✓	✓	
Auditory	✓	✓	✓			
Kinesthetic	✓		✓			✓

Using the learning style design structure above, the course content will be presented as text, audio, graphics, 2D/3D graphics, videos, and simulation or games depending on the resultant learning style of the learner. Now that we have an understanding of learning style and what they mean, next follows the theory that supports the study.

## Theory supporting the study

The theory used to guide this study is the activity theory. The activity theory indicates that “mediation through tools and technology is not a neutral process, the tools have an influence over the interaction between the subject and the object” (Hashim & Jones, 2007). In activity theory, an activity is used to understand individuals actions, through the usage of tools (Hashim & Jones, 2007). Activity theory is rich in terms of understanding how people interact with each other in order to do things using sophisticated tools in complex and dynamic environments.

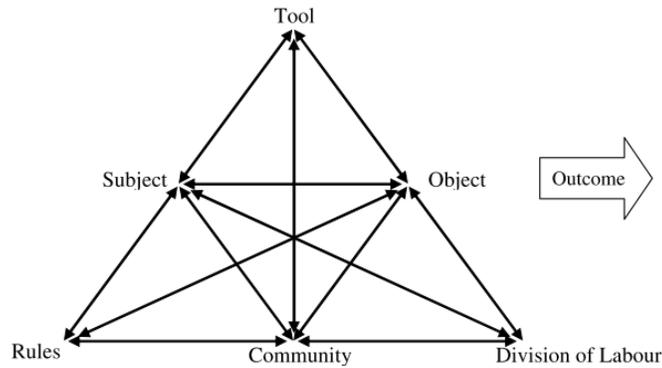


Figure 2. Activity theory model (Hashim & Jones, 2007)

**Table 2: Components of the eLearning activity system**

Components	Generic Description	Subject
Subject	It is the individual or group of actors engaged in the activity	Learners
Tools	It can be anything used in the transformation process (i.e. like cutter or computer mouse)	Learning Style Evaluation Questionnaire (LSEQ)
Object	Object can be any tangible or intangible things such as plans or even creative ideas	Assessment
Outcome	The expected result or the goal that the activity tries to achieve	Discover learners learning style
Division of Labour	It refers to vertical power of status and how tasks are split horizontally between community members	Learning style evaluation
Community	It negotiates and mediates the rules and customs that describe how the community functions	Training delivery division, and IT division at ComTek
Rules	It is the norms, traditions, or laws that exist in particular communities.	Learning styles can only be classified as auditory, visual or kinesthetic. One learner can only have one learning style.

Extended from the work of Wangsa, Uden, & Mills (2011:758)

The activity theory as a framework in this context was used as an assessment tool to unlock learners' learning styles and to see into which category the majority of learners will fall. The result/outcome of this assessment was used to make the organization aware of the type of learning content they need to produce and which must be based on the learning styles outcome. In the components of activity system table above, the learners were referred to as the subject using the LSEQ tool as a learning style questionnaire to evaluate their learning styles. The name LSEQ was coined to denote an abbreviation for the learning style evaluation questionnaire that was produced for the sake of this study. The activity theory in this study was used for learning style evaluation, thus it was seen fit to make the learning style evaluation attribute to act as the division of labour in the framework. In evaluating learning styles we chose to have only three learning style categories being auditory, visual and kinesthetic. These style categories were seen fit to form the rules part of the framework. While using the activity theory as theory to guide the study, we also want to extend this theory with the LSEQ conceptual model for learning style assessment. Next follows a reflection and explanation of the LSEQ model.

### The LSEQ conceptual model

As indicated previously in this study, the name LSEQ was coined to denote an abbreviation for the "learning style evaluation questionnaire" that was produced for the sake of this study. The figure below shows the intended notion for discovering learners learning styles using the LSEQ questionnaire. The eLearning team prepares and publishes the LSEQ on the eLearning system as a pre-assessment before the actual course. Each time the student wants to attempt a course, he/she will then be redirected to the LSEQ for completion and to discover his/her learning style.

The system then scores the LSEQ, and depending on the different scores the equivalent content to the learning style is shown.

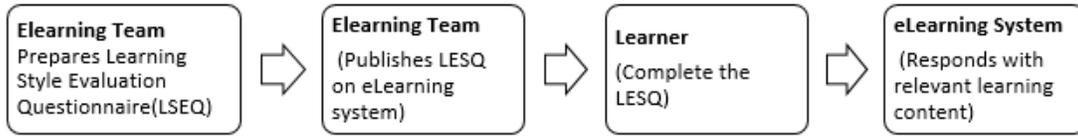


Figure 3. LSEQ Conceptual model/flow

## Methodology

This research was a qualitative research whereby qualitative methods were used to acquire data. Open ended questionnaires were used as data collection methods. The sample was purposive with a bit of snow balling, as the researcher was guided to which respondents to involve as the research unfolded. Ethical clearances and request for information forms were filled in and filed as part of ethical concerns. Pseudonyms were used in order to protect the organization which the research is about. The research questionnaires were sent to respondents using survey-monkey. Reminders were sent over a period of a month to obtain participation. Below is the demographics of the respondents.

