

Northumbria Research Link

Citation: Haq, Anwar, Magoulas, George, Jamal, Arshad, Majeed, Asim and Sloan, Diane (2018) Users perceptions of E-learning environments and services effectiveness: the emergence of the concept functionality model. *Journal of Enterprise Information Management*, 31 (1). pp. 89-111. ISSN 1741-0398

Published by: Emerald

URL: <http://dx.doi.org/10.1108/JEIM-03-2016-0074> <<http://dx.doi.org/10.1108/JEIM-03-2016-0074>>

This version was downloaded from Northumbria Research Link:
<http://nrl.northumbria.ac.uk/id/eprint/31223/>

Northumbria University has developed Northumbria Research Link (NRL) to enable users to access the University's research output. Copyright © and moral rights for items on NRL are retained by the individual author(s) and/or other copyright owners. Single copies of full items can be reproduced, displayed or performed, and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided the authors, title and full bibliographic details are given, as well as a hyperlink and/or URL to the original metadata page. The content must not be changed in any way. Full items must not be sold commercially in any format or medium without formal permission of the copyright holder. The full policy is available online: <http://nrl.northumbria.ac.uk/policies.html>

This document may differ from the final, published version of the research and has been made available online in accordance with publisher policies. To read and/or cite from the published version of the research, please visit the publisher's website (a subscription may be required.)

USERS PERCEPTIONS OF E-LEARNING ENVIRONMENTS AND SERVICES EFFECTIVENESS: THE EMERGENCE OF THE CONCEPT FUNCTIONALITY MODEL

Abstract

Purpose - E-learning Environments and Services (ELES) adoption and success rates challenge ELES designers, practitioners and organisations. Enterprise decision makers continue to seek effective instruments in launching such systems. This study aims to understand users' perceptions of ELES effectiveness and develops a theoretical framework which improves understanding of success factors for adoption.

Design/Methodology/Approach - Grounded Theory Method (GTM) is used to reflect on the relationships between changing users' requirements and expectations, technological advances and ELES effectiveness models. A longitudinal study collecting data from social media blogs over four years was authenticated based on the context evaluation, language structure and conversational constructs.

Findings – Identification of a new core dimension named “Concept Functionality” which can be used to understand the relationships between E-learning effectiveness factors, including the relationships with other domains such as security. The findings are also used to validate major existing models for the success of ELES.

Practical Implications - The new framework potentially improves system design process in the fields of education technology, enterprise systems, etc.

Originality/Value- Concept functionality dimension can offer more insights to understand ELES effectiveness and further improve system design process in a variety of domains including enterprise systems, process modelling and education technology.

Keywords System Design, Conceptual Modelling, E-learning Environment and Services (ELES), E-learning Effectiveness Model, Virtual Learning Environment (VLE), Grounded Theory Method, Massively Open Online Courses (MOOCS), Education Technology

Paper Type Research Paper

1. INTRODUCTION

The success of businesses, organisations depends on remaining at the forefront of innovation and advancement. “Learning” is a key attribute of competent and successful organisations, and the ability of individuals and organisations to acquire new knowledge and skills is becoming critical for advanced societies sustaining success.

In this context, E-learning Environments and Services (ELES) play an increasingly important role and new products, applications and services are constantly being added in this domain to improve E-learning services (Fry et al., 2014) and offer a mechanism through which learning content and activities are delivered via electronic medium (Sun et al., 2008). The Internet is increasingly used for learning collaboration between users (Rahimi et al., 2015), contributing to the globalisation of learning; presenting real opportunities for growth and transformation in the digital era. In the context of a virtual learning environment, Piccoli et al. (2001) defines the learning process as many-to-many interactions and relations among learners and their instructors. Understanding the nature of a relationship between learning and innovation in technologies and learners' perception of E-learning effectiveness is now an important area to study.

This paper uses E-learning Environments and Services (ELES) as a more inclusive term to cover several technologies used in a variety of learning contexts: Learning Management Systems (LMSs), Web-based Training (WBT), Virtual Learning Environments (VLEs), Computer-based Training (CBT), Education Channels on Video sharing sites and Massively Open Online Courses (MOOCs). For the purpose of this study ELES are defined in three contexts (Figure 1):

- **Open:** access to the environment, educational material and services is available without restriction through online medium and users may or may not extend the environment and services.
- **Close:** access to ELES is specifically restricted, with only institutional access. ELES users may need organizational authorization to use or extend the functionality.
- **Blended:** access to the ELES is partially open to users outside and they may or may not like to explore the options of ELES systems.

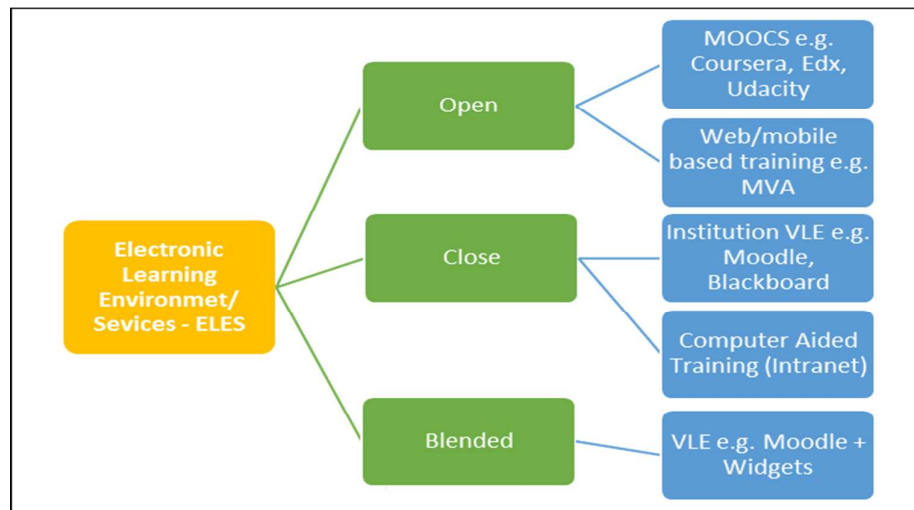


Figure 1. ELES Genre

E-learning is well established and used in modern learning domains and an important area is to identify key attributes learners require from the modern learning environment and explore what instruments exist to develop understanding of the relations between these attributes for the successful adoption of ELES (Beetham & Sharpe, 2013; Chu & Chen, 2016). There is also little evidence of utilisation of relationships between 'ELES use' and 'pedagogical constructs' Koop & Lackner (2014).

Lack of a cohesive framework presents serious methodical challenges for the e-learning practitioners, requiring a new tool, expertise and frameworks to address these - for example, how to approach large dropouts of learners when using MOOCs (Xing et al., 2016), why users gradually stop using ELES (Onah et al., 2014). Waheed et al. (2016), investigated the link between the perception of learners on the quality of knowledge gained, the nature of the content available on e-learning platforms and the related impact on the success of e-learning environments. The study (ibid) identified key attributes of 'Content' provision: Accessible, Actionable, Representation Knowledge Quality, Contextual, Intrinsic. The 'Content' dimensions provided a measurable mechanism for the quality of the knowledge, it is limited in discussing how practitioners could implement these dimensions in consideration of interplay with other factors for the success of e-learning platforms and limitations on their adoption. Despite the availability of theoretical models of e-learning effectiveness (Bristol, 2014), no approaches explore adequately the factors impacting on effectiveness, such as the rapidly evolving nature of the educational landscape, various learning contexts and the introduction of new technologies in education. ELES practitioners would benefit from a framework capturing existing and emerging dimensions, enabling practitioners to make sense of interplay holistically.

This empirical study was conducted to understand how users perceive ELES effectiveness, how technological advances and changing user requirements affect ELES design frameworks and effectiveness models, and identify the factors determining the evolution of successful, innovative

1
2
3 ELES design and components. The findings are used to propose a cohesive model for ELES
4 effectiveness from users' perspectives to overcome the aforementioned issues and provide a model to
5 map and dynamically capture the evolving nature of e-learning environment and services. The paper
6 reviews and evaluates the validity of available models by critically analysing their characteristics for
7 ELES effectiveness against evolving users' perceptions.

8 Section 2 discusses ELES effectiveness factors, Section 3 explains the research methodology,
9 Section 4 discusses the components of new ELES effectiveness model including the core dimension
10 'Concept Functionality' identifying utility and trends in modern e-learning systems. Section 5
11 discusses implications and proposes a future research agenda, Section 6 concludes.

14 2. ELES EFFECTIVENESS FACTORS

16 E-learning is an essential paradigm in modern education (Sun et al., 2008), however simply providing
17 technological solutions for learning problems will only lead to sub-optimal solutions with respect to
18 learning (Laurillard, 2008). The key issue is to find the right e-learning solution for the concerned
19 learning problems.

20 Early e-learning effectiveness models developed to better understand the adoption of
21 technology by the users in the e-learning domain (Chu & Chen, 2016). Piccoli et al. (2001) based
22 effectiveness factors on the Technology Acceptance Model: human and design dimensions were
23 perceived to impact on the effectiveness of ELES. A longitudinal experiment based on this model
24 revealed the issues students faced, in terms of communication in ELES; for example, higher drop rates
25 were detected compared with general population despite students showing same computer self-
26 efficacy and satisfaction (Merriam, 2001), highlighting the need for further investigation.

