Impact of Information Dimension on Service Quality of Digital Learning Solutions in Schools

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ABSTRACT

The two key problems faced by Indian schools viz., inadequate infrastructure and poor quality teaching can be overcome through digital intervention. Several companies are offering digital learning solutions (DLS) for schools. With DLS becoming all-pervading, service quality of DLS needs to be assessed. Assessment of service quality of DLS is quite complex, since in addition to the standard factors of service quality (SERVQUAL), that can be termed 'functional quality', other dimensions like technical/ outcome quality and information quality also play a major role. The information quality dimension is very critical since this is reflective of factors like accuracy, reliability, comprehensiveness and value added features of the content. This paper aims to study the impact of information quality on the assessment of service quality with regard to DLS in private schools. The paper will study this dimension from the perspective of teachers, who are the consumers (users) of DLS in schools.

Keywords: digital learning, e-learning, service quality, Indian school education

1 INTRODUCTION

As one of the youngest countries in the world, India has a huge percentage of its population in the school going age. The education system in India is the second largest in the world. According to the report, "Educational Statistics – At a glance 2014" (Government of India, 2014) it is estimated that as on 2013, the population with school going age in India is 30 Million, almost equal to the total population of USA. The report states that to cater to this huge school going population, the country has 1,425,564 schools serving primary, middle (upper primary), secondary and senior secondary students. In spite of the government's efforts in spreading education, the gross enrolment ratio continues to worry the educationists and policy makers. As per the report, the gross enrolment ratio drops to 87.4% at the upper primary education, thereafter to 49.1% at the senior secondary stage and to 21.1% at the higher education stage. In comparison, the gross enrolment ratios at higher/ tertiary education stage in other countries are: China – 26.7%, Germany – 61.7%, UK – 61.9%, Russia – 76.1% and USA – 94.3%.

The reasons for the high dropout (low gross enrolment ratio) are many – starting from historical reasons like education being the preserve of the elite to economic reasons like poverty and child labour. 90% of the schools are run by the state – by local self-governments like panchayat, municipalities, corporations or by state or central

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governments. The quality of schools run by the government vary in quality – from excellent to appalling, the excellent ones being schools run by the central government like Kendriya Vidyalaya and Navodaya Vidyalaya. Apart from these islands of excellence, majority of the state run schools are highly inefficient with high teacher absenteeism and low teacher engagement.

The sorry state of affairs of state run schools has given rise to burgeoning private school system. The private schools of various hues – from those catering to low income group to international schools with global accreditation and partnership that cater to the elite – have proliferated across the country, especially in the past 10 years. Irrespective of the type of school, whether government or private, standards of teaching and teaching-learning outcome are of questionable quality. While the government schools are abysmal in this regard, the status of private schools is only a notch better. The entire blame for this cannot be placed on the teachers since there has to be a systemic change on teaching-learning approach. The boards like CBSE (Central Board of Secondary Education) has taken a lead in this and has introduced continuous comprehensive evaluation, grade based evaluation, semester pattern etc.

However, it is also a fact that schools find it hard to get teachers, partly owing to the schools' proclivity to pay less salary. Also the quality of teachers, especially for mathematics and science are on a downward spiral. This is due to the fact that engineering has become mainstream education and one rarely finds someone pursuing graduation/ post-graduation in pure sciences.

The private schools have found a way to overcome this challenge – by using technology enabled learning. The private schools in India have adopted to 'Digital Classroom Solutions' or 'Digital Learning Solutions' in a big way.

2 DIGITAL LEARNING SOLUTIONS

Digital Learning Solutions essentially consists of three sub-systems – (1) Hardware or technology platform (2) Software or Multimedia/ digital content and (3) Delivery infrastructure. The components of these sub-systems (Sugant and Anvekar 2014) are as shown in the figure 1.

The hardware sub-system in the classroom consists of personal computer, projector, interactive white board, speakers, UPS and student response system (optional). It also consists of server located in a centralised location in school and networking switches. The software/ multimedia content includes audio-visual lessons for all the subjects – usually subjects other than languages. In addition, the content also includes other value add tools like math and science labs, map tools for social studies, exercises and mind maps, digital library, tools for creating assessments, lesson plans, diagrams and presentations etc. The software/ multimedia content is stored in the server and can be accessed by teachers across all the classrooms through the delivery infrastructure, normally local area network.

