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ICT Based School Mapping Application for Elementary Education in India

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Abstract: Policy implementation through proper planning, devised by sound methodological practices in India have always been challenging due to demographic and socio-economic diversities. In this context, any investigation into the use of ICT in education would generate additional knowledge on educational impact of investments in ICT applications in education. School mapping serves as an appropriate decision-support tool for planning for universalizing access in the school education sector. The current study, however, looks into aspects of ICT applications in educational planning techniques and methods, with focus on planning for universal access and participation in school education.
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Keywords: ICT based school mapping, Right to Education, distance matrix, National University of Educational Planning

1. Introduction

School Mapping is a well accepted and longstanding approach to the planning of school locations, and is also used to investigate and ensure the efficient and equitable distribution of resources within and between school systems when large-scale reform or significant expansion of an education system takes place (Hite, 2008). For a long time policy implementation was not given an appropriate interest theoretically and practically. It was taken for granted that any policy or plan would be successfully implemented once the decision or plan is made, even though sometimes it is difficult to make rational decisions in the absence of alternative choices. Primary education in India is predominantly funded and managed by the government. Therefore, investment decisions by the Government determine the pattern of expansion of educational facilities. Over a period of time it is noticed that certain areas are more endowed with school facilities than other areas. School mapping is an essential planning tool to overcome possibilities of regional inequities arising from the investment policies of the public authorities. ICT have a significant impact in education transformation, efficient ICT based applications for policy planning and implementation can save huge time and resources. The current study looks into the general trends in policy planning and ICT applications in education used in India; and the application of ICT in planning techniques and methods, with focus on planning for universal access and participation in school education.

2. Research Objectives and Methodology

2.1 Research Objectives

Keeping the scope of the study in view, the specific objectives of the study are as follows:

- To look into the level of ICT applications in education, particularly for improving access, classroom practices, school effectiveness and planning and management practices in the school education sector on the basis of review of available literature at the global and national levels;
- To assess the current level of ICT applications in planning for ensuring equitable access to school education in general and elementary education in particular in India; and

- To develop an ICT application to improve the school mapping technique that uses distance matrix and validate the same at the elementary level of education in one of the sub-district level units (viz. community development block) in Uttarakhand.

2.2 Research Methodology

ICT Application for school mapping that uses distance matrix is developed in Active Server Pages (ASP.NET) of Visual Studio 2008 and SQL Server 2008 platforms. The development of the ICT application has closely followed the steps involved in operationalzing a school mapping exercise. The application then has used relevant primary and secondary data collected from the field for its empirical testing and validation in the selected block. The school mapping steps along with distance matrices have been coded in application. The application is made on client/server model. The major steps involved in methodology are:

- On site observation, interviews of stakeholders and survey methods are adopted in collecting qualitative data i.e overall status of school mapping in India and quantitative data i.e literacy rate/ enrolment rate /retention rate/ dropout rate, number of teachers, teacher pupil ratio, building and infrastructure facilities, assessment the number of children to be enrolled, distance data between habitations, listing of habitation(s)/village(s) to identify school served areas, habitation wise population data and identification of available schools of all management types.
- Processing the data using the ICT application developed by the investigator, mainly for identifying the catchment area of the existing primary and upper primary schools/sections;
- Creation of a distance matrix of un-served habitations in the identified villages within the block based on state RTE norms and upload distances between all habitations in the matrix but diagonal of matrix remained 0.
- The above original matrix was then translated into a norm-based zero-one matrix n* n i.e., for primary school distance < =1.0 km = 0 and distance > 1.0 km=1; for upper primary distance < =3.0 km = 0 and distance > 3.0 km=1.
- Highlighted the availability schooling facilities in the Zero, one Matrix.
- Generation of Catchment Area of schools i.e 0/1 matrix showing habitations covered by schools.
- Generation of reduced matrix is done by eliminating the habitations located in the catchment area of existing schools. In the reduced matrix, filter for identifying the column with maximum number of zeros (i.e. cluster of largest number of habitations) applied to generate the first option for locating new school. Then all those habitations that fall in the catchment area of this proposed school are deleted (from both columns and rows) from the reduced matrix resulting in another smaller reduced matrix of un-served habitations. The same process is again follows to identify the second proposed location for establishing a school, which serves the second largest cluster of habitations in the reduced matrix. Same process of elimination of habitation again follows. This process continues till all un-served habitations eligible for establishing new schools were identified from the reduced matrix. This process is called spiraling for generating options for locating

