The Ambivalence of Strengths and Weaknesses of E-Learning Educational Services

Venera-Mihaela Cojocariu
Vasile Alecsandri University of Bacau, Calea Marasesti 157, 600115 Bacau, Romania
Phone: +40-747-066462
venera_1962@yahoo.com

Iuliana Lazar
Vasile Alecsandri University of Bacau, Calea Marasesti 157, 600115 Bacau, Romania

Gabriel Lazar
Vasile Alecsandri University of Bacau, Calea Marasesti 157, 600115 Bacau, Romania

Abstract
This paper represents a thorough phase in the effort to identify and assort the strengths and weaknesses of e-learning educational services. This paper reviews a synthesis of the assessments on the e-learning educational services through a survey of the specialized literature from 2000 to 2012 in order to identify the strengths and weaknesses of e-learning educational services which were reported during the past decade. The steps of our approach are the following: 1. The identification of a large number of specialized studies that analyze the above mentioned issue; 2. A basic theoretical review of the research from the perspective of identifying the strengths and weaknesses of the e-learning educational services and some of their implications on the intellectual development of the beneficiaries; 3. A descriptive statistical data analysis which is carried out in order to extract information about strengths and weaknesses relevant to the literature taken into consideration; 4. Results classification and interpretation; 5. Formulating practical suggestions for the notion of e-learning educational services considering the development of studies on the impact of their use on the intellectual development of the beneficiaries. The study results highlighted that strengths and weaknesses are not 'pure', but ambivalent, simultaneously incorporating meanings and limits with different weights. A predictive model of future e-learning educational services can be designed on the basis of the results obtained in the research. This predictive model is based on a pedagogical concept that takes into account the ambivalence of the higher indices which have been identified.

Keywords: interactive learning environment; pedagogical issue; teaching/learning strategy; intellectual development of the beneficiaries

1. Introduction

The concept of e-learning can hardly be the subject of a comprehensive and universally accepted definition, due to the different forms it takes now and to the multiplicity of variables involved, which have a large and permanent dynamic. A relevant study (Mata, Lazar, & Lazar, 2012) highlights some interesting and useful aspects for our study, as a response to the question "What are the e-learning educational services?":

- E-learning is *commonly referred to the intentional use of networked information and communications technology in teaching and learning* (Naidu, 2006).
- E-learning is *instruction delivered on a digital device such as a computer or mobile device that is intended to support learning*. This definition has several elements concerning the *what*, *how*, and *why* of e-learning.
  - *What*. E-learning courses include both content (information) and instructional methods (techniques) that help people learn the content.
  - *How*. E-learning courses are delivered via digital devices such as computers and smartphones using words in the form of spoken or printed text and pictures such as illustrations, photos, animation, or video. Some forms of e-learning called asynchronous e-

learning are designed for individual self-study. It may be noted that the two components of e-learning analyzed here (content and strategies) correlates with both the development of higher cognitive processes (thinking, memory, imagination, language) and formation / development of new techniques of intellectual work, different from those classic but complementary to them (data search, selection, storage, processing, graphic representation, realization of illustrations, animations, presentations, transfer) (Naaji et. al., 2015).
- *Why*. E-learning lessons are intended to help learners reach personal learning objectives or perform their jobs in ways that improve the bottom-line goals of the organization. In short, the 'e' in e-learning refers to 'how'-the course is digitized so it can be stored in electronic form(Clark & Mayer, 2008).

- E-learning is *an Internet-based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional education methods, but will greatly improve the efficiency of education* (Masud & Huang, 2012).

E-learning educational services represent a distinct category of formative services. It is about those services which offer instruction, training, retention, transfer, consolidation, evaluation, review, systematization by mainstreaming the 'e' dimension in teaching and learning. Our analysis will focus only on e-learning educational services in formal learning (although they can be integrated and exploited in any training which is more or less formal or non-formal) and on some of the benefits of intellectual nature that appear.

This paper represents a thorough phase in the effort to identify and assort the strengths and weaknesses of the e-learning educational services. In order to identify which strengths and weaknesses of e-learning educational services were reported during the past decade, this paper reviews a synthesis of the assessments on the e-learning educational services, through a survey of the literature from 2000 to 2012.

The spreading of e-learning educational services, which could hardly be thought of 25 years ago, has led to enhancing the research which aimed at analyzing this type of services in terms of their essence and their qualitative dimensions. Learning new technology, in particular those related to the Web 2.0, offers new opportunities to create and share content and to interact with others. Also known as 'social media', Web 2.0 encompasses tools that allow individual and collective publishing; sharing of images, audio and video files; the creation and maintenance of online social networks (Nedelea & Costea, 2016). It is stated that new practices and attitudes have come with these new tools (Bennett et al., 2012; Jomah, et al., 2016).

After two decades of actual educational practice in e-learning educational services, after overcoming the initial methodological and action enthusiasm, a deeper research was generated with regard to the pedagogical richness of these services and, especially, the real meaning of this phrase, which is still unclear (Middleton, 2010; Slevin, 2008).

