

Survey on Data Dissemination In Education Management Information System

Ruchika Thukral, Department of Computer Science, University of Delhi, India E-mail: ruchikathukral2203@gmail.com

Anita Goel, Department of Computer Science, Dyal Singh College, University of Delhi, India E-mail: agoel@dsc.du.ac.in

Abstract— In education system, the collected data is processed and disseminated to be consumed by end users, like, policy makers, planners, students, parents, educational institutes, districts, states etc. The data is disseminated in different formats, like, annual digests, summary reports, report cards etc. in both printed and electronic ways. The Education Management Information System (EMIS) allows the end users to view or download the desired data. Special provisions are also made, so that data can be directly accessed by the selected end users for further analysis. The process for direct data transfer or program to program data transfer is a tedious task. It has limitations, like, hardware and software dependency of the end user on the EMIS application, requirement of database connectivity code and updates on end user's side with every update in the EMIS application. It requires special infrastructure and professional expertise on the end user's side. Web services allow transfer of data across heterogeneous platforms. Web services are being used in different areas for data dissemination, like, geospatial, governance and weather forecasting. Using web service for data dissemination in education system shall allow direct data access irrespective of the hardware and software compatibility at the end user's end with the EMIS. Here, we discuss the different ways of disseminating the data in the education system. In this paper, we present an overview of the process for dissemination of data for the EMIS of different countries. We also introduce using of web services for the data dissemination process in the education system.

Index Terms—Data Dissemination, End users, Education Management Information System (EMIS), Education System, Web Service, XML, Client (End User) Application

1 INTRODUCTION

Education Management Information System (EMIS) is an information system whose purpose is to collect, process, analyses and present data of educational institutes. There are three phases of EMIS functionality: 1) *Data collection* phase where data is collected from educational institutes, 2) *Data process* phase where data is processed in the form of tables, summary reports, charts etc. and 3) *Data dissemination* phase where processed data is disseminated to end users. Here, we focus on different ways of data dissemination.

EMIS makes data available to users to encourage planning and implementation of policies in time. It is needed to:-

- Provide better educational facilities especially in remote areas where lack of infrastructure and teachers
- Strengthen decision making process with relevant and consistent information in time
- Implement educational policies in time to increase the standard of education as per global requirements
- impart quality education for betterment of society

It is also responsible to provide educational data to users of educational information.

Data requirement of different end users in education system is different so there is a need that data be disseminated according to the end user's need; Such as, at administrative level or sub administrative level, information requirement is [9]:

- Teacher needs detailed results, by subject or by student.
- Head needs detailed information of all the students, infrastructure, teacher training requirement, vacancies and school result with comparison to previous years.
- District manager needs information regarding all the

schools such as student enrolment, infrastructure requirement, teachers' requirement and admission pattern.

- State/region manager needs information of all the districts come under the region.
- National administrators need information on admission, girls-boys ratios, dropouts, repeaters, teacher's requirement in educational institutes and other information for budget analysis.

End users need educational data for many purposes, like, comparison of different institutes, searching vacancies, analytical study for future planning, research etc. End users are defined in two categories, internal end users and external end users. Internal end users are planners, decision makers, decision support system, experts and educational administrators within the ministry of education and external users are researchers, students, teachers, government and non-government organizations, national and international organizations, civil societies and private individuals outside the ministry of education [21].

In order to do the present the paper, we have explored EMIS web sites of many countries and studied the dissemination process and reporting formats. To cater the requirements of end users, data is collected from educational institutes, processed and published in annual digests. These digests are available in printed form as well as electronic form on EMIS web site. Annual digest is collection of raw data as well as analysed data with brief summaries, charts or comparison tables [2],[12],[17],[14] and [15]. Though annual digest includes all types of information but due to abundance of tables

