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A Study On Synthesis Of New Strategies To Elevate Learning Resources Center In India: With Special Reference To Karnataka

Mamata

RESEARCH SCHOLAR, SRI SATYA SAI UNIVERSITY.

Dr. Arun Modak

RESEARCH SUPERVISOR, SRI SATYA SAI UNIVERSITY.

ABSTRACT

Today, technology is being used for distance education programs in elementary education in attempt to improve teaching–learning processes in classrooms. Governments and international agencies are collaborating to develop and implement technology based educational tools across regions. These are aimed at complementing the regular teaching–learning processes in school education for improving the learning outcomes of students. The premise of utilizing technology based solutions to provide quality education at low cost is supported by research evidence.The range of technology in education has evolved steadily. It comprises use of computers, radio, multimedia players, and a range of wireless devices that can be used across regions by providing both audio and visual facilities for exchange of instructions. The role of the worldwide web/internet has grown immensely as it helps minimize the costs in reaching millions of students across geographical regions. In the context of Indian education system, states that the choice of a particular technology—be it television, radio, computers, or others— must be guided not merely by its availability or wide accessibility, but by the innate characteristics that make it appropriate for the educational goals, curricular objectives and pedagogical styles we want to promote on a large scale, in keeping with our National Curricular Framework.In elementary education, the use of high quality radio programs have been found to be successful for expanding access and quality of elementary education and teacher training inKarnataka. The radio interventions are used for both conventional school settings and also for children who are out of the schooling system. Radio is used to teach children who are not in school, who are affected by conflict, who are orphans, who live in countries where most social systems have broken down or never existed—the poorest, least supported and most remote learners to whom access to education

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has traditionally been denied. It is also is used in systems of huge scale, such as the 20+ million learners in Karnataka in India.

KEYWORDS: Learning Resources, India, technology, education programs, Karnataka, teacher training, India.

INTRODUCTION

India has more than 1.6 million schools, of which more than 70% are public (i.e. government) institutions. These government schools typically cater to children from the most marginalised sectors of Indian society as they offer free tuition as well as a range of support services, such as free textbooks, free school uniforms, lunch, bicycles and scholarships. Government schools face serious challenges in terms of the quality of education offered. The Annual Status of Education Report, a nationwide study conducted by the non-governmental organisation Pratham, concludes that an unacceptably large percentage of children are unable to undertake even basic reading, writing and arithmetic. Moreover, the study also claims that around 70% of children in India do not pass Grade, and many of those who do, lack basic life skills and competencies. Some reasons for the poor quality of learning in India are sociocultural. India has the largest population of illiterate adults in the world; hence, many of the children who are currently attending school are first-generation school who receive little or no support at home. Other factors impacting upon the quality of learning are pedagogical and structural, such as the limited availability of curricular resources, inadequate school infrastructure and inadequate teacher professional development (TPD), all of which create an impoverished learning environment. When assessing the current state of Indian education, it is also important to consider the fact that universalisation of school education only received serious attention in India following the 1986 National Policy on Education.

India operates on a federal government system, with the federal (central) government functioning at the national level and provincial (state) governments operating in each of the country's 29 states. To support schools, the Indian education system has institutions established at central, state, district and block5 levels. Education is a "concurrent subject", meaning that both central and state governments can legislate and implement educationpolicy and programmes. However, in practice, the central government role is restricted to macro-policy aspects such as curricular frameworks, and actual implementation is undertaken by state governments. Within the central government, the Ministry of Human Resources Development (MHRD) is responsible for education. The MHRD has different departments

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responsible for basic and higher education, which work with their corresponding departments in state governments. The state of Karnataka is the focus of this study. Its education structure is similar to other states and it has a Department of Education, which has structures/institutions at the state, district and block levels. Table 1 provides an overview of education administration and academic support structures in India.