This aspect is visible in the exponential growth of the research allocated to this problem, especially after 2000. Our previous studies led to the identification of9 most representative strengths, respectively 5 weaknesses of e-learning educational services, as follows:

➢ strengths: 1. It is a process in full development in agreement with some of the defining characteristics of the learners in the third millennium; 2. *Flexibility;* 3. *Customization* of learning related to the needs of the learner; 4. A great *methodological diversity*; 5. A particular*intuitive* character; 6. *Interactivity*; 7. *Collaborative* learning; 8. It is *motivating*; 9. *Focus on the learner*. All these strengths are considered as an expression of current trends in the area of psychology and science of education, especially the differentiating learning, and the focus on learning beneficiary, according to its individual cognitive peculiarities.

➢ weaknesses: 1. Insufficient *compatibility* between the technological design of the service and the psychological component of the learning process; 2. *Flexibility* and autonomy in learning are relative and fragile; 3. The limited, inadequate or unattainable character of the

learning *customization*; 4. A possible superficiality in learning which is induced by a wide *variety of methodology*; 5. A certain kind of reduction of the relations among learners, between them and the teacher, a possible loss of *direct communication* and immediate collaboration. All these weaknesses are considered as expression of some insufficient (yet) developments and psycho-pedagogical adaptations of the e-learning, especially on the intellectual training component.

A very interesting thing we have found since the time of the survey is that some of the identified strengths were also on the weaknesses list, highlighting both their inherent limitations and their ambivalence.

The main aim of the study is to identify the **ambivalent character** of a set of strengths and weaknesses of e-learning educational services. Their highlighting and analysis can provide the basis to design an optimal model of creating e-learning educational services to be used in higher education. The term of ambivalence has not been used so far, to our knowledge, with respect to such services. It means, in our view, the real possibility that the same feature of e-learning educational services, (for example, flexibility, customization or methodological diversity) can be analyzed and interpreted unilaterally, monovalently, by authors, either as a strength (flexibility(Smetana & Bell, 2012))or as a weakness (methodological diversity(Cuthbert & Slotta, 2004)) or some of them can analyze them simultaneously from two points of view.This study has been developed on the basis on these results.

2. Research Methodology

The documentation and data systematization were performed through a similar procedure as the one reported by Liao, Chu et al.(2012). Keyword indices, "e-learning services", "strong points", "weak points" and article abstracts were used to identify 203 articles. The research methodology is based on a two-stage analysis of a package including bibliographic studies published between 2000-2012 in the literature which is accessible to the general public in the following databases: Science Direct (Elsevier), ProQuest, and Google Scholar:

1. a quality study consisting of identifying and grouping the strengths and weaknesses of e-learning educational services in the selected literature;
2. astatistical quantity analysis, consisting of identifying the occurrence frequencies of those strengths and weaknesses in the literature. The statistical analysis was carried out in SPSS® version 20.0 that allowed us to subsequently identify those ambivalent strengths and weaknesses and the frequency of their being simultaneously entered under both categories.

The following hypotheses and research objectives were established:

Hypothesis 1: Are there features of e-learning educational services which may be considered strengths and weaknesses (ambivalent) at the same time?

Hypothesis 2: If such a set exists, is the number of ambivalent features of e-learning educational services enough from a statistical point of view so as to base the design of a model of e-learning educational services with a higher pedagogical level?

O1. identifying a relevant bibliography on the set issue, published between 2000 and 2012;

O2. content quality analysis of selected literature, which results in identifying strengths and weaknesses;

O3. Quantitative data analysis, classifying the strengths and weaknesses characteristic to e-learning educational services on a statistical basis;

O4. selecting and highlighting the ambivalent strengths and weaknesses, statistical analysis of their weight.

O5. making a system of distinct categories of ambivalent indices to develop a model of vectors required in the generation and operation of specific services, which is optimal from a pedagogical perspective.

Multiple responses analysis allows us to study the composition of the bibliographic package on which the research was conducted. This is a useful operation for the description of percentages of texts which specify different assessments. In this study, texts are represented by the studied articles, and assessments correspond to strengths, respectively weaknesses highlighted in these publications.

The significant bibliographic package was generated gradually by successive operations as follows:

➢ creating the primary bibliographic package-203 studies were identified;
➢ creating the final bibliographic package-192 studies were selected from the initial bibliographic package (by excluding the ones which were in both packages);
➢ constituting the three components of the final bibliographic package: 1.102 articles outlining strengths, referred to from now on as 'strong articles'; 101 articles outlining weaknesses,referred to as 'weak articles'; 102 articles from their total, containing the ambivalence idea of some of the strengths and weaknesses, referred to as 'common articles', presented in a separate section of the article's references.

The analysis of multiple responses allows us to study multiple choice items. In our case, each item is represented by the strengths and weaknesses which have been identified in the studied literature.

The chosen multiple answers analysis method corresponds to the dichotomous variables for each answer. For example, in the case of the article of Ossiannilsson (2012), the response to the item 'flexibility' was coded as 1 for yes, if this feature is specified, and 0 if it is not specified.

The statistical analysis was carried out by applying the dichotomous multiple responses analysis by the SPSS®software, version 20.0. This analysis was also done separately, according to the levels of 'categories' variable, namely the period of the appearance of the article, respectively: 2000-2004, 2005-2008and 2009-2012.