27 Liaw (2007) proposed a conceptual model where learner and environmental characteristics
28 were related to perceived learners' satisfaction and usefulness. Fosnot & Perry (2005) correlated this
29 with a behavioural intention of e-learning usage, revealing that although learners consider e-learning
30 as a useful tool in assisting their learning, they are concerned with the system quality and
31 communication features available. Their study identified Perceived Self-Efficacy as the strongest
32 indicator in learner's Perceived Satisfaction, along with Multimedia Instructions in the Perceived
33 Usefulness of the e-learning system.

34 Subsequent research in e-learning effectiveness moved towards personalisation and e-learning
35 environmental factors, where learners' behaviour and internal conditions emerged as an important
36 factor in e-learning effectiveness with the perceived e-learner satisfaction model by Sun et al. (2008)
37 identifying the importance of environmental dimension and users' behaviour and attitude for effective
38 e-learning. The study identified six factors having a 'critical relationship' with "Perceived e-Learner
39 satisfaction" (ibid, 2008, p. 1193). The findings revealed that when learners' computer anxiety is low
40 then the barrier to E-learning is low – training and education of learners towards gaining computing
41 knowledge and application of technology are important (Bolte et al., 2007). Instructor attitude towards
42 E-learning where the instructor is experienced, is not enough to have a significant impact on learners'
43 satisfaction – enthusiasm and level of engagement towards E-learning are key factors for any E-
44 learning instructor (Elango et al., 2008). Factors related to course quality, assessment and
45 technological design are important for learners' perceived usefulness and ease of use of a course,
46 impacting directly learners' satisfaction – pedagogical driven E-learning solutions could potentially
47 play a significant role in improving learners' satisfaction in relation to these factors (Fry et al., 2014).

48 Hyochang et al. (2007) showed the importance of personalisation to enhance the effectiveness
49 of e-learning using intelligent agents in virtual learning environments. Emphasis on personalisation
50 dimension (especially in the constructivist approach to learning) is in line with the findings of earlier
51 work by Wang (2003). Innovations in technology are emerging and there is a need for more dynamic
52 solutions to e-learning models. Effective communication of the e-learning strategy is a continuing
53 challenge (Singh et al., 2014). Moreover, existing models of e-learning effectiveness lack a holistic
54 perspective on the problem and do not capture the evolving nature of the learning landscape as new
55 technologies are introduced and people and society change - this requires a new e-learning framework.
56 This summarises the body contributing to the advancement and building of new paradigms in the field
57 of e-learning effectiveness and effectiveness models, and identifies the need for a cohesive model
58
59
60

1
2
3 which could capture the interplay of different dimensions and help in understanding the evolving
4 nature of the challenging contributing factors/dimensions in this field.
5
6

7 **3. RESEARCH METHOD AND DATA COLLECTION**

8
9 The majority of studies evaluated design features of a particular ELES using a survey methodology
10 (Mueller and Strohmeier, 2011) and consequently have failed to provide deep insights into evolving
11 users' perceptions of ELES effectiveness. The Glaserian Grounded Theory-GT approach (constant
12 comparative analysis) was used, which is a general iterative and systematic method to develop theory
13 and incorporating qualitative and quantitative data (Glaser, 2004). It is well-established and normally
14 used where meaning and relationships are not directly evident, therefore suitable to avoid injection of
15 any preconceived ideas, derived from existing models, and allow exploration of effectiveness factors.
16

17 This is appropriate as social media blogs with associated comments were chosen for the
18 investigation to obtain a view of discussions leading to a deeper understanding of the concerned field
19 of study. Blogs used were taken from 2005 onwards to capture the trends and relationships over a
20 significant period of time (approximately 10 years) capturing diverse and complex data spread over a
21 global scale. The GTM process creates a conceptual theoretical framework in the concerned field. The
22 research starts with the general area of interest and the key concepts emerge from the collection and
23 analysis of the data.

24 The social media space is increasingly attracting people of all ages to join the ranks,
25 participate in media production, discussions, reviews and critiques (Kaplan & Haenlein, 2010). The
26 blogs are an important part of social media landscape and could be considered as space for a personal
27 diary, a website and space for online collaboration around particular topics and building communities
28 classified as 'high' in reference to 'Self-presentations/Self-disclosure' and 'low' in reference to 'Social
29 presence/Media richness Medium' (Kaplan & Haenlein, 2010, p. 62). The Self-disclosure is defined
30 as, "... the conscious or unconscious revelation of personal information (e.g., thoughts, feelings, likes,
31 dislikes) that is consistent with the image one would like to give." (ibid, 2010, p. 62). This
32 classification is significant as it points out that the Blogs media potentially shed more light on author's
33 internal thought processes and feelings about a particular subject – blogs also provide opportunities for
34 interaction with others via the addition of comments in the blog resulting in potential insights on the
35 subject area. The blogs chosen had at least one comment associated (to capture the dialogue) with
36 them as the choice of data for this exploratory study for the following reasons:

- 37 1. Eytan et al. (2004) highlighted the value of communication generated through listings and
38 commenting in blogs as "... intended to relay the latest interesting, humorous, or thought
39 provoking information the user has run across."
40
- 41 2. For this study, the blogs provided varied, high volume and high dimensional data sets with the
42 360-degree view to start exploring users' perception, success factors and issues related to
43 ELES.
44
- 45 3. The study is longitudinal and the analytical process spanned more than four years capturing
46 the trends and depth – some of the technologies didn't even exist at the start of the study e.g.
47 MOOCS. The collection of online data was a suitable option to capture the more varied
48 experience and reflections of the users at the global scale, as compared to the questionnaires or
49 interviews as the method of data collection for a specific system.

50 The blogs and comments used were written by academic practitioners, ELES administrators, education
51 community members and the learners/users of the ELES. The keywords, relevance of discussions
52 carried out via the Blogs, the context of the information, the writing styles and elaboration on
53 experiences, were taken into account when the blogs' data was collected for its authenticity. The
54 sample size of the data is significantly from varied sources to eliminate any bias in the data collected.
55 Overall, 160 blogs were collected iteratively for this study in total with more than 500,000 words
56 including associated comments which helped in establishing the authenticity of blogs used.

57 Figure 2 shows the GTM process used illustrating the relationships and themes derived from
58 the empirical data using the constant comparative method with three main stages open coding,
59
60

theoretical sampling and selective coding where the analysis and data collection continually inform one another.

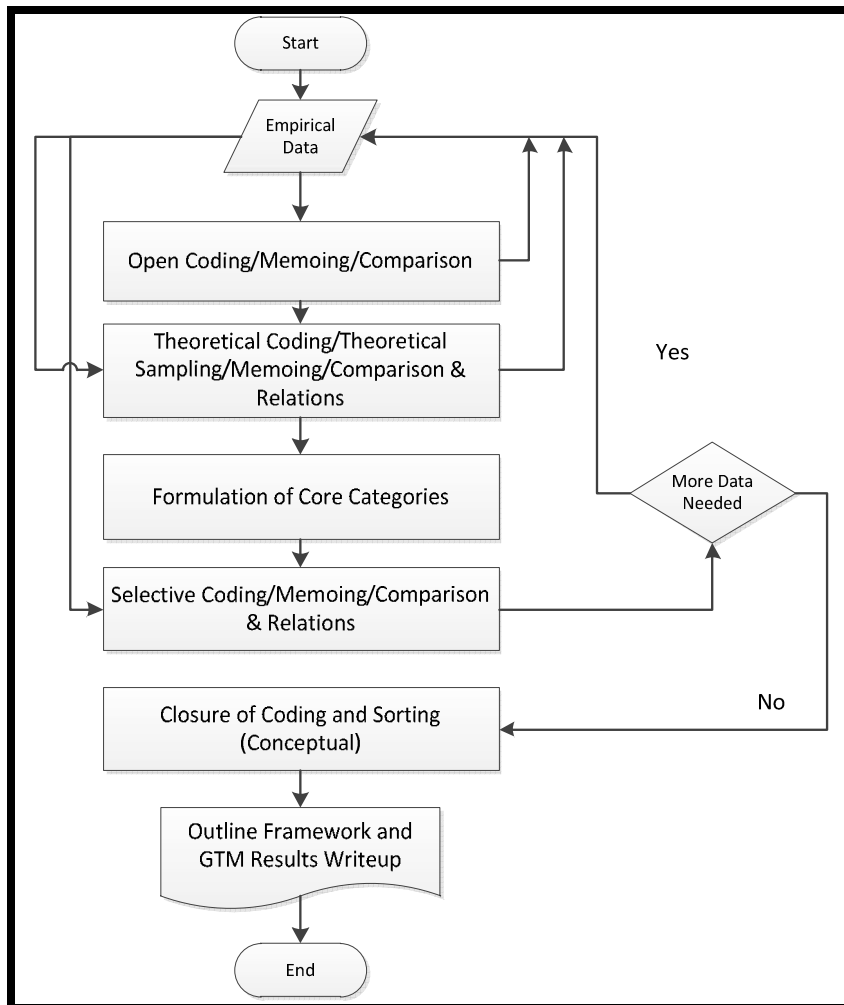


Figure 2. The flowchart representing GTM process.