it becomes difficult for the end users to find relevant data. EMIS provides processed data in the form of report cards or analytical summaries with tables and charts through web site in portable format or in excel sheets. The available data through reports is sometimes not relevant according to the requirement of end user or the data may be in abundance which needs to be further segregated for analysis purpose [2]. Registered users like districts or states are provided with client applications (end users applications) to download complete data directly to their database on their computing system. End users who need to import data on their computing systems, required to install client application at their end to access data directly. To install application, end users need to have same language drivers and database connectivity coding. Also we found that small modification at EMIS side requires modification at end users' side as well. Thus application to application data transfer is possible with current data dissemination system of EMIS for privileged end users with lots of hardware and software arrangements which discourages some times. To overcome these issues we introduce web service interface to access centralized data base directly by both types of end users i.e. registered and unregistered. This gives a new way to access data from EMIS database and retrieve data in XML document. Thus web service interface provides more flexibility to end users to use required web service from the set of web services present on web site to download relevant data. The users who want to further analyse the data can transfer data directly to analytical application as web service retrieve data in XML format which is independent of programming language or computing platforms. Web service enables application to application data transfer by end users where end users are only required to use web service client code (WSDL) to download relevant data. Web service client is defined with WSDL which makes it easy to install by end users without the requirement of application and database drivers and installation codes. Web service client application needs no modification in end users' computing systems. Data retrieved in XML format is easy to understand and can be used in any analytical software regardless of programming languages and operating systems. In this paper, we discuss the different ways of data dissemination in education system and also introduce application to application data dissemination through web service interface. Web service database access does not require special software and hardware settings for application to application data transfer.

This paper is divided in seven sections; section 2 explains different ways to disseminate data in education system. Section 3 reveals issues of data dissemination in education system. Section 4 describes web service and section 5 presents related work done in web service data dissemination in different areas. Section 6 proposes web service in data dissemination for education system through EMIS. We have conclusion in section 7 which is followed by references.

2 EMIS: DATA DISSEMINATION

Dissemination of data is done in number of ways, like, distribution of abstracts, quick references, indicator reports on regular basis, publication and distribution of pamphlets and distribution of reports to planners and decision makers in printed way [21]. EMIS publishes annual digest which are disseminated at national and sub national levels, like, centre, state and districts in printed form or in electronic form using CDs. Data in annual digest is tabulated in an organized and logical way with brief summaries. There are different ways to disseminate data which are discussed as follows:

Book format: Data collected in annual books is of great importance for planners to review it closely and for policy making process. Annual digest are printed and bound as a book to disseminate to each and every department of education system and other concerned departments.

Digitisation: Dissemination of annual books to all departments placed at distant places was a challenge and cost of printing and dissemination is also high. So, the annual digests are uploaded on web site.

View: End users who do not require data for further analysis are provided with the option to only view the reports or online annual digest. End users like students or parents need data only to check the performance of educational institutes for admission purpose. EMIS website provides an option to end users to only view the data by selecting the desired region, district and institute for the required data. The report is shown in HTML format which cannot be further utilized in any other program.

Download: End users, who need to store data for comparative study or for research work, download data from the EMIS website in spreadsheet or PDF formats. Spreadsheets can be further used for analysis purposes by creating charts. In the case of PDF format, data can only be downloaded and stored by end users and cannot be used directly for analysis purpose.

Print: End users also have an option to directly print data from EMIS web site required data from the reports given. This option benefits education system to send electronic copy of reports to state or district which can be printed by them to disseminate to remote areas where internet facility is not available. End users like students or parents are also facilitated with printing option for the report card of the institution or the student.

Program to program transfer: End users like policy makers, planners at different administrative levels such as state, district or school require data to be used directly in their analytical programs. For such dissemination of data, special client applications are created which are used by end users in their computing systems. For such arrangements, end users are required to setup complete hardware and software infrastructure and install database drivers for direct transfer of data. In this way, end users can directly transfer data from EMIS database to their computing system for further analysis.

Publication and distribution of different kinds of reports to a large group of end users increase the dissemination budget. So, education has provided the facility to access data directly through internet using EMIS web site. Different data output formats are given in table 1 [4],[9],[21]:

Table 1 Different ways of reporting

Reporting Ways	Description
Annual digest of statistics	Contains data in tabular format like flat tables, cross-tabulation tables, geographical tables etc. published once a year.
Annual statistical abstract	Summary of statistical tables for all the users, inside or outside the ministry who need statistical data for reference purpose, like students, teachers, researchers, trust organisations etc.
Quick references	Short summary of annual statistical report which is for users who do not require details.
Indicators reports	Analyse system's performance which is to be produced on regular basis.
Online Institution Report Card	Presents statistical report for institutes, like, teachers, students, institution infrastructure etc.
Online District report Card	Analysis of all the institutes in a district with report on institute's infrastructure, teachers vacancy, students enrolment etc.
Online State Report Card	Provides complete picture of enrolments and drop-outs from all the institutes of the State.