This type of methodology, inevitably, has a number of limitations(Liao, et al., 2012). Firstly, making a review of the literature is a difficult task, both from a quantitative and a qualitative point of view. Secondly, the selection of texts and analysis relied significantly on the keywords index and article abstracts, which mean, within certain limits, the researcher's subjective touch. Finally, the number of analyzed articles, even if it is important, does not cover, for sure, the whole sphere of publications, being the expression of the author's limited knowledge of this subject.

3. Results and Their Analysis

From the multitude of the obtained data only those that serve the hypotheses and objectives set out aboveare present.
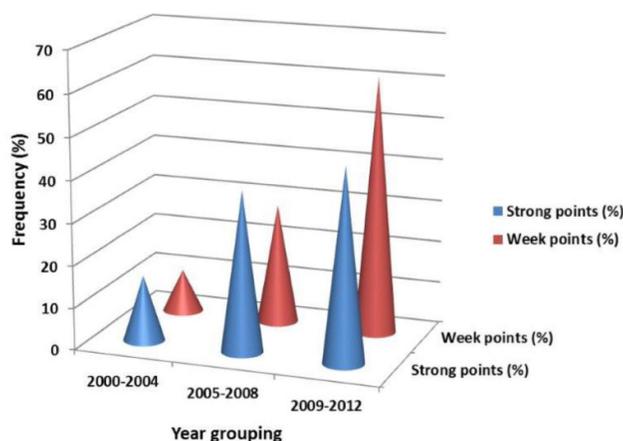

Figure 1. Frequencies of strengths and weaknesses through a survey of literature from 2000 to 2012

Step I/Objective 1- identifying a relevant bibliography on the set issue, published between 2000 and 2012

Identifying, selecting, organizing and analyzing the studies represent an extremely complex, but absolutely necessary process, providing the theoretical basis for the concept of ambivalence for the strengths and weaknesses of e-learning educational services. The most relevant aspects are: the comparative analysis of the perspectives offered by the selected studies; identifying the direction the studies evolve to and the interest of the people who use these services; the general rate for the studies' publication; comparative frequency of reporting the beneficiaries to the strengths and weaknesses during the covered period.

We identified 192 specific studies which analyze, directly or indirectly, the subject of the strengths and weaknesses of e-learning educational services, respectively those containing the idea of some of their strengths and weaknesses ambivalence. The frequencies of strengths and weaknesses reported to intervals corresponding to the years when they were published are shown in Figure1.

The above presented data analysis shows the following:

1. an accelerated and increasing evolution of studies on the issue of strengths, which has a rate increased by 22.5% in 2005-2008 compared to 2000-2004, by 7.8% in 2009-2012 compared to the previous period and by 30.39% compared to the initial period. Although the increasing interest for strengths is obvious during 2009-2012, it was 2.9 times less than in the previous period. Along the whole interval when studies related to strengths analysis appeared, the growth rate was an average of 33.3% for that period and 8.3% for the year;

2. an accelerated and increasing evolution of studies on the issue of weaknesses, which has a rate increased by 18.49% in 2005-2008 compared to 2000-2004, by32.8% in 2009-2012 compared to the previous period and by 51.3% compared to the initial period. The increasing interest for weaknesses is permanent and it is the biggest in the interval 2009-2012. It increased by 2.1times compared to the previous period. Along the whole interval when studies related to weaknesses analysis appeared, the growth rate was an average of 33.3% for that period and 8.33% for the year;

3. an identical average growth rate of the interest for the analysis of both strengths and weaknesses for the entire period was 33.3% on each of the three periods in which studies were grouped and 8.3% for each year;

4. a 1.5times greater interest of the authors for the strengthsanalysisbetween2000-2004 (15.7%) than for the weaknesses analysis(10.1%);

5. a 1.3 times greater interest of the authors for the strengths analysis between 2004-2008 (38.2%) compared to the weaknesses analysis (28.6%), with a 0.2 times decrease compared to the previous interval;

6. a much greater interest of the authors for the weaknesses analysis between 2009-2012(61.3%) compared to the strength sanalysis (46.1%), a 1.3times growth, almost double when compared to the previous interval;

7. a 4.1% greater interest of the authors for strengths than for weaknesses between 2005-2008 compared to 2000-2004, but an extraordinarily high interest of authors for weaknesses, 22.9% more in 2009-2013 compared to the previous period;

8. a significant and more rapid increase of the weight of studies analyzing weaknesses (51.3%) compared to those which analyze strengths(30.4%) along the whole period (2000-2012), which means 20.9%, i.e. 1.7 times more;

9. the trend of strengths and weaknesses analysis is an upward one, but it increases faster for weaknesses studies, especially between 2009-2012, when the growth of studies focused on strengths recorded the slowest rate in the whole interval (7.8%).

In terms of linking these data with the practice of e-learning educational services, it must be concluded that as they work, it begins to be more obvious what shortcomings their manifestation has and how interested the creators of these services are in identifying and reducing their weaknesses.

Step II/Objective 2-Content quality analysis of selected literaturewhich results in identifying strengths and weaknesses

The focused reading of the192 studies and the data centralization of the identified strengths and weaknesses, in the chronological order of their appearance was performed. Their systematization was done along the process of their identification by means of indices categories. For example, flexibility, interactivity, student-centered learning, accessibility, saving costs – for strengths; reduced social interaction, lack of instructors, cost, long time for preparing online courses, resistance to (new) technology – for weaknesses.