Digital Learning Solutions (DLS) essentially facilitates better learning by the children. It also helps in effective knowledge delivery by teachers and enhances quality of teaching (Sugant & Anvekar 2014). DLS is offered by multiple vendors in India and has

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been implemented in over 30,000 schools across India. However, not many studies have been taken up on the overall assessment of service quality of DLS.

The purpose of this study is to assess the impact of one component – quality of content, in other words, information quality on service quality perception.

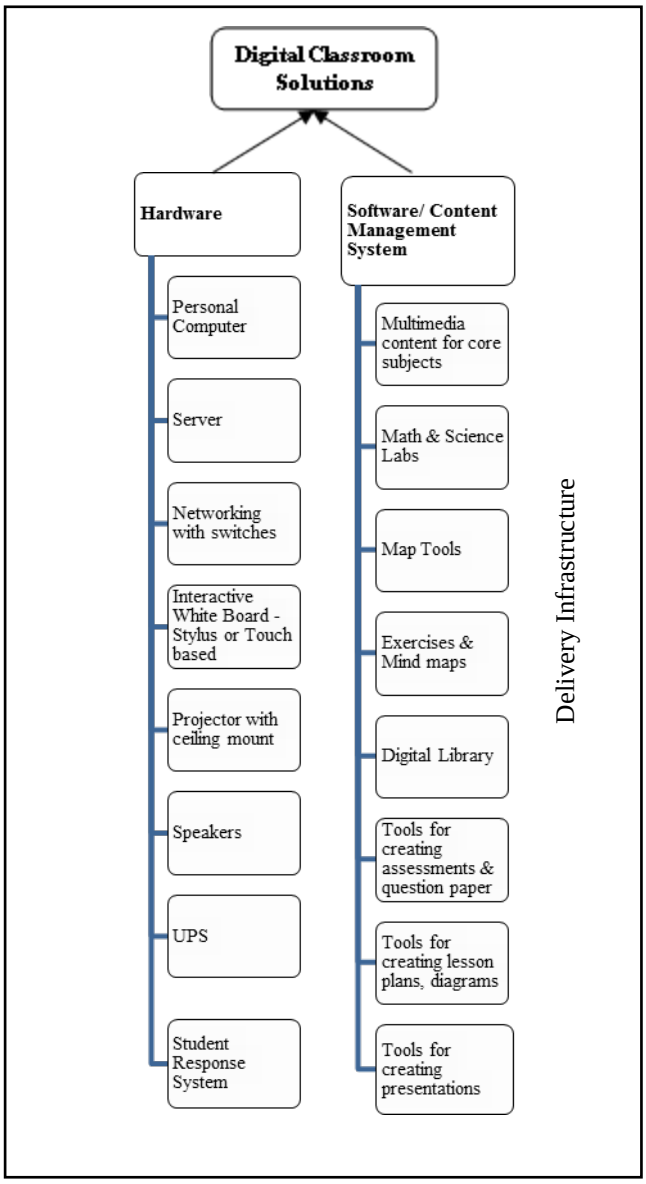

Figure 1

3 LITERATURE REVIEW

The concept of service quality as a key driver of service satisfaction has been first postulated by Parasuraman et al (1985, 1988) and established SERVQUAL as the appropriate framework for measuring service quality. SERVQUAL has been the subject of numerous studies and several models have been proposed as an alternate like SERVPERF (Taylor S A 1992), which was also later confirmed of its utility and effectiveness by Fogarty G et al (2000). Till the onset of e-services in the new millennium, SERVQUAL has stood the test of time. However, post proliferation of e-

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services, it was found that while assessing e-services, most of the elements of SERVQUAL like responsiveness, empathy and tangibles losing its relevance. Parasuraman et al, the key proponent of SERVQUAL proposed E-S-QUAL (2005) as a model to evaluate e-services. However this model with dimensions like efficiency, fulfilment, system availability and safety and privacy is meant to measure the service quality dimensions of on-line shopping. The efficacy of E-S-QUAL for other e-services, specifically e-learning is not proven.