Table 1: Overview of Indian education administration and academic support structures

Level of administration	Name of the administrative/ governing authority	Name of academic support institution	Number of institutions in India	Number in Karnataka
National	Ministry of Human Resource Development, Government of India	National Council of Educational Research and Training (NCERT)	1	N.A.
State	Department of School Education, Government of Karnataka	State Council of Educational Research and Training	29	1
District	District Education Office	District Institute of Education and Training (DIET)	Roughly 683	30
Block (taluka)	Block Education Office	Block Resource Centre	Roughly 6 000	176

Academic support institutions, such as DIET and the Block Resource Centre, are distinct from the administration institutions at each of these levels, and high levels of collaboration across institutions are required for coherent functioning. The size and complexity of the system makes coordination amongst the actors within the education system (teachers, teacher educators and education administrators) quite challenging, which has an influence on the efficiency of its overall function. Table 2 provides information on the number of schools, teachers and students in India and Karnataka in order to provide a sense of scale and the relative positioning of Karnataka in the national system.

Table 2: Number of teachers, schools and students in India and Karnataka state

	India			Karnataka state		
	Government	Private	Total	Government	Private	Total
Schools	1 180 622	498 645	1 679 267	50 934	25 780	76 714
Teachers	5 349 263	4 047 655	9 396 918	226 148	197 129	423 277
Students	135 887 920	100 080 588	235 968 508	5 065 175	5 047 563	10 112 738

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REVIEW OF LITERATURE

Ho and Thukral (2015) found that exposure to Interactive Radio Instruction (IRI) is associated with higher levels of student achievement, consistently producing learning gains among its participants of diverse ages and in diverse settings. In Haiti, Zambia and Sudan, IRI mathematics instruction has shown positive results with respect to pre- to post-test gains. Even for early learners, IRI has proved to improve not only increase in access to education, but more importantly, improve student achievement.

Kurrien (2017) brings out the findings of the radio program, "We Learn English". It was a bilingual radio program for teaching spoken English in urban and rural schools across various parts of India. The initiative was by the Center for Learning Resources, Pune, for the period 2000–2008. The program had a substantial impact on large numbers of urban and rural students studying in government schools, helping them to start speaking and expressing themselves in basic English. And this was possible despite the fact that their teachers themselves could not speak English. Neither were these students—a large proportion coming from poor families—exposed to any English at all in their homes or in their neighborhoods. Furthermore, improved oral ability indirectly influenced improvements in writing skills. Kurrien further highlights that it is important to note that in the Center for Learning Resources (CLR's) radio projects for teaching English, it was not classroom teachers' competence in subject matter but their professional commitment to students that determined the significant gains in learning.

Ho and Thukral (2014) mention that the most remarkable result in primary learning was seen in an English-language program in Pakistan, where the average student outranked all or almost all of his or her peers in non-IRI classes. The Centre for Budget and Policy Studies (CBPS) has not conducted a sample study in English for the 30 schools that it observed in Karnataka. Hence, it would be logical to rely on evidence to suggest that performance of students in English could be a possible area of future research.

LINGUISTIC DIVERSITY

The 2001 India census6 data indicate that 13 languages are spoken by more than 10 million native speakers, 30 languages are spoken by more than a million native speakers, and 122 languages are spoken by more than 10 000 people in the country. India is organised into states based on the language spoken and the Indian education system is also linguistically diverse. Typically, each state has one main language, spoken by the majority or at least a

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large percentage of its population. Invariably, many people in the border districts of any state also speak the major language of the neighbouring state. Indian education policy (Ministry of Law and Justice, 2009) requires that the state offer education with the first language of the learner as the medium of instruction. The state education system typically offers instruction in at least two languages – the official state language and English. In border areas, schools also offer the language of the neighbouring state as a medium of instruction. In Karnataka, apart from Kannada (the state language of Karnataka) and English, government schools offer instruction in Urdu, Telugu, Tamil and Marathi languages; these are also the languages spoken in Telangana, Andhra Pradesh, Tamil Nadu and Maharashtra, respectively, which border on Karnataka state.7 The multilingual nature of Indian society (and of the Indian education system) therefore provides a compelling context for OER adoption in multiple languages.