Step III/ Objective 3-Quantitative data analysis, classifying the strengths and weaknesses characteristic to e-learning educational services, on a statistical basis

We ordered the obtained data for the identified strengths and weaknesses. This was done by giving a point for each presence of an index, or not giving it for its absence. Thus, we quantified a total of 63 strengths and 91 weaknesses. In addition to finding a great diversity of views captured in the selected texts, the primary data analysis allowed us to set the parameters with the highest frequency. So, the most important for strengths is flexibility representing 29.7% of the total of studied bibliography and an occurrence frequency of 13.6% from the total of identified strengths (Figure 2).
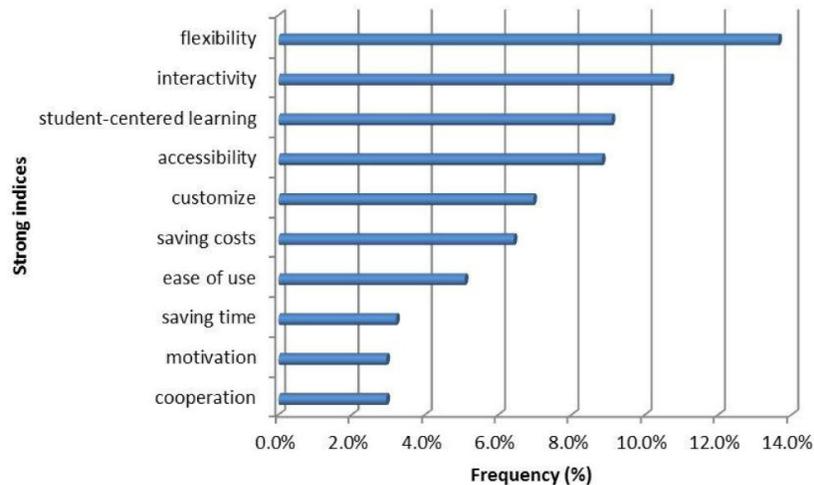

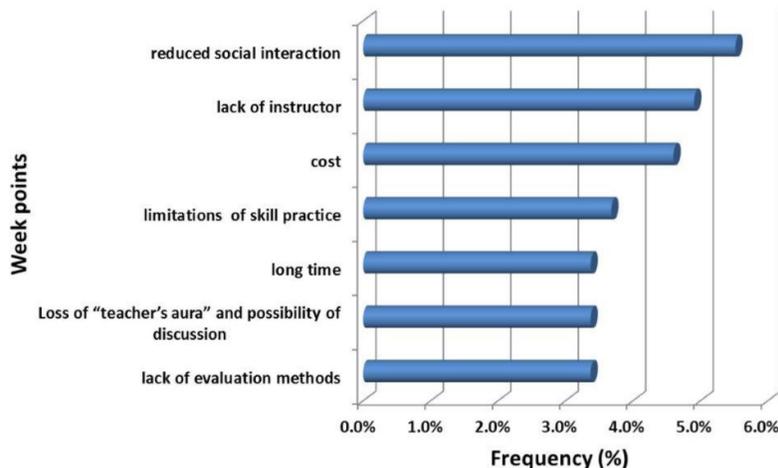*Figure 2. Frequency of principal strong indices related to 102 'strong articles'*

Figure 3. Frequency of principal week indices related to the 101 'week articles'

Reduced social interaction is the most important for weaknesses, representing 9.4% of the total of studied bibliography and an occurrence frequency of 5.5% (Figure3).

A significant frequency difference of the weaknesses indices compared to the strengths indices was observed. If the top 5 strengths have frequencies ranging between 13.6% and 7%, none of the weaknesses has an occurrence frequency over 6%, all barely ranging between 5.5% and 3.4%, relative to the middle of strengths frequency range. For the practice of e-learning educational services, this may show either a still insufficient detection or theoretical analysis of weaknesses, or, indeed, the superiority of these services.

Step IV/Objective 4-selecting and highlighting the ambivalent strengths and weaknesses, statistical analysis of ambivalent strengths and weaknesses weight

Based on the data presented in Figure 2 and Figure 3 and carrying out a comparative and cumulative analysis to identify ambivalent strengths and weaknesses, the 102 ambivalent strong/weak indices related to the 'common articles' in Figure 4 were highlighted.
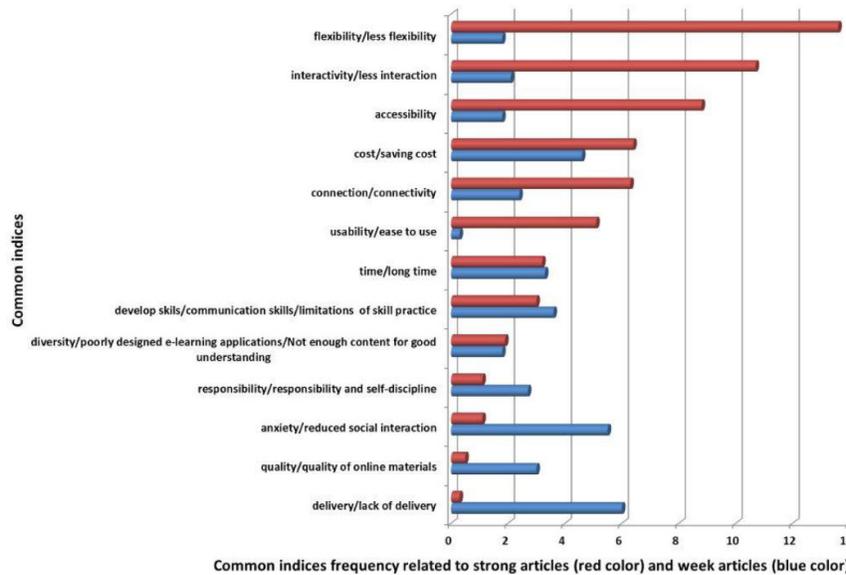