The current research is on service quality of digital learning solutions, for which, in the absence of research on this specific area, the literature review was done with service quality studies pertaining to IT services and e-learning. Pitt L F et al (1995) explains that system quality and information quality have to be considered in addition to service quality in case of software products. Xu et al (2013) expound that three types of quality viz., information quality, system quality and service are not independent for an e-service. Jia & Reich (2011) expounds IT service quality with its antecedent IT service climate. They suggest that the factor of IT service climate is internal to the organization and IT service quality consists of three components – service evaluation, service vision and service leadership, IT service climate is described as shared behaviours and perceptions of IT employees in their organisational workplace... Kritikos et al (2013) classify service quality as Quality of Service and Quality of Experience for software services. With regard to service quality of e-government services, service content and service delivery determines the effectiveness (Tan C W et al, 2013). Benlian A et al (2012) explain that for 'software as a service', system availability, privacy, security, flexibility, efficiency and fulfilment are the key dimensions of service quality.

While trying to understand the service quality of digital learning solutions, it is found that service quality of on-line learning/ e-learning is more pertinent to our field of study. Samaarasinghe and Tretiakov (2009) after studying different models conclude that content quality, system quality and service quality are success determinants for e-learning. Service quality in this study refers to instructor and technical support involvement. Landrum et al (2008) proposed an instrument, SERVCESS that is based on SERVQUAL and information success variables to measure service quality within the library environment. They concluded that the information success variables that influenced user satisfaction were information quality, system quality, service quality and usefulness. Jung (2010) created an empirical model for e-learning in higher education that showed institutional QA mechanism, information and publicity, institutional credibility, learner support, learning tasks, interaction and staff support as e-learning quality perception determinants.

Mustafa Suliman (2013) defines the quality of the content of e-learning as system quality. He proposes usability, reliability, accessibility and stability as the dimensions of system quality and uses these dimensions to evaluate the impact on the efficiency of e-learning system. He found Usability as the strongest dimension affecting system quality. Cho (2009) discusses the e-learning quality at micro level and identifies six categories viz., course content, usability, instructional design, evaluation, learning support and refinement and improvement. These categories together consist thirty seven factors which are used to evaluate quality. In the framework, the author ways that categories related to 'design, development, management and improvement are the basic

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dimensions for controlling e-learning quality'. Further, the evaluation dimension can be classified as process evaluation or outcome evaluation.

In an organisational context, E-learning system service quality which is made up of system quality, information quality, service quality and perceived usefulness impacts the acceptance of e-learning (Wong and Huang, 2011). A study by Chen L and Kuo Y (2011) proved that user interface and useful and relevant content are key to attracting users to avail e-learning services.

4 RESEARCH DESIGN

4.1 Statement of Problem

Though there are several studies conducted on service quality and e-learning service quality, specific study on service quality of digital learning solutions, as being used in classrooms in schools in India have not been taken up. This research aims to bridge this gap, thereby providing pointers to the industry. The service quality of digital learning solutions is defined as a combination of information quality, functional quality and technical quality. Information quality is a key dimension to service quality and hence this research aims at studying the factors that constitute information quality and also assess the role of information quality on service quality assessment. The service quality as perceived and observed by the customers, i.e. teachers of private CBSE schools are considered for the study.

4.2 Exploratory Study

Since there is no literature on service quality related to digital learning solutions, to ensure an appropriate conceptual framework for investigating service quality, an exploratory study was conducted with customers and service providers. The study was extensively done through focus group interviews with customers (in this case, teachers) and in-depth interviews with company executives (of service providers).

The focus group interviews with the customers was directed to elicit responses related to the factors the customers perceive as important from the point of view of quality and satisfaction. The in-depth interviews with company executives (from three leading service providers) was undertaken to understand their perception about service quality of digital learning solutions and to gain insights on the following issues.

- Executives' perception of the key dimensions of service quality
- Factors that constitute the key dimensions of service quality
- Marketer perception of the customer's service quality expectations.