Annual digest of statistics is a kind of year book which contains data in tabular format like flat tables, cross-tabulation table and geographical summary table. Flat table is used by EMIS to store all relevant data in one table where several variables are presented in columns as shown in Fig. 1. Such table is used for keeping data of a school, like, data in a spreadsheet. Cross-tabulation table shows data in two dimensions or with two categories where one variable is presented in two directions as shown in Fig. 2. It can be used to present data in abso-

Main type of NFE activity	Main type of NFE provider											
	Govt. Level 1	Govt. Level 2	Govt. Level 3	Co-op.	Public enterp.	Private enterp.	Education /training institute	Prof. assoc./ trade union	Religious mission/body	Nat. branch of internat. NGO	Local branch of national NGO	Local NGO
ECCE	25%	88.2%	100%	-	-	-	16.7%	-	-	100%	91.2%	44.9%
Literacy	75%	11.8%	-	-	-	-	83.3%	-	100%	-	-	39.3%
Equivalency schooling	-	-	-	-	-	-	-	-	-	-	-	-
Life skills training	-	-	-	31.9%	100%	-	-	29.4%	-	-	-	-
Income generation/ Non-formal vocational training	-	-	-	53.2%	-	-	-	70.6%	-	-	-	4.5%
Rural development	-	-	-	14.9%	-	-	-	-	-	-	8.8%	11.2%
Further education/ further professional development	-	-	-	-	-	-	-	-	-	-	-	-
Religious education	-	-	-	-	-	-	-	-	-	-	-	-
Cultural and traditional education	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%

Main type of NFE target group	No. of total courses (1)	No. of learners			No. of total learner-contact hours			Total expenditure (8)
		Male (2)	Female (3)	Total 2 + 3 = (4)	Male (5)	Female (6)	Total 5 + 6 = (7)	
Illiterates	35	680	250	930	224400	92500	316900	950700
Literates (basic level)	15	150	80	230	22500	9600	32100	128400
Literates (advanced level)	25	400	350	750	240000	210000	450000	2700000
Out-of-school children and school drop-outs	80	200	120	320	80000	48000	128000	96000
Marginalised adolescents and youth	5	80	50	130	1840	1250	3090	3090
Women and girls	8	-	1200	1200	-	15000	15000	22500
Rural poor	3	45	15	60	2250	750	3000	6600
Urban poor	-	-	-	-	-	-	-	-
Ethnic/linguistic minority groups	-	-	-	-	-	-	-	-
Groups living in special circumstances	-	-	-	-	-	-	-	-
TOTAL	171	1555	2065	3620	570990	377100	948090	3907290

lute numbers or percentage.

Fig. 1 Flat table [4]

Fig. 2 Cross-tabulation table[4]

Geographical summary table shows data for more than one geographical unit like villages or cities in a district etc. It presents the comparison percentage taking more than one variable for same geographical unit like villages as shown in Fig. 3.

Geographical unit	No. of courses (1)	No. of providers (2)	No. of enrolled learners (3)	No. of learner-contact hours (4)	Expenditure (5)	Average number of contact hours per learner 4/3 = (6)	Average expenditure by learner-contact hour 5/4 = (7)
Village 1	5	8	250	10000	300000	40	30
Village 2	9	6	135	67500	270000	500	4
Village 3	25	12	500	40000	600000	80	15
Total district	39	26	885	117500	1170000	132.8	10

Fig. 3 Data in Geographical summary [4]

Annual statistical abstract is summary of statistical data as shown in Fig. 4, for all end users whether user is a researcher or planner, teacher or student, who needs statistical data for reference purpose.