Figure 4. Frequency of strong/weak indices related to the 102 'common articles'

Their analysis shows that:

1. There are at least 13 ambivalent indicators identified in the studied literature (Table 1);

2. The strengths weight is 62% while the weight of weaknesses is 38.9%, resulting in a pretty big difference in favor of underlining and supporting the strengths, 23.1% more than in favor of weaknesses. These data indicate a significantly higher perception and approach in favor of appreciating the strengths of e-learning educational services, even in the case of their ambivalence.

3. In this context, the data illustrate the following *three cases*:

3.1. a huge gap between the perception and the interpretation of an index as strength and as weakness (e.g., flexibility is regarded 7.5 times more a strength rather than a weakness). It can be seen that this category of indices definitely belongs to strengths, acknowledged and validated by a large number of studies. In relation to these, efforts will be made for the development, improvement, elevation and obtaining superior parameters.

3.2. a relative correspondence between the perception and the interpretation of an index as strength and as weakness (e.g., the time required to design and implement educational services is considered a strength at a rate of 3.2% and a weakness at a rate of 3.3%). It results that this category of indices has to be studied thoroughly and watched in

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experimental studies, to replace the uncertainty area in their analysis, to determine which their area of predominance is, to what extent their identified limits and shortcomings have been reduced to allow their conversion into strengths or not;

3.3. a very large gap between the perception and interpretation of an index as a weakness and as a strength (e.g., lack of instructional delivery is considered as being a weakness 20 times more than a strength).This shows that this category of indices comes into focus as weaknesses which need to be analyzed, studied and experimented in order to reduce their negative impact.

Table 2. System of common indices on categories and frequencies related to 102 common articles

Common indices	Categories	Frequency (%)	
1. flexibility	**A. Technical support**	18.6%	
2. interactivity	"	15.4%	
3. accessibility	"	12.4%	
4. usability	"	6.2%	**64.1%**
5. connection	"	4.3%	
6. time	"	7.2%	
7. cost	**B. Financial support**	12.7%	**12.7%**
8. develop skills	**C. Educational approach**	4.3%	
9. quality	"	3.9%	**11.8%**
10. diversity	"	2.6%	
11. delivery	"	1.0%	
12. anxiety/reduce social impact	**D. Social impact**	7.2%	**11.4%**
13. responsibility	"	4.2%	

Step V/Objective 5-Making a system of distinct categories of ambivalent indices

An additional and very interesting perspective is provided by the analysis of common indices (ambivalent), based on the 102 works-common articles type, and their frequencies (Figure 5).
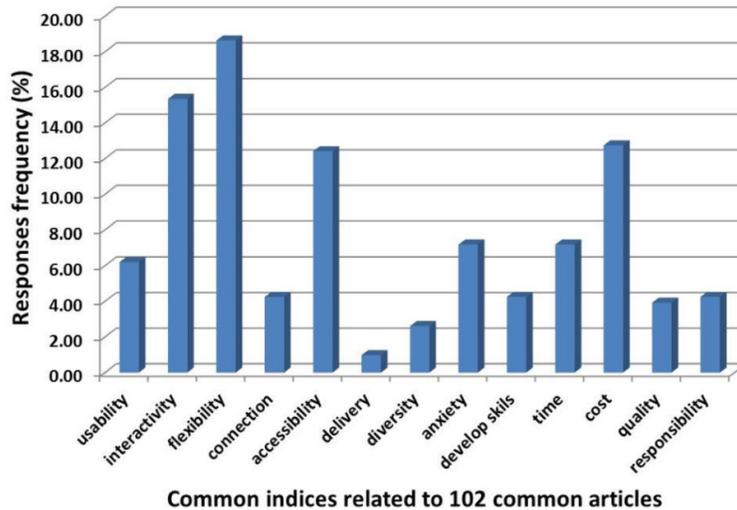

Figure 5. Frequency of common indices related to 102 'common articles'

The data reading indicates 13 ambivalent indices as percentages in descending order: 1. flexibility, 19%; 2. interactivity, 15.4%; 3. cost, 13%; 4. accessibility, 12%; 5. time, 7%; 6. anxiety/reduce social impact, 7%; 7. usability, 6%; 8. connection, 4%; 9. develop skills, 4%; 10. responsibility, 4%; 11. quality, 4%; 12. diversity, 3%; 13. delivery, 1% (Figure 5).