Based on the insights gained, the conceptual framework for this study was generated. The variables/ constructs that constitute the factors of accuracy, relevance, comprehensiveness and value added features which together constitutes the information quality are as per the table below:

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Table 1

Items Code	Item Description	Factors
VAR00001	Error free	Accuracy
VAR00002	Appropriateness of content for the school	
VAR00003	Relevant to the curriculum	Relevance
VAR00004	Relevant with trends in the knowledge area	
VAR00005	Completeness vis a vis curriculum	Comprehensiveness
VAR00006	Availability of comprehensive instructor manual	
VAR00007	Teachers' training on usage of DCS	Value-added features
VAR00008	Availability of question bank	
VAR00009	Tools for lesson plan	

4.3 Research Objectives

The research aims at looking exclusively at information quality dimension of service quality of digital learning solutions. Specifically, the objectives of the study are

- To understand the relationship between information quality and service quality of digital learning solutions
- To know the factors that contribute to information quality of digital learning solutions
- To assess the extent of contribution of each factor to the information quality.
- To assess the impact of information quality on service quality of digital learning solutions

4.4 Hypotheses

H1: service quality of digital learning solutions is positively associated with information quality experienced by the teachers of private CBSE schools.

H2: Correlation between the service quality and the information quality equal to 50%.

H3: The contribution from each factor to information quality is equal in terms of proportion.

4.5 Descriptive Research

Based on the framework (as shown in Table 1), a descriptive research was conducted. A quantitative research was conducted with a detailed questionnaire.

4.6 Sampling

The study was conducted on the users, viz. teachers of digital learning solutions in CBSE schools in Karnataka. The convenience sampling was used to determine the participants of the survey. The help of the heads of school was sought to identify the top 6 active users (teachers) of digital learning solutions. The samples were collected from

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12 CBSE schools that have implemented digital learning solutions in Mysore district of Karnataka, resulting in a total of 72 samples.

5 DATA ANALYSIS

5.1 Factor Analysis

The primary functions of factor analysis are (a) to identify constructs that constitute a factor and (b) to reduce the number of variables to a more manageable set.

In this study, factor analysis was used to understand the different constructs and group them into factors which can be further utilised to understand the different dimensions that influence service quality of digital learning solutions. The different factors considered for the analysis for this research include (a) Accuracy (b) Relevance (c) Comprehensiveness and (d) Value-added features (shown in figure 2).

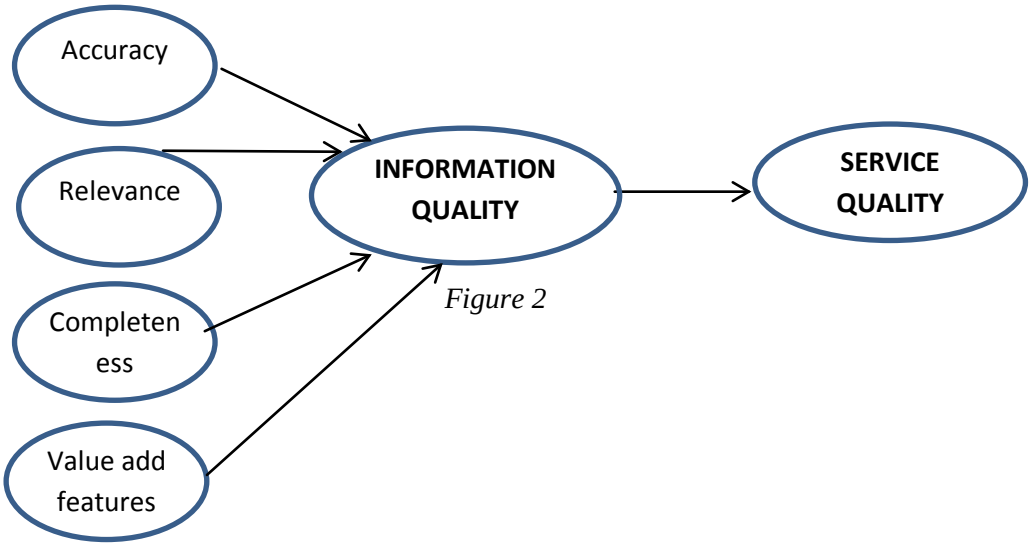

Figure 2

KMO value, factor loadings and communalities are the major measures that we will be focussing in factor analysis. KMO (Kaiser Meyer Olkin) & Bartlett's Test is recommended to test the sampling adequacy by checking the case to variable ratio of the analysis that is being conducted. The KMO index should be >=0.5 for further analysis.