School List - Kumi

Number of Schools

EMIS Number	School Name	On EMIS Register	County	Sub County	Parish	Nr of Students	Nr of Teacher	Nr of Classrooms	PTR	POR
4561	Kocheka P.S.	✓	Bukedea	Bukedea	Kocheka	534	10	7	53	78
4562	Aligoi P.S.	✓	Bukedea	Kachumbaia	Aligoi	768	17	7	45	110
4563	Mukongoro Kotia P.S.	✓	Bukedea	Kachumbaia	Aligoi	800	10	8	80	100
4564	Kotia P.S.	✓	Bukedea	Kachumbaia	Aligoi	535	6	7	89	78
4565	Amus P.S.	✓	Bukedea	Kachumbaia	Amus	588	10	8	59	74
4566	Amus Sapir P.S.	✓	Bukedea	Kachumbaia	Amus	615	10	6	62	102

	State/UT	School Structure		Number of Districts Reported Data								
		Primary	Upper Primary	2001 Census	DISE							
					2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	
1	Andaman & Nicobar Islands	IV	VI-VIII	2	2	3	3	3	3	3	3	3
2	Andhra Pradesh	IV	VI-VIII	23	23	23	23	23	23	23	23	23
3	Andhra Pradesh	IV	VI-VIII	13	16*	16*	16*	16*	16*	16	16	16
4	Assam	IV	VI-VII	23	23	23	23	23	23	23	23	27
5	Bihar	IV	VI-VIII	37	37	37	37	37	37	37	38	38
6	Chandigarh	IV	VI-VIII	1	1	1	1	1	1	1	1	1
7	Chhattisgarh	IV	VI-VIII	18	18	18	18	18	18	18	18	18
8	Dadra & Nagar Haveli	IV	VI-VII	1	1	1	1	1	1	1	1	1
9	Daman & Diu	IV	VI-VII	2	2	2	2	2	2	2	2	2
10	Delhi	IV	VI-VIII	8	8	8	8	8	8	8	8	8
11	Goa	IV	VI-VII	2	2	2	2	2	2	2	2	2
12	Gujarat	IV	VI-VII	26	26	26	26	26	26	26	26	26
13	Haryana	IV	VI-VIII	18	19	20	20	20	21*	21	21	21
14	Himachal Pradesh	IV	VI-VIII	12	12	12	12	12	12	12	12	12
15	Jammu & Kashmir	IV	VI-VIII	14	14	14	22	22	22	22	22	22
16	Jharkhand	IV	VI-VIII	18	22*	22*	22	24	24	24	24	24
17	Karnataka	IV	VI-VII	27	27	27	33	33	33	34	34	34
18	Kerala	IV	VI-VII	14	14	14	14	14	14	14	14	14
19	Lakshadweep	IV	VI-VII	1	1	1	1	1	1	1	1	1

Fig. 4(a) Statistical data[10] and table 4(b) State wise statistical data[16]

Quick references reports:- are reports which provide statistical summary for end users who need quick summary instead of detailed data.

Indicators reports:- "An indicator is synthesized and analyzable information, presented in terms of a measurable value (such as a ratio, rate, percentage etc.). It can be used to describe how an education system functions and performs."4. This is to analyse information systems' performance which is to be produced on regular basis. Its objective is to identify progress made and problems come across by educational units at different level of administration. Thus it provides important information to planners, decision makers and likes to take correct course of action.

Online report cards, districts and states are also available by EMIS website in tabular format. Online reports are open for all end users by selecting options on user interface of EMIS web site. Countries all over the world publish data online either in statistical reports or raw data for schools or districts to provide more transparency in education management [7]. Table 2 lists the website link of EMIS of different countries and the formats of online data dissemination highlighting their key features.