Initially, blogs related to e-learning and ELES topics were collected and used for open coding - started by 'close reading' and 'integration' of data (Charmaz, 2008). This first stage of the process, analysed and coded the data line by line, assigning the extracts to concepts or categories. The theoretical coding is the conceptualisation of the data through coding. After initial analysis to establish core categories further blog data, specifically related to the emerged topics, were gathered and used to understand and probe the issues and relations in greater depth. This provides initially substantive categories which at later stage relate to the theoretical categories through constant comparative analysis (Glaser, 2004). Concept and theoretical coding facilitated collection, analysis and coding of the next set of data. This process ensures collection of relevant sets of data to develop the emergent theory (Adolph S., 2008). Once the theoretical framework was matured, the comparisons and validations against existing body of knowledge were conducted to identify the newly emerging concepts based on the findings of the study.

Sorting is the process through which data and ideas are theoretically ordered, sorting of conceptual indicators related to core categories is done through the memos (Glaser, 2004). Memoing (Memo Writing) is the process of recording notes on the matters emerging, analytical thoughts throughout GTM processes capturing 'ideas in process and progress', providing traceability for the researcher and the tool for building and writing up the theoretical framework cohesively (Charmaz,

2008, p. 166). This revealed findings, conceptual relationships between categories, directions of further investigations & probing, emergent theoretical points and goes on in parallel with the data analysis. At this stage (open coding), the blogs' data was studied and incidents were identified in the data. An example of Memo reference related to above data reference given here including the Code example.

Memo & Key Point: ELES CA Data 08 Ref 1 M, *"The discussion points to the need for appropriate pedagogical implementation in online courses. The problem identified is prevalent use of online courses to disseminate factual information - not focused on learning process – lack of ELES specific instructional design and assessment approaches (needs further probing for the extent of the problem during next iteration of data collection)"*

Code: *"lack of application of pedagogical instruments"*

The emerging themes and relationships were identified using the computer-assisted qualitative data analysis software (CAQDAS), NIVIVO (QSR, 2016), increasing transparency and methodical rigour (Figure 3). The coding and constant comparison facilitate in sorting and synthesising a large amount of data, facilitating the empirical phenomenon and comprehending explicit and latent emerging perceptions e.g. "effective pedagogical driven training", "importance of informed learner choices" - including diminishing of the strands not relevant to the scope of the emergent themes, leading to the category generation. (Charmaz, 2008). Figure 3 shows an example of category generation based on this process.

Category: *"ELES and Pedagogy"*

Name	Sources	References
ELES	5	93
ELES and Pedagogy	4	63
ELES Design	3	14
ELES Effectiveness	6	51
ELES Adoption	7	80
ELES Benefits	8	90
ELES Limitations	8	69
ELES Functionality	9	129
ELES Personalisation	5	14
ELES Tools	9	104
ELES Users	1	2
ELES User Requirements	11	67
ELES User's perspective!	10	72

Reference 1 - 0.07% Coverage

We are using both Sharepoint and Moodle in our Department and we seem to fall into two groups used by those who teach standard modules and find it convenient. Sharepoint is used for its collaborativeness, and the possibility to have different levels of user permissions and contribu

Reference 2 - 0.03% Coverage

Does that mean we've finally worked out the best way to use them, or does it mean the developers and provider

Figure 3. Showing use of NVIVO CAQDAS for the research study

The data collection was stopped at the theoretical saturation point i.e. when new categories/concepts stopped emerging despite the inclusion of new data (Dominic & Ann, 2011). The conceptually sorted memos provide the outline of the theoretical framework. The next section presents the findings of the study, identifying the individual components of the model and the framework as a whole.

4. FINDINGS AND DISCUSSION

Using GTM seven distinct concepts/dimensions emerged, discussed in detail below with sample representative data items. Discussions on the relationships and attributes of each finding are also carried out including the cohesive nature of the model.

4.1 ELES Transformation, Scope and Scale

An ELES can be used as a distance learning tool or supplement to face-to-face classroom environment as indicated in Social Media Blog (SMB) data (sample) below together with the year it was published. The primary focus of the ELES is to facilitate teaching and learning, course creation, provide assessment tools and feedback to the users. SMB data shows that ELES provide mechanisms to obtain information from users e.g. using questionnaire and provide tracking tools. This is in line with the traditional ELES closed context, as defined in Section 1.

“The system (VLE) can often track the learners' progress, which can be monitored by both teachers and learners. While often thought of as primarily tools for distance education, they are most often used to supplement the face-to-face Classroom.” – 2007

The users' perceptions of ELES are evolving with the advent of Web 2.0/3.0, cloud-based tools and social media availability and their wide scale adoption. The SMB data has indicated, the ELES scope and objectives relate to functionality considerations including: communication tools to transfer and enhance ideas and knowledge; provide facilities to administer groups and social media in the context of teaching and learning; offer different options and choices to facilitate the learners and teachers which best suit them. The focus on supporting learning communities and need for an innovative environment to enable users to personalise their own learning structures, build their network and knowledge are perceived to be important factors for ELES effectiveness.

“Maybe a good model for a VLE is a social networking site such as Facebook. It is user friendly and an excellent tool for communication. Communication of ideas and knowledge is at the core of a school's role, use of technology in creating a VLE should surely mirror that. VLEs should above all become learning communities.” -2009

Wang (2003) included 'Learning Community' as the key factor in his ELES effectiveness model. This dimension emerges as important in many categories in this study, users are also reflecting the desire for more meaningful interaction within the learning community. The findings suggest that the changes in the scope and scale of ELES are directly influencing the perception of ELES effectiveness and adoption by the users and the organisations. It is therefore important to understand the relationship of ELES scope, scale and transformation with the other factors for ELES effectiveness.

The ELES (blended) is valuable in users' perception and bore potential for innovative ways to compliment/enhance education – reflected by a sample comment from the Social Media blogs data (SMB) below. The ELES is also perceived to support users in technology adoption in the education and learning. The ELES could potentially be used as the platforms for wider participation and a merging tool between formal and informal learning. Sun' et al. (2008) environment dimension incorporates user interaction with others and with the environment – affecting the perceived usefulness of the ELES. This dimension could be extended to the informal setting and could potentially give users functional control for the integration of services with other environments.

“Think about lectures, which are considered structured and formal, with YouTube, other video services, lecture capture, can now be accessed when and where the learner wants them, so blurring the formal and the informal. Discussion forums on the VLE allow seminar style activities to happen without the constraints of geography or time.” – 2012

1
2
3 The traditional ELES (closed) is not perceived (shown in the sample comment below) at the forefront
4 of the edu-tech revolution because it is used and adopted without thorough consideration of
5 design/engineering and pedagogical principles: in most cases new features were added on top of old
6 technology; users and experts were not fully incorporated in the vision for implementing ELES based
7 solutions. Readily available ELES solutions were imposed at levels where these were not designed for,
8 e.g. university/distance learning specifically designed systems onto school level education. The ELES
9 (open) is perceived to be still in the process of developing a suitable pedagogy which could
10 incorporate and accommodate the scope and scale of such systems – one of the main issues with ELES
11 (open) is related to the assessment as indicated by the sample data below.

12
13 *“We found that the exploitation of VLEs at curriculum level resembled more of a cottage*
14 *industry than a national technological revolution.*
15 *...used as a dumping ground or storage place for rarely used files.” – 2009*

16
17 *“In true Internet fashion, these peer reviews were totally anonymous. I couldn’t discuss*
18 *with my reviewer why he or she thought my essay was lousy, and I couldn’t defend my link*
19 *to Fox News. I felt uncomfortable and powerless. Stupid. This is not an environment that*
20 *encourages productive learning.” – 2014*

21
22 The above reflection is in line with Kirschners’ (2004) model, where ‘fitting pedagogy’ was presented
23 as a core dimension of the ELES effectiveness, putting emphasis on the importance of understanding
24 this dimension in relation to learning attributes, e.g. reflective learners, active learners, problem-based
25 learning etc.

26 New ELES models (blended) are providing opportunities for learners to gain
27 professional/industry specific skills. Platforms such as Udemy (2015) provide opportunities for
28 corporate training at much-reduced prices as compared to traditional training sources. Interestingly
29 the merger of ELES (blended) with traditional corporate/professional training setups indicates a new
30 shift in the companies’ attitude towards the use of ELES to achieve their business aims and objectives.

31
32 *“Inexpensive training isn't the only lure. Brightpearl, an online business software management*
33 *developer, started to use Udemy last fall to help train a new team of salespeople. It found that*
34 *the new team produced 32 percent more in revenue compared with a previous group of new*
35 *hires, who had been taught in a traditional instructor-led class.” – 2014*

36
37 ELES (open) is providing opportunities for people who were not able to acquire the level of education
38 and training they wished - opening up new prospects and professional level opportunities (reflected in
39 the sample data below) and linking to the cultural change in society in the context of attitudes towards
40 learning and development.

41
42 *“I want to share that MOOCs are providing those who are under-employed or under-educated*
43 *an opportunity to improve their lives through education and new skill acquisition. Meeting in*
44 *cohorts, having a coach and providing support facilities all matter - but more needs to be done*
45 *to really assure we are spreading this amazing opportunity among those who have not*
46 *successfully acquired a college education.” – 2014*

49 4.2 ELES Users Characteristics, Perspectives & Requirements

50
51 The ELES User Perspective concept reveals ‘What the users think of ELES?’ whilst the concept ELES
52 Requirements identifies reflections in response to the question ‘What the users want out of ELES?’
53 This section discusses the relationship between the concepts e.g. ELES User Perspective,
54 Requirements and ELES Functionality.