Communality is the proportion of a variable's variance explained by a factor structure and should be minimum 0.6. Factor loadings indicate the importance of the item to a factor and should be between 0.30 and 0.40 (can be negative or positive). Towards enabling grouping the items to factors, factor loadings must be considered. All the factors that constitute information quality dimension were considered and the results are as below:

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5.1.1 Accuracy

Accuracy is one of the factors that influences the information dimension which in turn influences service quality of digital learning solutions. Accuracy was represented by two items in the questionnaire – viz., error free and appropriateness of the content for the school.

KMO value and Bartlett's Test must be considered prior to further analysis.

Table 2: KMO and Bartlett's Test - Accuracy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	17.431
	df	1
	Sig.	.000

The KMO value is 0.500, which is the minimum prescribed, hence further analysis is possible.

Table 3: Communalities - Accuracy

	Initial	Extraction
VAR00001	1.000	.735
VAR00002	1.000	.735

Extraction Method: Principal Component Analysis.

Since the communalities values of both items were > 0.6, the items were retained.

Table 4: Total Variance Explained - Accuracy

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.471	73.549	73.549	1.471	73.549	73.549
2	.529	26.451	100.000			

Extraction Method: Principal Component Analysis.

The total variance explained is 73%.

Table 5: Component Matrix - Accuracy

	Component
	1
VAR00001	.858
VAR00002	.858

Extraction Method: Principal Component Analysis.

The variables have a loading of 0.858 and hence can be used for further analysis

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5.1.2 Relevance

Relevance is the second factor that influences the information dimension and thereby service quality of digital learning solutions. Relevance was represented by two items in the questionnaire – viz., relevant to the curriculum and relevant to the trends in the knowledge area.

Table 6: KMO and Bartlett's Test - Relevance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	11.969
	df	1
	Sig.	.000

The KMO value is 0.500, which is the minimum prescribed, hence further analysis is possible.

Table 7: Communalities - Relevance

	Initial	Extraction
VAR00003	1.000	.699
VAR00004	1.000	.699

Extraction Method: Principal Component Analysis.

Since the communalities values of both items were > 0.6, the items were retained.

Table 8: Total Variance Explained - Relevance

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.398	69.887	69.887	1.398	69.887	69.887
2	.602	30.113	100.000			

Extraction Method: Principal Component Analysis.

The total variance explained is 69%.

Table 9: Component Matrix - Relevance

	Component
	1
VAR00003	.836
VAR00004	.836

Extraction Method: Principal Component Analysis.

The variables have a loading of 0.836 and hence can be used for further analysis

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5.1.3 Comprehensiveness

Comprehensiveness is the third factor to be considered as influencing the information dimension and consequently service quality of digital learning solutions. Comprehensiveness was represented by two items in the questionnaire – viz., completeness vis a vis curriculum and availability of comprehensive instructor training manual.

Table 10: KMO and Bartlett's Test - Comprehensiveness

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	7.812
	Df	1
	Sig.	.005

The KMO value is 0.500, which is the minimum prescribed, hence further analysis is possible.

Table 11: Communalities - Comprehensiveness

	Initial	Extraction
VAR00005	1.000	.663
VAR00006	1.000	.663

Extraction Method: Principal Component Analysis.

Since the communalities values of both items were > 0.6, the items were retained.

Table 12: Total Variance Explained - Comprehensiveness

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.326	66.303	66.303	1.326	66.303	66.303
2	.674	33.697	100.000			

Extraction Method: Principal Component Analysis.

The total variance explained is 66%.