Table 2. Different reports used by EMIS world wide

Country	Website Name	Data Formats	Features
USA	http://ilrc.ode.state.oh.us/	Spread-sheets,	District data, school building data, yearly data
California	http://dq.cde.ca.gov/dataquest/	HTML	Annual reports, enrolment and number of Institutes, institute's details etc
India	http://www.semis-online.net/DownloadData.html	PDF, HTML	State report cards, District report cards, Importing and exporting data, teacher's and student's enrolment report, analytical reports.
Texas	http://ritter.tea.state.tx.us/adhocprt/	HTML format	Students report, Geographic information, staff reports for districts, states and country
Pakistan	http://www.bemis.edu.pk/Districts.html	HTML	District reports, state reports,
Republic of south Africa	http://www.education.gov.za/EMIS/EMISDownloads/tabid/466/Default.aspx	Spread-sheet	nstitutes' data of districts, Educational statistics of Institute realities,
Inter-Agency Network on Education Simulation Models	http://inesm.education.unesco.org/en/explore/home	Work-book containing Spread-sheets	Data for Primary, middle, secondary, professional, formal or non-formal education system of Viet Nam, Nigeria, Dominican Republic, Mauritania, Morocco and Argentina

3 MAJOR ISSUES OF DATA DISSEMINATION IN EDUCATION SYSTEM

As EMIS disseminates data using different ways of reporting system and dissemination methods. Data is available on internet through EMIS website to provide information to end users like planners, administrators, researchers, policy makers, decision makers etc. EMIS also offer program to program transfer of data for end users like state or district by using client application. In such data transmission, end users need to employ special staff to install software and hardware components, use only client application provided by EMIS with database drivers and connectivity strings on same platforms to have complete compatibility on both sides. Such arrangement needs

regular modifications with every modification in EMIS system. There are many departments who would need data in different formats for further analysis. Here, we address the issues in the current data dissemination system in education management. The issues are as follows -

- *Education management provides data in different formats* like PDF, spreadsheets and HTML format which can be viewed and downloaded by end users. PDF format is the format which cannot be used in any other format to be analyzed by end users. Spreadsheets can be copied and parsed to any analytical software but specialists have to be hired to accomplish the analytical task. HTML format is not accepted directly by any of programming languages.
- *There is same data for all end users* like planners, administrators, schools, districts, states, ministries, researchers etc. which has same set of queries to retrieve educational information. Every end user has different requirement of data but data retrieval is almost same for all users which is sometime not relevant. Data retrieval is also in abundance which requires sorting before it is further analyzed.
- *EMIS gives direct data access through web site for registered users only.* Other users who are not registered are only provided with limited data available on EMIS web site and online year books. Students or researchers have to satisfy with defined tables or charts and face scarcity of data in such cases.
- *Registered users, like, institutes, districts or states are given facilities by few EMIS websites to upload or download data directly to EMIS database.* To download or upload data from EMIS database, registered users have to have same database and application as of EMIS end. They need to install complete computing environment for the same. End users are required to download same web application at their end as on EMIS side. Here an issue arises is the technical infrastructural arrangements. To access data from EMIS data base, drivers used on EMIS side have to be installed on end users' side as well. With every change on EMIS side, end users' side has to be updated "see Ref. 6". Heterogeneous databases access is also not possible with a web application because related database code needs to be written in each individual application "see Ref. 19". Thus *direct data transfer from application to application* is possible with current EMIS system which has lots of limitations.

To handle these issues, we introduce web service interface in education data dissemination system.

4 WEB SERVICE

Web service enables publishing of applications on the web to be used by any application across the web, independent of computing environments. Web service has three main components: - SOAP, UDDI and WSDL. Web service uses SOAP which is based on XML based message protocol. It supports interoperable machine to machine interactions using SOAP messages (www.w3.org). The transport protocols (HTTP, FTP, SMTP etc) used by web service are standard protocols on in-

ternet. Web service describes itself in Web services Description Language (WSDL) which is based on XML. It also describes its parameters, transport protocols used and how to invoke them. Third component is like a telephone directory; Universal Description, Discovery, and Integration (UDDI) which lists web services to be located by any user[3]. Thus web service leverages web standards and successfully adopted by all networks and programming languages.

Web services communication is not limited to any operating systems, programming languages, hardware configuration or communication protocol [8]. It leverages existing web standards to access data from remote databases through applications which require a small XML messaging client [6], [11]. It is web based application which can be published and accessible by users programmatically [1]. Thus web service provides interoperable interface for data access from data base.