55 System functionality and use should be related to the perceived usefulness. Even a cutting-
56 edge system may not be successfully adopted by the users if they perceive that it will not affect their
57 learning or academic results. This suggests, learners’ engagement is related to their perception of the
58
59
60

1
2
3 system. An ELES system should provide the mechanisms and tools to improve users' perception, such
4 as a user-friendly environment and a variety of tools and opportunities for the exchange of ideas and
5 knowledge. The sample data below indicates that cultural background should also be considered when
6 designing the ELES and users should be able to tailor their ELES environment to their taste, mood and
7 feelings.

8
9 *"He used a student population in China as the first people to try the system. It didn't have the*
10 *uptake that he expected. They soon realised that this was because the students had come to the*
11 *conclusion that use or non-use of the system did not directly affect their grades. The students*
12 *also lacked an understanding of the (Western?) concept of a Personal Learning Environment."*
13 *- 2010*

14
15 Liaw (2007) and Sun, et al. (2008) suggested the perceived usefulness as a key contributing factor for
16 ELES effectiveness in their models – conforming with the reflections from the empirical data and
17 emerging concepts in this study and should be incorporated in the e-learning design, delivery and
18 ELES functionality. An interesting theme is emerging from the SMB data on how the users'
19 expectations and behaviour are changing the nature of their experience with technology changes, e.g.
20 centralised and traditional ELESs might pose a mismatch to users' experience as users are increasingly
21 using flexible and collaborative tools in their personal life (Guizzardi, 2005). Intelligent interaction
22 with the content is required in ELES to improve learners' engagement during the learning process and
23 in varied settings, e.g. content in group settings (Breitman et al., 2007). Directing learners through
24 particular learning pathways by restricting their navigation in the ELES does not necessarily imply
25 that effective learning has happened – this implies the need for thoughtful pedagogical-based design
26 and instruments for learning to happen effectively, this design feature should be a key characteristic of
27 modern ELES (Bower et al., 2011). Users should be able to choose a different type of ELES system
28 functionality based on their requirements, such as flexibility, the level of access and permissions,
29 content relevance and level of contribution according to personal learning goals etc., suggesting users
30 require tools and mechanisms to improve communication and collaboration. Moreover, engaging
31 learners with the learning process requires giving users control to enhance personalisation and enable
32 integration of external services. There seems to be a need for a standards-based service which would
33 enable exchanging data between ELESs and cloud-based services, enabling smooth interaction
34 between the distributed systems (Fensel, 2005).

35
36 *"I have been thinking about compliance and other regulated training, and while logic dictates*
37 *that robust assessment should be enough, when is it ever logical?! In such cases, forced*
38 *navigation and SCORM interactions may remain to cover the company's backside. Whether or*
39 *not the learning is effective, well that's a different issue."* – 2010

40
41 The cohesion of well-planned resources and tools; pedagogy; collaboration & interactions;
42 personalised support seems to be a combination for success in e-learning environments. The question
43 is: Do we have a well-established framework for the cohesion of all these varying components,
44 necessary for the learning experience the learners wish for? This study plays an important role in
45 devising such a framework.

46 47 4.3 ELES Effectiveness

48
49 The ELES perceived benefits directly affect the functionality and adoption of the system. This concept
50 is quite inclusive covering the provision of online courses, the exchange of information between peers
51 and teachers, online submission of assessment elements, searching facilities, marking and grading
52 tools, tools for collaboration, linking resources and the provision of a secure and trusted environment
53 for students shown below.

54
55 *"I was the one who posted the entries for the kids to respond to. I was the one creating the wikis*
56 *that the kids would add to. With the MOODLE we all create together. It is OUR space."* - 2012
57
58
59
60

1
2
3 *“And what of formative assessment? Unless I missed it you do not appear to mention the*
4 *benefits of working in a closed and e-secure environment in which teachers and students can*
5 *work in a trusted formative dialogue.” - 2009*
6

7 The existence of a positive relationship for perceived benefits and e-learning effectiveness is
8 consistent with the findings of Liaw (2007) and Sun et al. (2008). The reinforcement of content
9 provision and its availability, especially when direct contact learning opportunities were missed due to
10 other commitments or illness are considered added benefits as illustrated below. Access to educational
11 content and related resources from a common point and presentation of the information in a
12 personalised format are rated high.

13 *“I believe there is value in offering students a VLE to support their learning. Not to act as a*
14 *substitute for attending face-to-face classes but as an additional form of reinforcing content and*
15 *a “safety net” to help students who have missed work due to sports exchanges, illness or those*
16 *who are disorganised and have lost their class material. I also believe parents value the easy*
17 *access to relevant and up-to-date class material as a means of supporting their son/daughters’*
18 *learning at home.” - 2009*
19

20 ELES facilitate course management, reducing the burden on support staff by making relevant
21 information available to concerned parties or stakeholders. Findings also revealed that the ELES can
22 provide the opportunity for learners to accustom with virtual learning even if they have little prior
23 experience.
24

25 *“The Exams secretary put timetables on there (and this meant teachers, pupils and parents*
26 *could access the information whenever they wanted and this reduced their phone calls to the*
27 *school office and exam secretary. Our SEN students contributed (often but not exclusively by*
28 *making suitable animations); gifted and talented contributed and eventually had their own*
29 *sections tapping into their own interests; parents had a section – and the parents of SEN*
30 *students particularly liked the additional information and form of contact.” - 2009*
31

32 The ELESs are generally centrally controlled and tightly coupled, meaning the functionality provided
33 is not easy to change or extend. Thus, some institutional ELESs can appear limited in scope for larger
34 contributions or collaborations.
35

36 *“VLEs are already out of date – the way forward is loosely-coupled, not central-and-*
37 *monolithic...” - 2008*
38

39 Another perceived limitation is the lack of ELES tools for supporting users who want to continue
40 using and building their own resources after they leave the institution. Innovative functionalities, for
41 example, creating thematic learning networks around which learning communities could be developed
42 is considered to be limited in some ELESs as well as providing learners broader functionalities, such
43 as, job searches. Additionally, the integration of tools, services and networks to the institution’s ELES
44 are perceived to be the security concerns.
45

46 *“Now one of the issues you may find with your VLE is that the security settings restrict you*
47 *using embedding code on pages or discussions forums on your VLE; this is certainly the case*
48 *with Moodle.” - 2010*
49

50 Use and adoption of ELES require thorough planning and backing of all stakeholders in the institution
51 including careful examination of user’s requirements. This is perceived to be the key for successful
52 use of ELES and mapping ELES functionality and provision of services in ELES with corresponding
53 security and privacy needs.
54

55 4.4 ELES Design, Tools & Services

56
57
58
59
60

1
2
3 The ELES design, tools and services should evolve along with the systems and delivery mechanisms
4 contributing towards learning experience, new innovations of tools could open up new ways for
5 collaboration, new pedagogical dimensions and system design possibilities.

6
7 *“There are numerous other research opportunities with MOOCs, including adaptive pathways*
8 *during the course, personalized learning, self-regulated learning, alternative credentialing*
9 *approaches, automated assessment, evaluating the impact of socially created artefacts on*
10 *learning, alternative approaches to lectures and content presentation, and so on. Those are*
11 *topics for future exploration.” – 2014*

12
13 ELES tools should offer provision to create courses, provide services and configuration tools ensuring
14 the ELES could meet the organisations’ requirements. ELES tools include tools for assessment, e.g.
15 automatic marking, communication, uploading content, providing feedback, peer assessment,
16 administrating student groups, collecting and organising student grades, questionnaires and surveys,
17 tracking tools, e.g. content usage and accessed statistics, wikis, blogs and RSS. Rahimi et al. (2015)
18 linked the provision of tools and technologies (web 2.0) with the learners’ control dimension (control
19 over self-learning process and interaction and dialogue with instructor). But the study didn’t explicitly
20 specify mapping mechanism between tools/technologies and learners control in terms of functionality
21 of ELES (Boyce & Pahl, 2007). The modern ELES should provide tools to enable learners to plug in
22 their personal toolsets of networks and applications.

23
24 *“All the practitioners then choose at least one feature that they will use with their learners on*
25 *one of their courses. Features could include voting, feedback, discussion forum, photo gallery.”*
26 *– 2011*

27
28 Learners, practitioners and institutions require tools necessary to exercise their choice of transferring
29 content and communications into and out of the ELES. Online resources and the integration of
30 external services in ELESs has blurred the lines between informal and formal training. Forums and
31 social networking services and social media have opened new avenues and design dimensions in
32 learning. The modern ELES is perceived as a system that should be able to adapt in terms of provision
33 of social tools, considered as a container for tools such as blogs, wikis, podcasts, web links and sites.
34 Creating a space where knowledge sharing, creation and communication happens, e.g. rating tools or
35 review tools, could be adopted for the community evolution or authenticity of discussions and
36 contributions. ELES design will increasingly play a key part in the evolution of such systems and this
37 study contributes to capturing and understanding this transition with its proposed conceptual model.

38
39 *“As a member of that community this makes it very hard to identify which people in the*
40 *community are worth listening too and who to ignore: all of a sudden I’m surrounded by 16000*
41 *people all talking at once. When things ramp up more slowly, I can build out my social network*
42 *more easily. Coursera doesn’t have any notion of study groups.” – 2013*

43
44 Well-thought out pedagogy, structure and correct use of tools for learning engages and motivates
45 learners, including enhancing teaching practises through better understanding of pros and cons of
46 certain approaches and their relationship with particular environments. ELESs should not be restricted
47 to institutional tools and services, but incorporate tools where users can inform change of practices and
48 potentially led to improvements in the learning experience.