The first position occupied by flexibility, an index belonging to the technical support category, represented by a percentage of 19%, compared to the last position occupied by delivery, an index belonging to the educational approach category, represented by a percentage of 1% are both appreciated as being relevant. At this level of analysis, we may generalize considering that the two parts of the fight for the better use of new learning technologies are between these (technical) advantages and (pedagogical) limits.

Table 2. Weight of indices categories through a survey of literature from 2000 to 2012

No.	Category of common indices	Frequency of common indices category related to 102 'strong articles'	Frequency of common indices category related to 101 'week articles'	Frequency of common indices related to 102 'common articles'
1.	technical support	47.7%	11.7%	64.1%
2.	financial support	6.4%	4.6%	12.7%
3.	educational approach	5.7%	14.4%	11.8%
4.	social impact	2.2%	8.2%	11.4%
	total	62%	38.9%	100%

The effort to fit common (ambivalent) indices into categories and frequencies generated the system from Table 2.

We systematized the four categories of indices and presented the following in the order of frequencies in Table2: 1. technical support; 2. financial support; 3. educational approach; 4. social impact. We proceeded, also intra-categorically, to creating a hierarchy of indices based on their frequency. The prevalence of indices from the technical category can be remarked in an overwhelming proportion of 64.1%, so that from the total of the first 7 indices (Figure 5), 6 indices totally cover technical support. The other three categories of indices are positioned far away from it and the weights are relatively close to each other: financial support, 12.7%; educational approach, 11.8%and social impact, 11.4%. It can be seen that the amount of their weight, 35.9%, is slightly above half the weight of the technical support category. The data confirm the findings of previous partial analyses according to which the technical aspect of educational services represents the researchers and practitioners' greatest interest.

Correlating the data presented and analyzed on the basis of figures 2-5, we undertook a systematic synthesis of categories of indices and we obtained the following results:
1. Of the whole amount of the consulted literature, 62% of sources highlight strong indices while only 38.9% highlight weak indices, showing a superior interest for the advantages of e-learning educational services;
2. It is interesting that both the largest weight (47.7%)-*technical support* and the smallest weight (2.2%)-*social impact*, belong to strong indices;
3. The difference between the highest and lowest weight recorded for strong indices is very high, 45.5%, marking almost a break between the technical support (47.7%) and the other three categories of indices (financial support, educational approach and social impact) which together cover only 14.3% of the strong indices. The data clearly show a higher interest in the technical performances of these services, even users' exuberance related to their novelty and attractiveness.

4. The difference between the highest and lowest weight recorded for weak indices is 9.8%, and by reporting it to the same difference of strengths, it is 4.9smaller. At the same time, analyzing differences by category of indices, we can see a more balanced approach, without breaks, even relatively homogeneous, the difference from one category of weak index to another being an average of 3.3%. Considering the period when the analyzed studies were published, it can be appreciated that, relative to strengths, users are becoming more interested in technical performance, while in relation to weaknesses they become more cautious and demanding in many fields;

5. For strong indices, the first two categories which become obvious as weight arethe technical support (47.7%) and the financial support (6.4%), showing the manifest support type advantages through which the analyzed services are detached from classical education services. This strong interest for technical and financial aspect is convertible, paradoxically, in a weakness in terms of psycho-pedagogical interest for adapting the e-learning services to cognitive peculiarities of the beneficiaries. These data correlate well with those to be analyzed at point 6;

6. For weak indices, the first two categories which become obvious are the educational approach (14.5%) and the technical support (11.7%). The first weight indicates the serious and profound pedagogical shortcomings of this category of educational services. This result is confirmed by the relatively small weight obtained by the educational approach category as strength (5.7%), 2.6 times smaller than the one highlighted for weaknesses (14.5%).From a theoretical perspective, these data reinforce the prevalence of the technicist approach of e-learning educational services, with strong emphasis on the advantages of this type and with a relative delay in getting aware of the individual and social limits and dangers included into this perspective. The 4.1 times smaller weight of technical support (11.7%) as a weakness indicates that although the strengths of this category of indices are clear, there are also at least 25% problems which should be solved in order to optimize them;

7. Data relating to the educational approach are of particular importance. They reflect a paradoxical situation: while the indices considered strengths only cover 5.7% of the total of 62%, i.e. a weight of 9.2% of strengths, their weaknesses, being highlighted much better (14.4%), express 31% of the total of weaknesses. It is confirmed the prevailing perception of pedagogical shortcomings of e-learning educational services. By reporting educational approach weightto the weaknesses of the technical support category (11.7%), it seems natural and relatively understandable (meaning that pedagogical limitations of these services are obvious, given the constant innovation and development of the field and the difficult reported to a human resource characterized by fluctuation and subjective parameters), and even higher,with a percentage of 2.7%.However, the weight of strengths awareness of this category of indices is extremely low (5.7%), both in relation to all categories (62%) and especially to the technical support as a strength (47.7%) (addressed 8.36 times more like a strength than the educational approach).These data raise serious questions about the pedagogical effectiveness of these services, or about the interest for the studies addressing this issue.

8. The lowest weight for strong indices belongs to social impact (2.2%) which, together with the weight located in the third position for weak indices (8.2%), 3.7 times bigger than the weight of social impact considered as a strength, determines the understanding of this index (even if ambivalent) as being, in reality, mostly a weakness;

9. The lowest weight for weak indices belongs to financial support (4.6%), 1.8 times less than the social impact and 1.4 times less than the recognition of the same category of indices as strength. These data indicate that the increasing costs arising from the creation and improvement of these services are recognized, and also the availability of public and private companies and institutions to invest in this area.