Table 13: Component Matrix - Comprehensiveness

	Component
	1
VAR00005	.814
VAR00006	.814

Extraction Method: Principal Component Analysis.

The variables have a loading of 0.814 and hence can be used for further analysis

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5.1.4 Value – added features

Value added features is the fourth factor that influences the information dimension and consequently service quality of digital learning solutions. Value-added features was represented by three items in the questionnaire – viz., teachers' training, availability of question bank and tool for lesson planning.

Table 14: KMO and Bartlett's Test – Value-added features

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.600
Bartlett's Test of Sphericity	Approx. Chi-Square	32.972
	Df	3
	Sig.	.000

The KMO value is 0.600, which is more than the minimum prescribed of 0.500, hence further analysis is possible.

Table 15: Communalities - Value-added features

	Initial	Extraction
VAR00007	1.000	.687
VAR00008	1.000	.389
VAR00009	1.000	.693

Extraction Method: Principal Component Analysis.

Since the communalities values of two items were > 0.6, these items were retained. The value of one item – availability of question bank – is only 0.389 and hence this item is rejected

Table 16: Total Variance Explained - Value-added features

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.768	58.945	58.945	1.768	58.945	58.945
2	.784	26.123	85.067			
3	.448	14.933	100.000			

Extraction Method: Principal Component Analysis.

The total variance explained is 59%.

Table 17:Component Matrix – Value added features

	Component
	1
VAR00007	.829
VAR00008	.623
VAR00009	.832

Extraction Method: Principal Component Analysis.

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Two variables that have a loading of 0.829 and 0.832 can be used for further analysis, while the other variable that has a loading of 0.623 is not to be accepted. However, since this variable is critical for the study and on the presumption that the loading is low due to low sample size, this variable is also accepted and used for further analysis.

5.1.5 Summary of factor analysis

The summary of factor analysis vis a vis items in the questionnaire are as below:

Table 18: Summary of Factor Analysis Results

Items Code	Item Description	Factor	KMO Value	Communalities	Variance Explained (%)
VAR00001	Error free	Accuracy	0.500	0.735	73.549
VAR00002	Appropriateness of content for the school			0.735	
VAR00003	Relevant to the curriculum	Relevance	0.500	0.699	69.887
VAR00004	Relevant with trends in the knowledge area			0.699	
VAR00005	Completeness vis a vis curriculum	Comprehen-siveness	0.500	0.663	66.303
VAR00006	Availability of comprehensive instructor manual			0.663	
VAR00007	Teachers' training on usage of DCS	Value-added features	0.600	0.687	58.945
VAR00008	Availability of question bank			0.389	
VAR00009	Tools for lesson plan			0.693	

The above table gives a summary of the factor analysis. From the factor analysis, it is observed that KMO measure of sampling adequacy for all factors are greater than 0.5 and hence is acceptable. The communalities are another significant criteria that has to be considered. All, but one of the communalities value of the variable lie in the acceptable in the acceptable range of greater than 0.4 and hence is acceptable. One variable (VAR 00008 – availability of question bank) has low communality value of 0.389. Though statistically, the value is low, it is retained due to the importance of this variable. Also it is expected that with higher sample size and addition of more variables, the communalities coefficient may go up.

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Based on the exploratory factor analysis, the model for information dimension of service quality is confirmed as below in Table 19:

Table 19

S No.	**Constructs that constitute the factors**	**Factors that contribute to the 'information quality' dimension of Service Quality**	**Dimension of Service Quality**
1.	Error free	Accuracy	Information Quality
2.	Appropriateness of content for the school		
3.	Relevant to the curriculum	Relevance	
4.	Relevant with trends in the knowledge area		
5.	Completeness vis a vis curriculum	Comprehensiveness	
6.	Availability of comprehensive instructor manual		
7.	Teachers' training on usage of DCS	Value added features	
8.	Availability of question bank		
9.	Tools for lesson plan		

Based on the factor scores, the values of accuracy, relevance, comprehensiveness and value added features were calculated and the same is used to calculate information quality.