49
50 *“MOOC learners are not undergraduates who expect a diet of lectures delivered synchronously*
51 *over a semester. They are not at college and do not want to conform to institutional structures*
52 *and timetables. It is unfortunate that many MOOC designers treat MOOC learners as if they*
53 *were physically (and psychologically) at a University – they are not.” - 2016*

54 55 4.5 ELES Networking & Collaboration 56 57 58 59 60

1
2
3 Users consider an ELES as space where all can learn together utilising tools and services of this space.
4 It is perceived that the networking technologies has the potential to engage learners in meaningful
5 learning processes as indicated by the sample comment below.
6

7 *“When I describe a MOODLE to the un-initiated, I often resort to the somewhat snide: It is like*
8 *a website on steroids! My MOODLE is so much more than that. It is my classroom. It isn't an*
9 *extension, or a place for the kids to play - it is a space where we all learn together.” - 2012*
10

11 ELES provides networking opportunities around learning concepts inadvertently enhancing learning
12 and engagement. Community learning around topic/course using ELES (open) as a tool reveals new
13 opportunities, particularly for students without traditional college/university background, and could be
14 used to teach learners to develop networking skills and achieve common goals while working with
15 others.
16

17 *“To those of us who have had the opportunity to go to college; we may be disappointed in what*
18 *the MOOC's offer but to others who do not have the opportunity and can use the information to*
19 *build their knowledge base; it's opened a whole new world. I know of several groups of people*
20 *(non college grads) who self-organize in enrolling and discussing the course that they are in.*
21 *That is where I have found the course content is truly being used to “learn”; through the*
22 *information given and being discussed.” - 2013*
23

24 Shee & Wang (2006) recognised the importance of learning communities, communications and social
25 space in the e-learning effectiveness models. ELES designers and practitioners must incorporate social
26 learning dimension in their design and delivery. Today's users expect the availability of the content
27 across multiple platforms, enabling them to make exchanges with peers and tutors seamlessly and
28 immediately.
29

30 ELES is complimenting traditional learning when used with thoughtful pedagogical
31 considerations, providing opportunities, advances in technology for collaboration and adding new
32 perspectives to the discussions (Coman, 2001). ELES lower the barrier for learners to take part in the
33 conversations, even for those who feel shy in the traditional classroom setup.
34

35 *“I very much enjoyed doing this online course. I liked it because with doing the assignments you*
36 *could see other student's responses and most importantly their opinions. During a class you*
37 *don't always get to see this. Some people are too shy to participate during a class discussion...”*
38 *- 2014*
39

40 The provision of networking and collaboration poses certain challenges and this study highlights that
41 conforming with organisational policies and privacy perceive is a major one. The ELES integration
42 with mobile systems also presents new privacy issues - how these are managed will be an interesting
43 area to observe.
44

45 *“... I'd love to hear your thoughts on web vs. native app - and on tracking what learners do on*
46 *their mobile devices (e.g. the crazy desire of so many big companies to have SCORM-*
47 *conformant courses so they can track completion. As learning becomes (hopefully) more*
48 *informal, do we seriously want to track everything people do on their mobile devices” - 2011*
49

50 Another challenge of adopting ELES (open, blended) is increased availability of the content and
51 consequently increased interaction with tutors, potentially disturbing work-life balance as indicated
52 below. Requiring careful management which must be taken into account when designing the
53 parameters of the online courses.
54

55 *“I have seen my students exchanging much as they are learning to engage each other and then*
56 *me as we expand the teaching and learning virtual learning environment. If you are serious*
57 *about teaching on-line courses then be prepared to spend much time both preparing your*
58
59
60

1
2
3 *courses and in responding to students who are multi-tasking using a diverse assortment of*
4 *technologies based instruments such as Nooks, iPad and their iPhone to stay on task. I have*
5 *been holding dialogues with students while on the Santa Fe plaza on a bench using my iPhone*
6 *and interactive video.” - 2011*
7

8 An interesting phenomenon is the increasing importance of ELES (open) for companies interested in
9 recruiting global talent across. Some companies are already paying ELES (open) providers, e.g.
10 Coursera (2016) for this service. ELES (open) is also increasingly being used as a tool to market and
11 project specific services and products by the companies e.g. Salesforce using Udacity (Udacity, 2016)
12 platform. It seems this trend will increase as the adoption of ELES (open) increases.
13

14 *“One MOOC provider, Udacity, also offers a program where recruiters can access student*
15 *resumes. According to Bersin, Over 350 firms, including Amazon, Facebook, Google, and*
16 *Twitter have paid Udacity and Coursera to match them with high-performing students.” - 2014*
17

18 4.6 Pedagogy

19
20 The users’ perception showed that the ELES were prevalently used to disseminate factual information
21 – not on learning as an active process, echoed by Rienties et al. (2015) identifying that a positive
22 learning experience in online settings requires thoughtful design and pedagogically-based
23 considerations. Simply applying traditional classroom-based teaching and learning pedagogies, may
24 not work in electronic based environments illustrated below. This sample observation indicates the
25 potential problem of using traditional instructional design in MOOCS setting - pointing towards the
26 need for instructional design and pedagogy specific to MOOCS to avoid limiting wider participation.
27

28 *“Nevertheless, it will be interesting to see how the design of MOOCs emerges as institutions*
29 *and people with more experience of credit-based online learning start grappling with the issue.*
30 *Will they add value, or will ‘instructional design’ kill the inherent nature of a MOOC, which is*
31 *its wide (initial) appeal?” - 2013*
32

33
34 The pedagogy of ELES and utilisation of tools for achieving specific learning goals and the experience
35 should be considered carefully at the design stage of the course. Despite more people engaging in e-
36 learning, it seems there is a gap in the provision of training on how to use them effectively.
37 Development of more informed users about the choices available to them and the implications of these
38 choices in terms of their own learning experience e.g. how the choices made will lead to a particular
39 learning style e.g. constructivists etc. is required.
40

41 *“It is necessary to correct the misconception that computer teach; computers are nothing more*
42 *than an appliance unless the faculty and student use it as conduit for active teaching and*
43 *learning. I am preparing a doctoral level course in logistics and operations in higher education*
44 *institutions and I am involved in a discovery process to identify and apply many resources from*
45 *both the public and private sectors to inform the students.” – 2011*
46

47 The pedagogy employed in ELES (open) could, guide learners to form study groups, build skills
48 required to form/join learning communities, inform and educate them to find relevant
49 people/resources/support for the tasks. Support structures should be provided for the learner in ELES
50 (open) environment and should be carefully planned within the pedagogy.
51

52 *“As a member of that community this makes it very hard to identify which people in the*
53 *community are worth listening too and who to ignore: all of a sudden I’m surrounded by 16000*
54 *people all talking at once. When things ramp up more slowly, I can build out my social network*
55 *more easily. Coursera doesn’t have any notion of study groups.” - 2013*
56
57
58
59
60

1
2
3 Picolli et al. (2001) showed the importance of Human dimension (Students & Instructors attributes)
4 and the need for careful planning utilising specific learning models, arguing that just giving more
5 control in e-learning environments may not result in more user satisfaction, and could impact
6 negatively on the learning experience. Kirschner (2004) identified the need for innovation in
7 pedagogies as the key factor for improved learning experience. The findings by Singh et al., (2014)
8 showed an interesting contradiction: the result for the pedagogies effectiveness for e-learning showed
9 negative reading, signifying the lack of influence of pedagogies for e-learning effectiveness. The work
10 of Sridharan et al., (2008) does not generally conform with the previous studies conducted on the e-
11 learning effectiveness but our study validated this finding that just designing and implementing
12 pedagogies would not be enough to engage users and enhance their learning experience. Application
13 of pedagogies must be complimented with innovative and fresh thinking specifically designed for the
14 e-learning environments, educating and informing users about particular pedagogies and the
15 implications of the choices they will make in e-learning environments. The findings of our study
16 corroborate Picolli et al. (2001) for the need to educate and inform users on how to use more control
17 and flexibility available to them in e-learning environments.

18 The need to better understand the relationship between tools, pedagogies and learning
19 environment emerged, with ELES technology regarded as a tool rather than solution fit for all
20 circumstances - thoughtful pedagogy and meaningful utilisation of tools are required for an effective
21 learning experience. The use of technology and ELES should have a meaningful purpose to make the
22 subject alive, even innovation in pedagogy could be utilised, opening up new dimensions in thinking
23 and delivery - enriching learners' experience. The provision of context, considering specific themes
24 and building the concept like a story are useful components of teaching methods, irrespective of
25 environment settings, e.g. online or offline.

26 It is perceived that the success rates for ELES (open) are low because people start the course,
27 full of energy and enthusiasm but after initial momentum diminishes, end up not engaging
28 continuously with the course - causing large numbers dropping off and not finishing off the course
29 (Onah et. al., 2016). Personalised coaching and motivational tools may help but personalised
30 coaching/support may have additional cost associated with it.