Web service also provides interface to share data, data logic, metadata, business entities in a heterogeneous computing environments. It also eliminates the need of driver oriented communication because driver installed at database side can be accessible from client through web service. This facilitates direct access to data base irrespective of security, performance, scalability and reliability [19]. Data base connections can be shared among different client programs [8], [11], [19] to access data directly from remote database.

5 WEB SERVICE IN DATA DISSEMINATION IN OTHER DOMAINS

Web service data access method is being used by several departments successfully. Web services are used to improve the communication between government and common people. Several web services have been created for women, infant, family health data, employee tax details, child support obligations etc. from distributed database. One government web service can use another government web service to access data from distributed data base [1].

The YEAST Search for Transcriptional Regulators And Consensus Tracking information system contains thousands of regulatory associations between transcription factors and target genes. New regulatory associations were added with their experimental evidences and classifies as direct and indirect evidences. In such system, end users found difficult to query data based on data without evidences, with direct or indirect evidences. So, web service interface is used to make data available for end users by querying, retrieving and exploiting YEASTRACT database. Machine readable restful web service was designed to access data for user which is not limited to defined queries set. Users can add their own functionalities; develop their own views on data to retrieve required data[5].

Web applications are being used to access data from relational database through JDBC standard API which requires JDBC drivers to be used on both sides i.e. server and client. Web service can be deployed on server side and querying or updates on data base are possible through data base web service. Here client side computation will be done at server side. So web service interface on database would provide SQL based querying system which will return data to client in XML for-

mat. Also web service provides a database and driver transparent interface for client application [6].

Brazilian weather forecast and climate studies center (CPTEC) uses web service to compose queries to access data stored in CPTEC database. CPTEC has made data available on World Wide Web to be queried for different purposes like education, research, planning etc. Such kind of dissemination system needs expert staff to put queries on database. This data dissemination mechanism is not suitable for all users. Thus Brazilian weather forecast department has web service interface on database which needs moderate knowledge of programming to retrieve data for further analysis [18].

Web service is used in water resources management processes through WISDOM which is bilateral project between Germany and Vietnam. Wisdom is an Information system for the Meknog delta which covers spatial and non-spatial data collection and dissemination. Web service provides enough flexibility to access spatial data and rendered maps from related database [21].

Web service is used to extract information from SABIO-RK which contains information about biochemical reaction, their kinetics rate equations with parameters and experimental conditions. Various search criteria have been defined to comply with complex search queries through web service interface. They have both data access system, old one where web application is used to access data and new one where web service interface is being used. Web service offers much faster and convenient way to access database as compared to old applications [22].

Bhuvan cell of Indian National Remote Sensing center uses Open Geospatial Consortium (OGC) web services to query the database dynamically. OGC web service provides interoperability among distributed geospatial databases to access data [20].

Although web services are being used in different areas, our search for use of web services in EMIS did not yield any results. The existing EMIS database is open to be accessed directly by registered users with their login-id and password. Set of queries have been used to obtain data using web application. Web application is to be downloaded on client end and client fetches data from the remote database. The unregistered users have to be dependent on annual digests on website or published copy due to security reasons [2], [4], [9], [12], [13], [14], [21].

6 INTRODUCING WEB SERVICE FOR DATA DISSEMINATION IN EMIS

Web service interface for education system can be used for direct transfer of data from EMIS database to end user's database. Currently, special application is required at the end user's end, which can only be used by using database drivers with installation of special software and hardware. Web service creates web service client application which does not require special setup, as shown in Fig. 5.