Information quality = Accuracy + Relevance + Comprehensiveness + Value added features

5.2 Testing of Hypotheses

H1: The quality of services of DCS is positively associated with information quality experienced by the teachers of private CBSE schools.

Table 20

Correlation between information quality and service quality			
		Information quality	Service Quality
Information quality	Pearson Correlation	1	.416**
	Sig. (2-tailed)		0.0001
	N	72	72
	Pearson Correlation	.416**	1
	Sig. (2-tailed)	0.0001	
**. Correlation is significant at the 0.01 level (2-tailed).			

The correlation between information quality and service quality is significant and hence this hypothesis is accepted.

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H2: Correlation between the service quality and the information quality is equal to 50%.

In this case, we got the p-value as 0.3731 and hence the hypothesis is not rejected and claim that the correlation will be 50% in the population is retained

H3: The contribution from each factor to information quality is equal in terms of proportion.
To test this hypothesis, chi square test for the proportions was used.

Table 21

P1	**P2**	**P3**	**P4**				**Total**
0.1275	**0.3038**	**0.2637**	**0.305**				1
Table-I							
Category	**Specified Proportion**	**Observed Frequencies**	**Expected Frequencies**	**(O-E)**	**(O-E)^2**	**(O-E)^2/E**	
Accuracy	0.1275	9.18	18	-8.82	77.7924	4.3218	
Relevance	0.3038	21.8736	18	3.8736	15.00477696	0.83359872	
Comprehensiveness	0.2637	18.9864	18	0.9864	0.97298496	0.05405472	
Value added features	0.305	21.96	18	3.96	15.6816	0.8712	
Total	1	72	72				
						6.08065344	
Results							
Test Statistic		6.08065344					
Degrees of Freedom		3					
p-value		0.215503037					

It was observed that the p-value is > $\boldsymbol{\alpha}$ (5%) and hence the hypothesis that the contribution from each factor to information quality is equal in terms of proportion is not rejected.
The study has established the association between information quality and service quality of digital learning solutions. Also the study established the validity of factors viz., accuracy, relevance, comprehensiveness and value added features to the constituting of information quality dimension of service quality.

6 CONCLUSION

Learning through “digital learning solutions” is uniquely an Indian phenomenon where service providers are responsible for providing the hardware, software, and multi-media content and support services for schools. This is a high stake and fast growing industry. It is imperative that the service providers need to understand the perceptions and expectations of the customers, specifically teachers, to different dimensions of service quality and the factors that constitute these dimensions. Among the three dimensions that are identified, this study has taken up ‘information quality’ for investigation. The research has shown that information quality is positively associated with service quality.

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Also the research has validated the factors that constitute information quality – viz. accuracy, relevance, comprehensiveness and value added features. Further the study has proven the validity of the variables that constitute these factors (Table 18). The research outcome can provide a basic framework for the industry to focus upon to ensure service quality and thereby customer satisfaction.

7 SCOPE FOR FURTHER RESEARCH

The sample size of current research is only 72. Increasing the sample size will further validate the finding and also the suitability of the variables that constitute the factors of information quality. While the current research covered the impact of information quality on service quality, it has to be noted that this is not the only dimension that impacts service quality. The impact of other dimensions like functional quality and technical/ outcome quality on service quality need to be further investigated and studied upon. Also the factors that contribute to the functional quality and technical quality need to be investigated and concluded upon. Further service quality is an antecedent to customer satisfaction and hence the impact of the service quality and the different dimensions of services quality on customer satisfaction could also be taken up for further research.

REFERENCES

[1] Benlian, A, Koufaris, M, & Hess, T (2012), "Service Quality in Software-as-a-Service: Developing the SaaS-Qual Measure and Examining Its Role in Usage Continuance", *Journal of Management Information Systems*, vol. 28, no. 3, 85–126.

[2] Cronin, J J & Taylor, S A (1992), "Measuring Service Quality: A Re-examination and Extension", *Journal of Marketing*, vol. 56, no.7, 55-68

[3] Eunsoon Cho (2009), "Framework of micro level e-Learning quality dimensions", *International Journal of Contents*, vol.5, no.2, 1-5

[4] Fogarty G, Catts R, & Forlin C. (2000), "Measuring Service Quality with SERVPERF", *Journal of Outcome Measurement*, vol. 4. no.1, 425-447.