31
32
33 *"I should not take online courses. ... But I do know myself better than anyone else, and I know*
34 *that I have trouble finishing projects. When I get an idea in my head, when I'm inspired, I start*
35 *in full force, with passion and drive and every intention of seeing this thing through to the end.*
36 *Then I start to get a little bored. Without someone pushing me along, my intrinsic motivation*
37 *starts to taper off and I lose steam. I'm not a "slow burn" type of person." - 2013*

38 Learners are expecting pedagogically driven experience to gain substantial knowledge and expertise in
39 the concerned field of study. Offerings not accommodating these learners' expectations, lose out on
40 reputation and revenue. ELES (blended, open) is increasingly used to complement traditional
41 classroom setup, in many cases flip classroom pedagogy is employed to give more personalised
42 attention to learners during the class time.

43
44
45 *"With my class, I was disappointed to find that there was one initial lecture, which I didn't feel*
46 *offered enough information (especially not 15 dollars' worth), and one wrap-up lecture. The*
47 *lesson didn't expand enough on what the syllabus promised. One video was too sparse for a*
48 *week-long course, and I wanted to be taught more. I wanted to know how to create those*
49 *images, and I felt like I was led on. Instead, the instructor linked to other photography blogs*
50 *and articles, all of which I could have found for free. (Keep in mind that MOOCs offered by*
51 *prestigious universities such as Harvard and MIT are obviously more in-depth than my one-*
52 *week Skillshare class.)" - 2013*

53
54
55 *"With an online platform only the very first stage is successfully reproduced. Yes, better to have*
56 *the professor's lecture online to view any time any place. But this is no more than viewing a Ted*
57 *Talk. The student doesn't even have to take notes in real time (a really useful mental activity of*
58 *active listening and synthesis) because the transcript is there." - 2015*

1
2
3 ELES (open) provide opportunities for the learners to explore new dimensions that even instructors
4 may not have perceived e.g. emerging from learner discussions and interactions. The question is what
5 pedagogical instruments and ELES tools could be utilised in such situations to encourage innovation
6 and use of creative ideas or even make learners realise that they are exploring/creating something
7 new?
8

9 4.7 Concept Functionality

10
11 The system functionality is generally defined as the result of requirement analysis resulting in clear
12 understanding of system functions (Systems Engineering Fundamentals, 2001). Functionality is central
13 to understanding, what the users want out of an ELES and what it can deliver and how this impacts the
14 user's perception regarding the ELES. Tools, services and pedagogies offered must adapt to changing
15 needs of the users and wider community. In this research a new dimension of 'Concept Functionality'
16 has emerged, this new idea binds an object, design, concept or an artefact with not only what it does
17 but also with what relationship it has with other objects, concepts in a given context and what is the
18 meaning of these relations.
19

20 4.7.1 The New Dimension

21
22 Instead of looking at the dimensions of e-learning effectiveness models discretely, the notion of
23 'Concept Functionality' enables us to look at these dimensions cohesively. For example, it helps us to
24 identify what relationships exist between pedagogies, networking, users' characteristics,
25 personalisation, services and technologies used in ELES. Moreover, it enables to identify what
26 functions of ELES corresponds to particular learning styles, or helps to understand how choices made
27 at the design stage enable us to achieve specific learning goals.
28

29 The ELES are used to create courses and make related services available to the users. ELES
30 functionality involves submitting assignments electronically and this solves the problem associated
31 with space and time in many situations. The ELES provide the access to contents online, assessment
32 and feedback, communication features, grading facility, administration of groups, tracking and
33 statistical tools, collaborative features, e.g. wikis or blogs, acquisition of targeted material for learning
34 purposes, e.g. RSS feeds. Effective communication is core to ELES functionality and exchange of
35 information can be done in an innovative way, for example, blogs, forums or discussion groups,
36 allowing participants to construct gradually their knowledge of a particular topic. Other users may also
37 benefit from this community knowledge. In addition to content creation, content management,
38 delivery and availability of assessment features, ELES could be integrated into other institutional
39 systems to offer seamless transition and flow of information as indicated by SMB data sample below.
40

41 *"A virtual learning environment (VLE) is a software system designed to support teaching and*
42 *learning in an educational setting, as distinct from a Managed Learning Environment (MLE)*
43 *where the focus is on management. A VLE will normally work over the Internet and provide a*
44 *collection of tools such as those for assessment (particularly of types that can be marked*
45 *automatically, such as multiple choice), communication, uploading of content, return of*
46 *students work, peer assessment, administration of student groups, collecting and organising*
47 *student grades, questionnaires, tracking tools, and similar. New features in these systems*
48 *include wikis, blogs and RSS."* - 2008
49

50 Provision of personalisation features in ELES is perceived to enhance the users' interaction,
51 engagement and satisfaction. Where users are given more control over the functionality and
52 personalisation features then they should also be educated in how to use these responsibly and
53 effectively. This process could teach students wider social and civic attitudes as well, e.g. how to
54 respect the privacy of other people. Availability of control to place and rearrange tools and services on
55 the ELES working space/environment known as 'functional control' tend to have a positive impact on
56 users' enthusiasm towards their ELES space. Functional control over layout e.g. ability of a user to
57 turn on or off services/features within the environment perceive to make it more useful and to avoid in
58
59
60

1
2
3 simplifying the environment from clutter and distractions is the key factor determining the
4 effectiveness of ELES as remarked by a blogger:

5
6 *“And what of templates, skins, choice of fonts, avatars etc? If the e-Portfolio is supposed to be*
7 *Lifelong AND life wide, it should be capable of changing templates or skins according to*
8 *audience or the very mood the learner wants to communicate. What of the teenager who*
9 *regularly changes the pop-group genre they follow or the football team that they support? The*
10 *ability to change one's self-representation can be done in minutes, if not seconds, with a good e-*
11 *Portfolio system.” - 2009*

12
13 Applications and services that are tightly coupled with a particular ELES system tend to restrict users
14 in exploring new modes of learning as noted in user's comment below. The complexity involved in
15 services integration and reliability considerations pose obstacles (sometimes) to the integration of third
16 party services in ELESs. If ELES are to contribute beyond course duration, then these should provide
17 the functionality for the users to integrate services and change environment according to users learning
18 needs.

19
20 *“I was surprised to find that Sakai, much like many of the proprietary course-management*
21 *systems, fell prey to building their own applications such as the wiki, the blog, chat, forums, etc.*
22 *None of them seem particularly stellar, and in fact many of them are admittedly sub-standard-*
23 *specifically the blog.” - 2007*

24
25 Student engagement and productivity increase by providing control over the way the activities,
26 assessment and collaboration tools are linked. Making users choose themselves or create learning
27 paths and workflows may increase student engagement, satisfaction, and retention. It is likely,
28 learners' use these tools and skills beyond course based situations and this freedom and interaction
29 could result in creativity and improved engagement for learners. As a learner notes:

30
31 *“Because you can link to an infinite variety of web pages and you can embed media (images,*
32 *videos, and Slideshare presentations) in a tile, as an instructor, you can make a webmix quite*
33 *interactive. For example, you can create tiles that link to challenges, quiz questions, polls,*
34 *discussion forums, chat pages, and other types of content and media that will facilitate more*
35 *student involvement and creativity. You can provide a tile linking to a web page describing a*
36 *number of exploratory activities a student will need to engage in, but make the path for*
37 *accomplishing these activities (e.g., the numbers and types of tiles used) up to the student.” -*
38 *2010*

39
40 This research suggests that functional control over the ownership of users' content and
41 working space is a crucial factor that could potentially enhance the adoption of ELES system and its
42 effectiveness at wider scale. This research found conflicting views on giving users control over ELES
43 functionality acknowledging that institutions often impose specific requirements or conditions when
44 providing a formal ELES environment to their users. The traditional use of ELES suggests strict
45 central security control and limited extensibility of ELES features and services to the wider
46 community. The paradox between users control and security often lead to a designer's dilemma and
47 maintaining a balance between users and system/institution control over the ELES environment is the
48 key to successful adoption of ELES. The control of services which are based on cloud infrastructure
49 could be shared by the users, academics and institutions. So, there is no single point of control for one
50 party. The functional control over the exchange of data between the ELES and the cloud via a
51 standards-based body or service could hugely benefit the continuation of the learning process beyond
52 the institutional context, bridging the gap between formal and informal learning, e.g. integrating
53 cloud-based learners' work (such as knowledge acquired in the workplace) in the institutional ELES.
54 This will also offer users the choice of sharing this information/knowledge or keeping it private or
55 even specifying what information they would like to share in a particular learning context or system.
56 ELES should provide mechanisms for the users to have ownerships of their learning process and
57 interactions just as they have it in social media. Ownership and ability to functional control are key
58
59
60

factors why users adopt social media for learning more as compared to traditional ELES when it comes to collaboration and discussions.

“Students and staff both need to control their learning environment and access external learning networks and CoPs. At the same time institutions still need a platform of providing formal online learning/teaching for all students and staff. It’s clear that there is a need for both formal and informal learning and learning networks.” – 2010

Becoming part of the learning communities for a particular ELES course increases learner's engagement and resultant completion rate. Just providing activities through the medium of ELES without pedagogical grounding may cause confusion for learners e.g. learners might not know, why an activity is being designed and presented in a particular way.