The data reconfirm the researchers and practitioners overriding interest for the technical dimension of educational services, seen as a representative category both for strengths (47.7%) and as an ambivalent category (64.1%). Some debatable perspectives are also stated on the pedagogical side of these services which is the leader when it comes to weaknesses (14.4%) and just the third as an ambivalent index (11.8%) because of its poor identification as strength.

We are going to fathom the study of ambivalent indices categories by analyzing multiple dichotomous responses. This will allow us to study the variation of common indices, with the following response options: 1 for yes (the index was identified) and 0 for no (the index was not identified).In this article, we will analyze the multiple dichotomous responses by the grouping year variable.

Table 3. Common indices of technical support category grouping by stages years

			Stage years			
			2000-2004	2005-2008	2009-2012	Total
Technical support[a]	1. flexibility	Count	12	17	28	57
		% within Technical support	21.1%	29.8%	49.1%	
	2. interactivity	Count	7	23	17	47
		% within Technical support	14.9%	48.9%	36.2%	
	3. accessibility	Count	7	10	21	38
		% within Technical support	18.4%	26.3%	55.3%	
	4. connection	Count	3	5	5	13
		% within Technical support	23.1%	38.5%	38.5%	
	5. usability	Count	3	6	10	19
		% within Technical support	15.8%	31.6%	52.6%	
	6. time	Count	4	7	11	22
		% within Technical support	18.2%	31.8%	50.0%	
Total		Count	19	32	48	99

Percentages and totals are based on respondents.
a. Dichotomy group tabulated at value 1.

The evolution of common indices from the technical support category grouped by stage years can be followed in Table 3. What do these data show?

− Firstly there is speeding growth of analyses targeting these indices.
− Of the total of six indices, four of them record growth on each separate period (flexibility, accessibility, usability, time). One index (interactivity) records growth on the first period, and it has a slight setback in the second, even if it is a higher percentage compared to the first period. The last index (connection) is the only one which records growth on the first period and then it stagnates.
− The 'usability' index has the most accelerated growth throughout the period 2000-2012, which is 3.3 times.
− For the period 2005-2008 compared to 2000-2004, the most significant growth is given by the 'interactivity' index, 3.3 times, which then will record a decrease of 0.7 times compared to the previous quarter. For the last period, the most representative growth of 2.1 times is given by the 'accessibility' index.

Overall, we can say that there is still a growing interest from researchers and practitioners for all indices ranging from the technical support category. And these data confirm the previous analysis that emphasized the priority and impact of the technical aspect of e-learning educational services. Moreover, unfortunately, confirm their low interest for psycho-pedagogical indicators, with relevance for the cognitive training of the beneficiaries.

The evolution of common indices from the financial support category grouped by stage years can be followed in Table 4. What do these data show?

−   There is an increasing number of studies aiming at both indices belonging to this category.
−   While the growth of the 'not evidenced financial support' index is a continuous one, from one time slot to another, the growth recorded by the 'evidenced financial support' index is a two-steps process in which the initial impact of studies on the topic is slightly decreasing by 7.7% and then, on the second interval, there is a larger increase, by 15.4%.
−   The most accelerated growth, 4.1 times, throughout the period 2000-2012 is recorded by the index 'not evidenced financial support'.
−   For the period 2005-2008 compared to the period 2000-2004, there is a 2.3 growth in the 'not evidenced financial support' index and a 1.3 times decrease in the 'evidenced financial support' index. For the last interval, the increased interest in studies of the two indices is relatively close, slightly higher for the 'no evidenced financial support' index which is 1.8 times, compared to the growth of the 'evidenced financial support' index which is 1.6 times.

Table 4. Financial support indices grouping by stages years

			stages years			
			2000-2004	2005-2008	2009-2012	Total
Financial support	No evidenced	Count	13	30	53	96
		% within cost	13.5%	31.3%	55.2%	100.0%
	evidenced	Count	13	10	16	39
		% within cost	33.3%	25.6%	41.0%	100.0%
Total		Count	26	40	69	135
		% within cost	19.3%	29.6%	51.1%	100.0%

Overall, we can say that there is still a growing interest from researchers and practitioners for all indices belonging to the financial support category.

The evolution of common indices from the educational approach category grouped by stage years can be followed in Table 5. What do these data show?

−   Firstly, there is a rhythmic growth of the analyses related to only two indices (develop skills and diversity strategies) of the total of four.
−   One of the other two indices (delivery) registers a growth of 33.4% on the first interval, which is almost double, and on the second interval it marks a complete drop, as no studies have been revealed to address this issue. The last index (quality) is the only one which has the most fluctuating evolution, marking an 8.3% decrease in the first period and a 41.6% increase over the last period, which means 3.5 times.
−   The 'diversity' index has the most accelerated growth, 5 times, throughout the whole period 2000-2012.
−   For the period 2005-2008, compared to the period 2000-2004, the growth of all three indices that are in progress (develop skills, diversity, delivery) is equal, respectively 2times. For the last interval, the 'quality' index gives the most representative growth of 3.5 times of all 3 indices in progress.