[5] Government of India, Ministry of Human Resources Development, Bureau of Planning, Monitoring & Statistics, New Delhi (2014). "Educational Statistics at a Glance 2014"

[6] Jia, R & Reich, B H (2011), "IT Service Climate – An Essential Managerial Tool to Improve Client Satisfaction With IT Service Quality", *Information Systems Management*, vol. 28, 174-179.

[7] Jung I (2010). "The dimensions of e-learning quality: from the learner's perspective", *Educational Technology Research and Development*, vol. 59, no. 4, 445-464

[8] Kritikos, K, Pernici, B, Plebani, P, Cappiello, C, Comuzzi, M, Benbernou, S, et al (2013), "A Survey on Service Quality Description", *ACM Computing Surveys*, vol. 46, no. 1, 1-58

[9] Landrum H et al. (2008), "SERVCESS: A Parsimonious Instrument to Measure Service Quality and Information System Success", *Quality Management Journal*, vol. 15, no. 3, 17-25.

[10] Ling-Hsiu Chena and Ying-Feng Kuob (2011), "Understanding e-learning service quality of a commercial bank by using Kano's model", *Total Quality Management*, Vol. 22, No. 1, 99–116

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

[11] Parasuraman, A, Zeithaml, V A & Malhotra, A (2005), "E-S-QUAL - A Multiple-Item Scale for Assessing Electronic Service Quality", *Journal of Service Research*, vol. 7, no. 10, 1-21.
[12] Parasuraman, A, Zeithaml, V A & Berry, L L (1985), "A Conceptual Model of Service Quality and its Implications for Future Research', *Journal of Marketing*, vol. 49, no. 4, 41-50.
[13] Parasuraman, A, Zeithaml, V A & Berry, L L (1988), "Refinement and Reassessment of the SERVQUAL scale", *Journal of Retailing*, Vol. 67, no. 4, 420-450.
[14] Parasuraman, A, Zeithaml, V A & Berry, L L (1988), "SERVQUAL: A multiple item scale for measuring consumer perceptions of service quality", *Journal of Retailing*, vol. 64, no. 1, 12-40.
[15] Pitt, L E, Watson, R T & Kavan, C B (1995), "Service Quality: A Measure of Information Systems Effectiveness", *MIS Quarterly*, vol. 10, no. 2, 173-188.
[16] Samarasinghe, S.M. & Tretiakov, A. (2009). "A multi-dimensional measure of e-learning systems success. In Same places, different spaces." Proceedings ASCILITE Auckland 2009, http://www.ascilite.org.au/conferences/auckland09/procs/samarasinghe-poster.pdf
[17] Sugant R and Anvekar S (2014), "E-Learning and Digital Classroom Solutions in CBSE Schools: A Study of factors that determine the effective knowledge delivery by teachers at secondary level", *IOSR Journal of Research & Method in Education*, vol. 4, no. 4, 27-32
[18] Sugant R and Anvekar S (2014), "E-Learning and Digital Classroom Solutions in Indian Schools: A Study of types and variables for effective adoption", *International Journal of Information Systems*, vol. IV, no. II, 01-06.
[19] Suliman Oun Alla M M (2013). "The Impact of System Quality in E-learning System", *Journal of Computer Science and Information Technology*, vol. 1, no. 2, 14-23
[20] Tan, C W, Benbasat, I & Cenfetelli, R T (2013), "IT-mediated customer service content and delivery in electronic governments: an empirical investigation of the antecedents of service quality", *MIS Quarterly*, vol. 37, no. 1, 77-109
[21] Wong W and Huang N (2011), "The Effects of E-Learning System Service Quality and Users' Acceptance on Organizational Learning", *International Journal of Business and Information*, vol. 6, no. 2, 205-225
[22] Xu, J, Benbasat, I & Cenfetelli, R T (2013), "Integrating Service Quality with System and Information Quality", *MIS Quarterly*, vol. 37, no. 3, 777 – 794

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