“In e-learning and Digital Cultures, the one thing we had in common was an interest in the topic, and the only reason we were compelled to complete the MOOC was sustained interest in the community.” - 2013

Learners want meaningful learning experience; ELES functionality could be instrumental for this purpose in providing learning experience based on sound pedagogical principles. An interesting question arises here e.g. if the tools and services are provided for pedagogically driven learning experience – then how to inform and guide practitioners and learners to make use of this functionality. ELES (Open) currently lacks equivalent opportunity (compared with traditional methods) for assessment feedback to act as an instrument of dialogue and enable the learner to improve based on the provided grading process.

The solution to this problem cannot rely on just making certain technologies available to users; it needs deep innovative pedagogical thinking with clear relations to technologies and design possibilities.

“For starters, anonymous grading should not determine the students' success—at least not by itself. If I had the ability to defend myself and possibly change a grade, I might be more inclined to get actively involved. In college, I was always allowed, if not encouraged, to meet with the professor or teaching assistant who graded my work to challenge or ask questions if I didn't agree with the final grade. Even if I didn't change someone's mind, chatting with someone made feel more at ease.” - 2014

Getting content in ELES is easier, but giving a meaningful context around the content and informing how best to exploit the resources is a bigger challenge. ELES should provide pedagogically informed functionality where users could put context around the resources in convenient and natural way.

“The MOOC platforms are mostly course delivery systems - I think these companies can think much broader about how they bring content, connections, and experiences together.” - 2016

4.8 Concept Functionality Model

The findings of the GTM process indicate, ‘Concept Functionality’ is a core dimension for the ELES effectiveness model – this reflects there is a need to put an appropriate emphasis on this dimension from practise and decision-making perspectives. The concept diagram of Figure 4, shows the emergence of ‘Concept Functionality’ in relation to ELES scope & Scale and Users’ perspective and how these affect the type of functionality users’ desire or would be keen to use. In addition, the concepts ELES Effectiveness (e.g. perceived benefits and limitations), ELES Networking & Collaboration, ELES Design, Tools & Services, ELES Pedagogy and their relationships to ELES ‘Concept Functionality’ also emerged.

‘Concept Functionality’ tells us that entities or objects have deeper meaning and relationships e.g. a tool in a particular functional area might have a deeper meaning in a given context, it could

entail corporate policy, satisfy personalisation or privacy needs of the users, signify the need for better integration for the designers, pose a hindrance for a particular learning design or complement a particular learning design. 'Concept Functionality' informs us: it is not enough to consider just a tool or a particular aspect or a function of the system for its utility but the consideration should incorporate, how the users and practitioners could be made aware of the degree of relevance, significance and relationship that this tool might have with the application of particular concept, theory or the model.

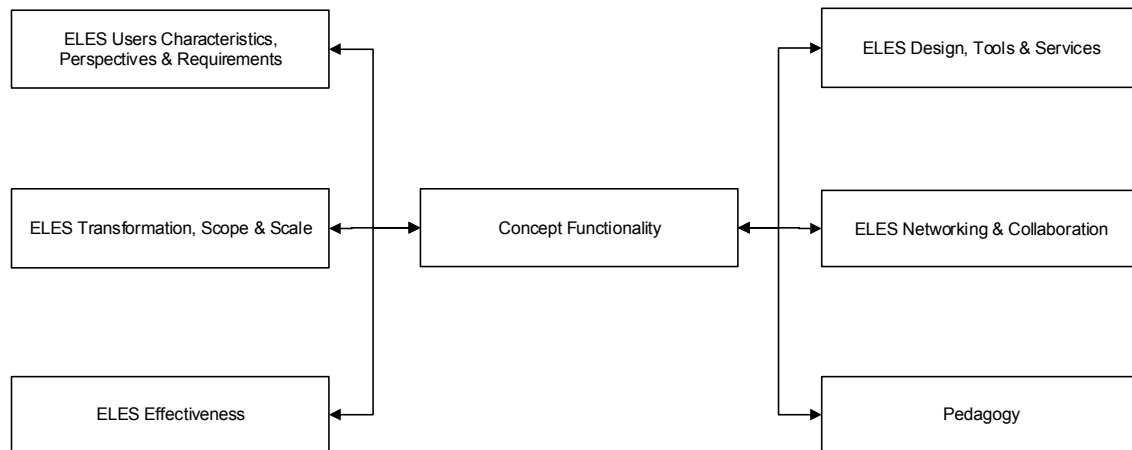


Figure 4. The concept diagram is representing Concept Functionality as the core dimension in relation to other ELES effectiveness dimensions.

In the next section, we discuss how these findings can complement or enhance existing ELES effectiveness models and could be used by practitioners.

5. IMPLICATIONS AND FUTURE DIRECTION

The study findings reveal that the e-learning effectiveness dimensions (Human factors e.g. Students, Instructors; Learning Model; Technology; Learner Control; Content; Interaction) presented by Piccoli et al. (2001) are still valid for modern ELES system. Although the focus has shifted from just considering these dimension to how these dimensions could be used effectively and how users and practitioners are informed and educated about the choices available to them, and, more importantly, develop the understanding of the meanings of these choices and related implications. The relevance of Human dimension e.g. Instructors immediacy behaviour (reducing social distance between the tutor and learner) for e-learning effectiveness was highlighted by the research presented by Arbaugh (2001), and corresponds to our findings that despite the changing scope and scale of ELES, learners still expect and desire to have meaningful interactions with their tutors. Thus 'human dimension' is one of the key factors impacting e-learning effectiveness (Ronen-Fuhrmann et al., 2008).

Corroborating Wang (2003), the research validated four instruments for measuring the e-learning effectiveness namely: Personalisation, Learning Community, Content and Learner Interface. However, modern users perceive the value of learning communities more than other factors, e.g. just providing a good learner interface might not increase user satisfaction, it has to fit meaningfully within overall learning experience driven by thoughtful design constructs.

Just because a tool or a service is available - simply providing it, is not enough in modern ELES systems. This study highlights the need for designers to think how a 'tool or service' could be meaningful for practitioners by giving a context and how practitioners could be informed through design in achieving a better learner experience. Our research conforms with many studies reporting technology as an important dimension (Piccoli et al., 2001; Liaw, 2007; Sun et al., 2008; Bhuasiri et al., 2012); however, we found user focus is perceived to be shifting in utilising the relationships that exist between technology and other dimensions such as pedagogy, networking and collaboration.

1
2
3 The practitioners might implement a certain pedagogy but it has to be relevant and
4 meaningful for learners and they should be able to understand a particular approach to engage fully –
5 this way our research findings conform with Kirschner's (2004, p. 6) e-learning effectiveness factor,
6 when he defined it as, 'a fitting pedagogy'. The conceptual model presented in our study has
7 Networking and Collaboration as a key dimension in e-learning effectiveness model conforming to
8 previous research studies (Wang, 2003), (Kirschner, 2004), (Shee & Wang, 2006) in this field.

9 There seems to be a lack of communication and understanding between users and
10 practitioners for enabling each other to understand the rationale for doing things in a particular way.
11 The central role of 'Concept Functionality' dimension could bridge this gap by linking and enabling
12 all stakeholders to better understand the design, learning process and pedagogy. For example,
13 Learning design (Koper, 2006, p. 13) is more abstract in nature and Instructional design (Merrill et al.,
14 1966, p. 2) is more procedural in nature. Learning practitioners may think about the tools and
15 technologies first and then think about the learning concept to be taught, resulting in distorted
16 pedagogy where learners are not the central focus. A mapping layer may help in bridging the gap
17 between the two, resulting in more informed practitioners. This layer could help and inform users
18 explicitly about the relations between Learning Design, Users Characteristics, Instructional Design
19 and ELES Services & Tools. The need for mapping may not be new, previously some (limited)
20 attempts (Conole et al., 2004) have been made to map learning theories, pedagogical processes and
21 characteristics to a learning model, although these attempts have been limited to a specific type of
22 learning model. There seems to be a need for a more generic way of mapping which is not constrained
23 to a specific model. 'Concept Functionality' opens up the possibility of this new dimension to be used
24 as a key instrument in building a mapping layer independent of specific learning models.
25

26 **6. CONCLUSION**

27
28 The adoption of ELES and E-learning environments has posed many new challenges for both
29 practitioners and designers and require effective instruments for launching these systems effectively.
30 A theoretical framework is devised in this study aiming at modelling users' understanding of the use
31 of ELES effectiveness. This study shows that the users don't just need availability of the networking
32 and collaboration or other technical opportunities, they want means and mechanisms to interact in a
33 meaningful way increasing their learning experience. This highlights the increasing importance of the
34 use of the pedagogies as the complexity of design, technologies and user expectations increases in the
35 field of e-learning including the value of informed users and practitioners in this domain. This study
36 identifies 'Concept Functionality' as a core dimension to understanding the evolving relations between
37 technologies, services, e-learning effectiveness, users' expectations/requirements, collaboration
38 mechanisms, design and pedagogies.