Throughout the whole period, we can say that there is a fluctuating interest from researchers and practitioners for indices belonging to the educational approach category. Studies related to develop skills and methodological diversity have a sustained growth. At the same time, they have not been identified (statistically significant) articles that address the impact of the e-learning educational services on the stimulation/development of higher cognitive processes (thinking, memory, imagination, language). Studies related to the quality of these services record a fluctuating

evolution, initially marked by a decrease, followed then by the most significant growth, emphasizing the more and more serious concern about this aspect in the last 3 years. Delivery seems to be the index for which the researchers' interest seems to have totally decreased lately.

Data for (ambivalent) common indices belonging to the social impact category are presented in Table 6.

Table 5. Common indices of educational approach category grouping by stages years

			stages years			
			2000-2004	2005-2008	2009-2012	Total
Educational approach	develop skills	Count	2	4	7	13
		% within Educational_benefits	15.4%	30.8%	53.8%	
	diversity	Count	1	2	5	8
		% within Educational_benefits	12.5%	25.0%	62.5%	
	quality	Count	3	2	7	12
		% within Educational_benefits	25.0%	16.7%	58.3%	
	delivery	Count	1	2	0	3
		% within Educational_benefits	33.3%	66.7%	0.0%	
Total		Count	6	8	16	30

Percentages and totals are based on respondents.
a. Dichotomy group tabulated at value 1.

Table 6. Common indices of social impact category grouping by stages years

			stages years			Total
			2000-2004	2005-2008	2009-2012	
Social impact[a]	anxiety	Count	6	6	10	22
		% within Social impact	27.3%	27.3%	45.5%	
	responsibility	Count	2	4	7	13
		% within Social impact	15.4%	30.8%	53.8%	
	Total	Count	8	8	17	33

Percentages and totals are based on respondents.
a. Dichotomy group tabulated at value 1.

The cumulated data of the entire analysis confirm hypothesis no. 1 of the research. There is a set of ambivalent strengths and weaknesses of e-learning educational services, which we have identified on the basis of quality and quantity analysis of a package of 192 papers published between 2000 and 2012. This set has 4 important categories of indices: technical support, educational approach, financial support, social impact. A set of 13 ambivalent indicators were identified by reporting them to the above mentioned categories : 1. flexibility, 19%; 2. interactivity, 15.4%, 3. cost, 13%; 4. accessibility, 12; 5. time, 7%; 6. anxiety/reduce social impact, 7%; 7. usability, 6%; 8. connection, 4%; 9. develop skills, 4%; 10. responsibility, 4%; 11. quality, 4%; 12. diversity, 3%; 13. delivery, 1%.

According to the data presented and analyzed in Figures 1-4 and Tables1-5we can conclude that e-learning educational services are interesting, as practice and also as theory, especially due rather to the prevailing technical and financial benefits (54.1%) than to those of socio-pedagogical and human type (7.9%). Accordingly, the difficult issues the beneficiaries of these services are most

worried about are related mainly to technical support and educational approach (26.1%) and much less to social impact and financial support (12.8%).

4. Conclusions

The analysis of the studied bibliography has not led us to identify a systematization of strengths and weaknesses, much less to the idea of their ambivalence or their systematization from this point of view. Through their approaches most recent studies (Bhuasiri et al., 2012; Elster, 2010; Lin, 2011; Smetana & Bell, 2012; Sun et al., 2008)mention, both our previous statement and the results we obtained from the analysis of the relevant literature.In general, there are developed bibliographic studiesor practical, experimental perspectives(Bellefeuille et al., 2008; Lee & Yoon, 2009; Székely & Nagy, 2011), related to designing and implementing e-learning solutions in education. Most of them are about drawing some conclusions on the strengths and weaknesses of these services; they may also have optimization suggestions, unlike our study which emphasizes their ambivalence.

Based on these results we consider that the hypothesis 2 of our study is also validated. We have had sufficient data to generate in a future stage of our efforts, a predictive model of e-learning educational services with higher educational level, given the ambivalence of the identified indices. In the same time, in future studies, an additional attention should be paid to the identification of different categories of cognitive effects (superior cognitive processes: thinking, with its forms, memory, imagination, language; specific skills of intellectual work but also cognitive motivation) produced by the use of the e-learning services.

Compared to the areas of uncertainty identified at the beginning of the study, we have been able, on the basis of the effective study of 192 texts, to give the following responses by systematizing the highlighted perspectives:

 ➢ E-learning educational services are necessary, for the moment, rather due to the technology they objectify than to the pedagogy they incorporate and promote. An approach from a pedagogical and also a technological perspective is necessary.(Cuthbert & Slotta, 2004).
 ➢ Strengths and weaknesses are, to a large extent, not 'pure', but ambivalent, simultaneously incorporating meanings and limits with different weights.
 ➢ The reaction related to those dimensions of e-learning educational services which were identified simultaneously as strengths and weaknesses, must be discerning, cautious and within bounds, so that the maximum impact can be double, both for the positive accents to be valued and the negative ones to be reduced.
 ➢ Programmers of e-learning educational services must become aware of the ambivalence of their services'features, and be supported to adapt their predominantly technical perspective to an interdisciplinary one, with pedagogical and socio-humanistic accents.

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