3. Literature Review

Literature on school mapping with respect to implementation of the technique in India is very limited. Apart from the UNESCO/IIEP efforts to popularize school mapping in decentralized educational planning since1970s, NUEPA, New Delhi has contributed to the literature in introducing the concept of distance matrix in SM for optimization of investments in school education following the existing development policies, norms and standards (Varghese, 1997). SM, therefore, has become an institutional requirement for enforcing RTE Act, 2009 in India. Therefore, in recent years, with the implementation of large scale education reform programme it has now become mandatory for states and union territories to carry out SM. As such, several states in India are using SM for planning for school education, particularly at the compulsory level of education. However, in the recent past many states in India have implemented GIS based SM but have no clarity as to how GIS can help them carry out the SM and would it be able to meet the requirements of SM. As a result, the outcomes of GIS based SM in states, often, have become misleading. There is, therefore, a need to gain an in-depth knowledge of the

ICT application/GIS in SM that uses the distance matrix in India for improving its use and effectiveness and generating dynamic layers of maps to analyze school networks and provisions in an administrative/geographical unit on the basis of geo-spatial, demographic and EMIS data. Besides the on-going SM in all states and union territories as part of enforcement of universalization of school education through SSA(Serva Siksha Abhiyan) and RMSA(Rashtriya Madhyamik Siksha Abhiyan), there were attempts in the past in India to carry out SM under various large scale education development programme and projects like District Primary education Project (DPEP), Lok Jumbish etc.,

4. Operationalization of SM

ICT based SM application is operationalized in Doiwala block of district Dehradun, Uttarakhand, India, to validate developed functionalities of SM at local level. Here the non-hilly region was selected for SM exercise, all 55 habitations covered under 11 gram panchayat were taken for study. In this exercise, the revenue villages have been named as V1, V2, V3, V4, ……,V17. The habitations have been coded with reference to the respective revenue villages in which they are located. Accordingly, the habitations have been named as VIH1, V2H1, V3H1, V3H2, V4H1, V4H2, V4H5, V5H1, V5H2…….V17H1. The matrix of 55*55 is prepared covering almost 20 kms from first habitation i.e VIH1 to last habitation i.e V17H1 apart from habitation information available schools of all management types (i.e Govt, Private, Aided). All steps as discussed in methodology are followed to arrive at the following new schools recommended in system generated habitation(s)/location(s) for new PS(primary schools) with their catchment area and population: see system generated Figure 1.

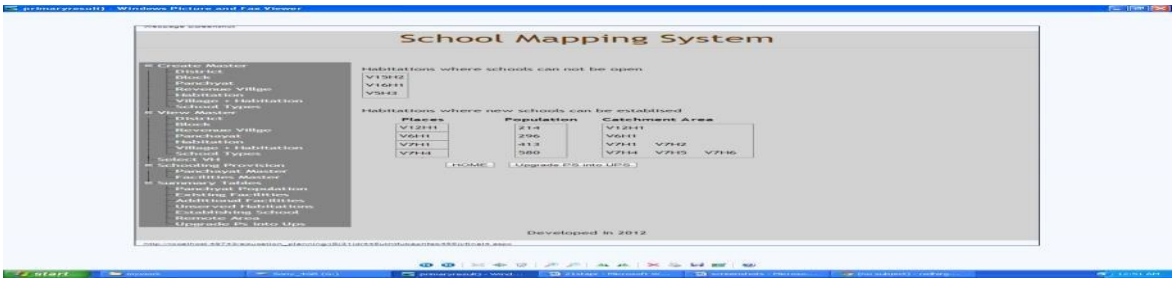

Figure 1. Final Inferences for PS

5. Conclusion

This study contributes by providing cost-effective, user-friendly real time ICT based school mapping application to improve the existing SM methodology for planning for access in school education in India. One of the important policy implications of the study is that, in order to make successful use of ICT in enhancing the reach and quality of teaching and learning, the policies need to be systemic, aligned with national needs and priorities within the nation's developmental context.

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