39 A major contribution of the study is to successfully capture complex multi-dimensional
40 domain and present a single core dimension that can be used to understand the relationships between
41 effectiveness factors, changing user requirements, design evolutions and the advent of new
42 technologies cohesively. This will make the decision and policy making process simpler at the
43 strategic level for the design and implementation of e-learning solutions for the educational
44 institutions, corporate sector and government bodies.
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

REFERENCES

- Adolph S., Hall W., Kruchten P., (2008). A Methodological Leg to Stand On: Lessons Learned Using Grounded Theory to Study Software Development, Proceeding CASCON '08 Proceedings of the 2008 conference of the center for advanced studies on collaborative research: meeting of minds, ACM.
- Arbaugh, B. (2001), How instructor immediacy behaviors affect student satisfaction and learning in web-based courses, *Business Communication Quarterly*, 64(4), 42-54.
- Beetham, Helen, and Sharpe, R. (2013) *Rethinking pedagogy for a digital age: designing for 21st century learning*, Rhona, Routledge, New York.
- Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J.J. and Ciganek, A.P. (2012), "Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty", *Computers & Education*, Vol. 58 No. 2, pp. 843–855.
- Bolte, S., Holtman, M., Poustka, F., Scheurich, A., & Schmidt, L. (2007). Gestalt Perception and Local-Global Processing in High-Functioning Autism. *J Autism Dev Disord*, 37, 1493–1504.
- Bower, M., Craft, B., Laurillard, D., & Masterman, L. (2011). *Using the Learning Designer to develop a conceptual framework for linking learning design tools and systems*. Sydney: LAMS Foundation.
- Boyce, S., & Pahl, C. (2007). Developing Domain Ontologies for Course Content. *Educational Technology & Society*, 10(3), 275-288.
- Breitman, K. K., Caanova, M. A., & Truszkowski, W. (2007). The future of the internet. In K. K. Breitman, M. A. Caanova, & W. Truszkowski (Eds.), *Semantic Web Concepts, Technologies and Applications* (p. 8). Springer.
- Bristol, T. J. (2014). EDUCATE, EXCITE, ENGAGE. *Teaching and Learning in Nursing*, 9, 43–46.
- Charmaz, K., 2008. Grounded Theory as an Emergent Method. In: *Handbook of emergent methods*. New York: The Guildford Press, pp. 155-170.
- Chu, T.H. and Chen, Y.Y. (2016). With Good We Become Good: Understanding e-learning adoption by theory of planned behavior and group influences. *Computers & Education*, 92, pp.37-52.
- Coman, P. G. (2001). Critical Success Factors for E-learning Delivery. *Proceedings of the International Conference on Computers in Education (ICCE'02)*. IEEE.
- Conole, G., Dyke, M., Oliver, M., & Seale, J. (2004). Mapping pedagogy and tools for effective learning design. *Computers & Education* (43), 17-33.
- Coursera, 2016. Coursera. [Online], Available at: <https://www.coursera.org/>, [Accessed 31 12 2016].
- Dominic F., Ann B., (2011). *Confessions from a Grounded Theory PhD: Experiences and Lessons Learnt*, CHI, Vancouver, BC, Canada.
- Elango, R., Gudep, V. K. & Selvam, M., 2008. Quality of e-Learning: An Analysis Based on e-Learners' Perception of e-Learning. *Electronic Journal e-Learning*, 6(1), pp. 31 - 44.
- Eytan, A., Zhang, L., Adamic, L. A., & Lukose, R. M. (2004). Implicit structure and the dynamics of blogspace. In *Workshop on the weblogging ecosystem*, 13(1), 16989-16995.
- Fensel, D., Hendler, J., Liberman, H., & Wahlster, W. (2005). Introduction. In D. Fensel, J. Hendler, H. Liberman, & W. Wahlster (Eds.), *Spinning the Semantic Web* (p. 11). Cambridge, Massachusetts, London: The MIT Press.
- Fosnot, C. T., & Perry, R. S. (2005). Constructivism: A Psychological Theory of Learning. In *Constructivism: A Psychological Theory of Learning* (Second ed., pp. 10 - 22). Teachers College Press.
- Fry, H., Ketteridge, S., & Marshall, S. (2014). Effective Online Teaching and Learning. In *A Handbook for Teaching and Learning in Higher Education: Enhancing academic practice* (pp. 139-151). Taylor and Francis.
- Glaser, Barney G., Judith. H (2004). Remodeling Grounded Theory [80 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 5(2), Art. 4, <http://nbn-resolving.de/urn:nbn:de:0114-fqs040245>.
- Guizzardi, G. (2005). *Ontological Foundations for Structural Conceptual Models*. Netherlands: Telematics Instituut Fundamental Research Series.

- 1
2
3 Hyochang L., Sang-Gun, L., & Kichan, N. (2007). Validating E-learning factors affecting training
4 effectiveness. *International Journal of Information Management*, 27, 22 - 35.
- 5 Kaplan, A. M., & Haenlein, M. (2010). Users of the World, unite! The challenges and opportunities of
6 Social Media. *Business Horizons*, 59 - 68.
- 7 Kirschner, P. A., Martens, R. L., & Strijbos, J. W. (2004). CSCL in higher education? A framework
8 for designing multiple collaborative environments. In P. Dillenbourg (Series Ed.) & J.W.
9 Strijbos, P.A. Kirschner & R. L. Martens (Vol. Eds.), *Computer-supported collaborative*
10 *learning: Vol. 3. What we know about CSCL _*. And implementing it in higher education
11 (pp. 3-30). Boston, MA: Kluwer Academic Publishers
- 12 Koper, R. (2006) 'Current research in learning design', *Educational Technology & Society*, vol. 9, no.
13 1, pp. 13–22.
- 14 Koop, M. & Lackner E. (2014) DO MOOCS NEED A SPECIAL INSTRUCTIONAL DESIGN?
15 https://www.researchgate.net/publication/263784897_Do_MOOCs_need_a_Special_Instructional_Design
- 16 Laurillard, D. (2008). The teacher as action researcher: using technology to capture pedagogic form.
17 *Studies in Higher Education*, 33(2), 139 - 154.
- 18 Liaw, S. (2007). Investigation students' perceived satisfaction, behavioural intention, and
19 effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education*,
20 51, 864 - 873.
- 21 Merriam, S. B. (2001). *Andragogy and Self-Directed Learning: Pillars of Adult Learning Theory*. New
22 Directions for Adult and Continuing Education no. 89, pp. 3 - 13.
- 23 Merrill, D. M., Leston, D., Lacy, M. J., & Pratt, J. (1966). Reclaiming Instructional Design.
24 *Educational Technology*, 36(5), 5 -7.
- 25 Mueller, D., Strohmeier, S. (2011). Design Characteristics of Virtual Learning Environments: State of
26 Research. *Computers & Education*, 57(4), 2505-2516.
- 27 Onah, DFO., J Sinclair, J., Boyatt, R. (2014) Dropout rates of massive open online courses:
28 behavioural patterns. EDULEARN14 Proceedings, 2014 Available online at:
29 https://www2.warwick.ac.uk/fac/sci/dcs/people/research/csrmaj/daniel_onah_edulearn14.pdf
- 30 Piccoli, G., Ahmad, R., & Ives, B. (2001). Web based Virtual Learning Environments: A Research
31 Framework and A Preliminary Assessment of Effectiveness in Basic IT Skills Training. *MIS*
32 *Quarterly*, 25(4), 401 - 426.
- 33 QSR, (2016). Available from: <http://www.qsrinternational.com/product> [Accessed 15th July 2016].
- 34 Rahimi, A., Vu, D., Cohn, T., Baldwin, T., (2015). Exploiting text and network context for
35 geolocation of social media users. In Proceedings of the 2015 Conference of the North
36 American Chapter of the Association for Computational Linguistics — Human Language
37 Technologies (NAACL HLT 2015), Denver, USA.
- 38 Rienties, Bart; Li, Nai and Marsh, Vicky (2015). Modeling and managing student satisfaction: use of
39 student feedback to enhance learning experience. Quality Assurance Agency, Gloucester.
- 40 Ronen-Fuhrmann, T., Kali, Y. & Hoadley, C. (2008) 'Helping education students understand learning
41 through designing', *Educational Technology*, vol. 48, no. 2, pp. 26–33.
- 42 Shee, D. Y., & Wang, Y.-S. (2006). Multi-criteria evaluation of the web-based e-learning system: A
43 methodology based on learner satisfaction and its applications. *Computers & Education*, 50,
44 894 - 905. Singh Gurmak Hardaker Glenn, (2014), "Barriers and enablers to adoption and
45 diffusion of eLearning ",
- 46 Singh, G., & Hardaker, G., (2014), "Barriers and enablers to adoption and diffusion of eLearning ",
47 *Education + Training*, Vol. 56 Iss 2/3 pp. 105 – 121
- 48 Sridharan, B., Deng, H., & Corbitt, B., (2008), "Evaluating Intertwined Critical Success Factors for
49 Sustainable E-learning". ACIS 2008 Proceedings. Paper 102.
- 50 Sun, P., Tsai, R., Finger, G., Chen, Y., & Yeh, D. (2008). "What drives a successful e-learning? An
51 empirical investigation of the critical factors influencing learner satisfaction", *Computers &*
52 *Education*, 50, 1183 - 1202.
- 53 Waheed, M., Kaur, K. & Qazi, A., (2016). Students' perspective on knowledge quality in eLearning
54 knowledge quality in eLearning. *Internet Research*, 26(1), pp. 120-145.
- 55 Wang, Y.-S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems.
56 *Information & Management*, 41, 75 - 86.
- 57
58
59
60

1
2
3 Xing, W., Chen, X., Stein, J. and Marcinkowski, M., (2016). Temporal predication of dropouts in
4 MOOCs: Reaching the low hanging fruit through stacking generalization. Computers in
5 Human Behavior, 58, pp.119-129.
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60