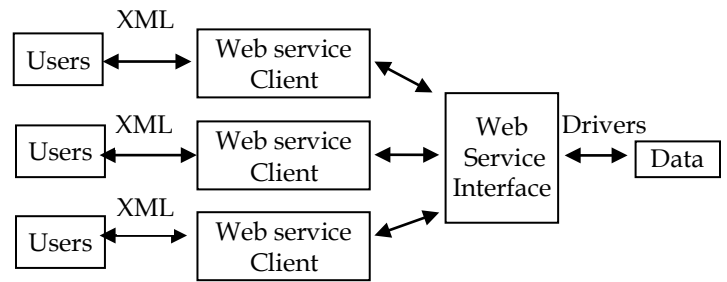


Fig. 5 Web Service based access to Database using Web Service Client application

The advantages of using web service are as follows:

- EMIS with web service interface can provide *data in different formats to satisfy the end users requirements*. In such type of interface, each format can be introduced with a web service on end users demand without re-designing of complete user interface. The web services dissemination system retrieves data in XML along with spreadsheet or PDF format. Spreadsheet or PDF formats are used by end users to view, print or download data to analyse it using charts or comparisons bars. End user will have the option for XML data retrieval which can directly be used in their analytical application for further analysis.
- Web service interface will also *facilitate end users to select the attributes for accessing required data* rather downloading complete data which is not always needed. Thus, it will be easier for end users to study the data for different purposes.
- The web service based system can be *designed for both types of end users: registered or unregistered*. Government has some policies to provide data for different end users. Thus with such kind of system, we can have separate facilities for accessing data by end users. Unregistered end users can be given view facility and registered end users can be given view and download both. Privileged end users can be given direct access of data i.e. *program to program*.
- End users can be provided with a set of web services, where they can choose as per their requirement. *End users are also provided with web service client application where web service functionality can be directly accessed by them*. They are free to use web service to fetch data from database to their application with the use of web service clients. For application to application data transfer, programmer only requires XML parsers, package details and connection strings to be used with web service client application⁶ which is present in WSDL. So that data received can be further used by end users as per their requirements.
- With the use of web service there is *no extra cost incurred* for setting up computing environments on both EMIS and end user's side. Data from EMIS is accessed in XML document with web service interface as compared to HTML data retrieval or spreadsheet and is

flexible to be utilised by end users in different formats through applications at their end. Queries are decomposed in simple and efficient way through web services. It also provides efficient interface in multiple user queries in parallel and manages multiple connections [7], [10]. XML queries are easy to understand so no extra cost for employing additional technical staff is required to be incurred by end users.

7 CONCLUSION

This paper presents survey on how EMIS disseminates data to end users like students, teachers, institutes, districts, states, researchers, planners, decision or policy makers, NGOs etc. From the survey we found that few countries provide user interface on EMIS website with set of queries to access database. Two types of end users may access data: registered and unregistered with the interface provided by EMIS. Data accessed is reported in specified formats like HTML, PDF or spreadsheets. HTML and PDF data formats cannot be directly utilized for further analysis by analytical applications. Direct application to application data transfer has also been provided but with limitations like hardware and software compatibility at both the ends. This paper also introduces web service to be used for data dissemination. This enables program to program data transfer in heterogeneous computing environment and provides access to the desired data in different formats to be further utilized by the end users.