Table 3. Demographics

Respondent Age		Respondent Percentage	Number of respondents
	17 or younger	-	-
	18-20	-	-
	21-29	25%	5
	30-39	30%	6
	40-49	25%	5
	50-59	20%	4
	60 or older	-	-
Respondent Education Level			
	High school or lower	-	-
	Grade 12 or equivalent	10%	2
	Diploma or College degree	30%	6
	Bachelors or Honors degree	50%	10
	Master's degree	10%	2
	Doctoral degree	-	-
Respondent Roles			
	Content Designer/ Author/ Content Developer	25%	5
	Trainer/ Facilitator	5%	1
	Scheduler/ System Administrator	10%	2
	IT partner/ System Architect	15%	3
	Team Manager/ Strategic Partner	5%	1
	Business Analyst/ Subject Expert	5%	1
	Vendor/ Service Provider	-	-
	Business owner/ Customer	10%	2
	Learner/ Trainee	25%	5

## Data Analysis

Table 4. An overview of learning styles meaning at ComTek

Data Themes				
Preferred way of learning	Learning methods	Way to organize learning	Aimed at target audiences	Way of rationalizing information

			<b>content</b>		
<b>Codes built from responses</b>	Preferred way to learn Way you prefer learning Learning new ways Own learning style preference Preferred style Own unique way of learning Way of passing knowledge Learning by reading/pictures (visual) Learning by listening (auditory) Learning by doing (kinesthetic)	Method Learning methodology How learning can be done Various methods	Way learning content is formulated	Target audience individual/ unique/ Personal Introvert Extrovert Tendencies and interests	Rationalize information

From the data that was received, at least five themes were generated from the codes established from this data. From the five themes it may be seen that some makes sense when correlated to the literature while some do not make much sense and will rather not be discussed. The data above reflects that most learners at ComTek regard learning styles as preferred way of learning. Maybe most of the respondents feel that the word style has a lot to do with an individual's way of doing things. Earlier in this study it was said that a learning style is the way a person expresses himself or herself characterized by all features differentiating him or her from others (Sepic et al., 2010). Now when we look at both the data and the literature definitions, we realize that both have got the word "way" in them. The data carries on to say a learning style is actually a learning preference, and this actually tend to have a close relationship with the concept of differentiating a person from others in his/her oneness. Bousbia et al (2009) elaborates on an educational preferences layer which refers to attributes like preferred learning time, environmental preference, information representation and encoding methods. There is a close correlation of data with literature in this regard giving a concrete argument that a learning style is actually a preferred way of learning.

In the data we see three types of learning styles which are: learning by listening, learning by reading or by pictures, and learning by doing. The three learning styles represent an auditory, visual, and kinesthetic learning approach respectively. McNutt & Brennan (2005) confirmed the three learning styles that we discover in our data. Here we see another correlation which gives an indication that most of the respondent actually understands the concept of learning styles.

Some respondents think that learning styles include information rationalization. While this is the case it is not clear what the respondents wanted to imply. Thus no further analysis will be done on this theme. Perhaps the respondent wanted to imply that using different learning styles brings some sort of rational thinking to the person learner pursuing learning content. However, whether the learning content is visual, auditory or kinesthetic does not imply that it is rational or not.

**Table 5. An overview on dominating learning styles**

<b>Codes</b>	<b>Themes</b>		
	<b>Auditory</b>	<b>Visual</b>	<b>Kinesthetic</b>
Learning preferences	25%	62.5%	12.5%
Assembling equipment	12.5%	81.25%	6.25%
Receiving Directions	50%	50%	-
Remembering people	31.25%	18.75%	50%
Learning Vocabulary	12.5%	18.75%	68.75%
Hobbies	37.5%	25%	37.5%
Remembering things	31.25%	-	68.5%
Destructions	31.25%	18.75%	50%
Not forgetting things	18.75%	50%	31.25%
Understanding	43.75%	12.50%	43.75%
Individual Talent	43.75%	31.25%	25.00%
<b>Weight</b>	<b>337.5</b>	<b>368.75</b>	<b>393.5</b>

The above results were obtained using the LSEQ questionnaire of learning styles. The codes were developed from the actual questions asked in the questionnaire and the three themes were generated as a result of the responses. Considering the percentages above per learning style category, and summing them up as a method of weighing the feedback, assisted in realizing what method of learning is actually dominant at ComTek. It was found that most of

the respondents are kinesthetic learners, with an overall weight of 393.5 kinesthetic weight compared to visual weight with 368.75 and auditory weight with 337.5 as illustrated in the table above. However, looking at all the weights it may be seen that they are almost equal in weight, indicating that they all are equally to be considered when creating learning content. The simulation here means, if the three themes are taken into consideration when developing learning content, the quality of learning will improve at ComTek.

## Findings

Taking from the data analysis section we discover that respondents do portray an understanding of learning styles. While most say learning styles are preferred way of learning, some say it is rather a method, a way of organizing content, and it is aimed at target audiences. Some think learning styles have something to do with rationalizing information. Most respondents are kinesthetic learners which means they learn most by doing.

## Limitations

As this study is a qualitative study, no intervention of any sort was anticipated. The study was commenced to understand the underlying concept of learning styles and their contribution to quality and equity in learning. The limitation we came across during the research was that the company where the research took place was undergoing major unforeseen strategic changes during the time of the research, such that only limited access to the research sample and units of analysis was allowed. The research went on until a point where the researcher was not able to do to evaluate pre and post conditions due to time and access limits.

## Contributions

ComTek appreciated the learning style study as a contribution for future consideration in improving quality and equity in their learning. The publication of this paper will also help other companies and the research society to reflect on the content of this study, extend it, and re-evaluate learning to be based on learners' learning styles, thereby increasing the quality and equity of learning.

## Future research

An action research study will be conducted in order to have some sort of intervention and activities which reflect results of change.

## Conclusion

All literature and data collected point out that learning styles are equally important when embarking on a learning project. Taking learning styles into account boosts the ability to improve the quality and equity in learning. An advice to ComTek and any institution implementing an eLearning project is, to start authoring learning content that takes into consideration learning styles and similarly to base their assessments on individual learning styles. When implementing an eLearning project, it is imperative to know your audiences, the learners, as they are people who will be involved in consuming the learning content. The use of the LSEQ or any learning style evaluation questionnaire or software will be helpful in determining the learning style of learner audiences.

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