REFERENCES

- [1] Abdelmounaam Rezgui, MouradOuzzani, AthmanBouguettaya, BrahimMedjahed Preserving Privacy in Web Services Proceedings of the 4th international workshop on Web information and data management WIDM '02, 2002
- [2] Ahmed A.Karim, Al Koofi (2007) A Study of How an Education Management Information System (EMIS) can be Effectively Implemented in the Ministry of Education in the Kingdom Of Bahrain from www.mirandanet.ac.uk/ejournal/uploads/590/EMIS.pdf, 2007
- [3] An Oracle White Paper Database Web Services from www.oracle.com, 2002
- [4] Criana Connal, Claude Sauvageot NFE-MIS Handbook-Developing a Sub-National Non-Formal Education UNESCO from <http://unesdoc.unesco.org/images/0014/001457/145791e.pdf>, 2005
- [5] Dário Abdulrehman, Pedro Tiago Monteiro, Miguel CachoTeixeira, Nuno Pereira Mira, Artur Bastos Lourenço, Sandra Costa dos Santos, Tânia Rodrigues Cabrito, Alexandre Paulo Francisco, Sara Cordeiro Madeira, Ricardo Santos Aires, Arlindo Lime de Oliveira, Isabel Sá-Correia, and Ana Teresa Freitas YEASTRACT: providing a programmatic access to curated transcriptional regulatory associations in *Saccharomyces cerevisiae* through a web services interface doi: 10.1093/nar/gkq964 *Nucleic Acids Res.*, 2011
- [6] Erdogan Dogdu, Yanchao Wang and Swetha Desetty A Generic Database Web Service International Conference On Semantic Web and Web Services, 2006
- [7] Gxwati The Education Management Information System of the Free State Department of Education - a systems analysis, Thesis from http://scholar.sun.ac.za/bitstream/handle/10019.1/6487/gxwati_education_2011.pdf, 2011
- [8] Han-Chieh Wei, Travis Godfrey (2006) Database Middleware and Web Services for Data Distribution and Integration in Distributed Heterogeneous Database Systems *Information and Knowledge Engineering - IKE*, pp. 24-29, 2006
- [9] L. Carrizo, C. Sauvageot and N. Bella Information tools for the preparation and monitoring of education plans U N E S C O from <http://unesdoc.unesco.org/images/0013/001323/132306e.pdf>, 2003
- [10] Marcia Bernbaum, Kurt Moses (2011) EQUIP2 Lessons Learned in education Education Management Information systems http://gec.fhi360.org/publications/EQUIP2/Lessons_Learned/EQ UIP2%20LL%20EMIS%20AAR.pdf, 2011
- [11] Mensah, Kuassi (2003) Web services enable your database: turn your database into a Web services provider and consumer Web Services *Journal* April, 2003
- [12] Michael Trucano (2006) Education Management Information System: A Short Case Study of Ghana from www.infodev.org/en/Document.502.pdf, 2006
- [13] Michael Trucano Education Management Information System: A Short Case Study of Mozambique" from www.infodev.org/en/Document.501.pdf, 2006
- [14] Michael Trucano Education Management Information System: A Short Case Study of Nigeria from www.infodev.org/en/Document.503.pdf, 2006
- [15] Mudassar Sajja, S Manzoor Hussain Shah Effectiveness Of Programme Monitoring And Implementation Unit (PMIU) In Providing Administrative Support To Secondary School ASIAN JOURNAL OF SOCIAL SCIENCES & HUMANITIES Vol 2. No. 1, 2013
- [16] NUEPA Elementary education in Rural India downloaded from <http://www.dise.in/Downloads/Publications/Publications%202011-12/Elementary%20Education%20in%20Rural%20India.pdf> 2011-12
- [17] Republic of Yemen Education Management Information System (EMIS) Indicators, Data Presentation, Use from <http://geip-yemen.org/files/22613.pdf>, 2006
- [18] Rogério B. Andrade, Luiza Nunes, Eduardo Batista de Moraes Barbosa, Nandamudi L. Vijaykumar and Rafael Duarte Coelho dos Santos A Web Service-based Framework for Temporal/Spatial Environmental Data Access 12th International Conference on Computational Science and Its Applications, IEEE, 2012
- [19] Seifedine Kadry An implementation of ODBC Web Service *Journal of Theoretical and Applied Information Technology* Vol. 26 No. 1, 2011
- [20] Sonal Aggarwal, Naresh N, Syed Shadab, Kalyan Deep K, Arulraj M and Harish C Karnatak Thematic Data Dissemination on Bhuvan OSGEO-INDIA: FOSS4G 2012- FIRST NATIONAL CONFERENCE 25-27th October 2012, @ IIIT Hyderabad, 2012
- [21] Tegegn Nuresu Wako Education Management Information Systems (EMIS) A Guide for Young Managers Harare, Zimbabwe NESIS/UNESCO from <http://unesdoc.unesco.org/images/0022/002206/220621e.pdf>, 2003
- [22] Ulrike Wittig, Renate Kania, Martin Golebiewski, Maja Rey, Lei Shi, Lenneke Jong, Enkhjargal Algae, Andreas Weidemann, Heidrun Sauer-Danzwith, Saqib Mir, Olga Krebs, Meik Bittkowski, Elina Wetsch, Isabel Rojas, and Wolfgang Müller SABIO-RK – database for biochemical reaction kinetics *Nucleic Acids Research*, Vol 40, Issue D1, Pp. D790-D796 doi: 10.1093/nar/gkr1046, 2012