TECHNO-SOCIAL FACTORS

The term "techno" in this context refers to digital technologies, including infrastructure, devices, connectivity and software. The design and uptake of digital technologies is influenced by the social contexts in which they are utilised. At the same time, digital technologies also influence social contexts. Vespignani (2009) states: "We live in an increasingly interconnected world of techno-social systems, in which infrastructures composed of different technological layers are inter-operating within the social component that drives their use and development." The term "techno-social" in this study thereforerefers to the interrelationship between digital technologies and teachers' use thereof in OER adoption. Reports from the International Telecommunications Union, the United Nations body responsible for global communications, reveal the poor availability of information and communication technologies (ICT) in the Global South in terms of physical access to ICT infrastructure, capacity-building for access and use, and maintenance of ICT infrastructure to enable continued access. The "Individuals Using the Internet 2005 to 2014" report8 suggests that there is a large gap between developed and developing countries with regard to key ICT indicators. The availability of digital technologies is poor in Indian households and schools, and the lack of ICT infrastructure is a defining feature of the Indian education system.

OUTSOURCED ICT IMPLEMENTATION

The ICT Schools programme of the government of India9 aims to provide ICT infrastructure to all high schools in the country and has been outsourced to vendors in most states, including

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Karnataka. In this outsourcing model, the programme is implemented and managed by a private company which supplies the computers, sets up the labs, appoints and manages the ICT teachers, and provides the content for the ICT classes. The state of Kerala is an exception in this context, in that it chose to implement its ICT programme through the teachers in the education system. The outsourcing model of implementation is widely regarded as a failure and state governments are open to exploring alternative models where ICT education is delivered by regular teachers. A study by the Central Institute of Educational Technology suggests that ICT use may not simply follow its provisioning. ICT integration processes therefore need to be carefully designed in order to encourage teacher use and participation (CIET, 2015).

TEACHER NETWORKING FOR PROFESSIONAL DEVELOPMENT

In India, the provision of a school within or close to every habitation is a policy requirement. The SarvaShikshanaAbhiyaan (MHRD, 2008) (or "universal education") programme of the central government, adopted by all provincial governments, requires that lower primary education facilities (grades 1–5) and upper primary schools (grades 6–8) be located within 1km and 3km of every habitation, respectively. This has resulted in the public school system being vast and dispersed. Teachers therefore seldom have contact with their peers in other schools or with other educational institutions. It has been recommended that spaces for sharing teaching experiences be recognised as an important principle of in-service teacher education (NCFTE, 2010). There is therefore a need to study how a technology-enabled professional learning community (PLC) where teachers network virtually can support OER adoption and teacher development by reducing teacher isolation and enabling peer learning. In other words, there is a need to understand in what ways collaborative, "bottom-up" approaches by teachers working together to adopt resources can provide an effective OER adoption model, and whether such collaboration can influence TPD and teaching practices.

LOW LEVEL LEARNING OUTCOMES AT ELEMENTARY STAGE IN STATE RUN SCHOOLS IN KARNATAKA

India faces the biggest challenge of providing quality elementary education to all children. The issue of quality has many dimensions: academic development and related learning outcomes along with the development of creativity, life skills, confidence, and the desire to learn and negotiate, all of which are part of the quality of education. Assessing these dimensions of quality is equally a challenge. The most easily available indicator to measure

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quality is learning outcomes. Karnataka, one of the better performing states in India with respect to Gross State Domestic Product, still faces challenges in providing quality elementary education. In 2008–09, the state stood 16th in the overall ranking of the Education Development Index (EDI).1 Looking at the performance of the students in the elementary schools of the state in the period 2005–08, the Karnataka State Quality Assessment Organization (KSQAO) shows that average state performance has improved from 50 percent to 72 percent. But the Assessment Survey Evaluation Research (ASER) survey shows a lower level of performance at 36.8 percent in 2005–06, which rose to 60.6 percent in 2008.

Table 3: Overall Learning Achievement (%) at Elementary Stage in Karnataka (2005–2008

Year	KSQAO	Pratham/ ASER
2005–06	50	36.8
2006–07	63.8	41.5
2007–08	71.2	57.2
2008	71.74	60.6

In 2007–08, 16 of the 32 districts of the state fell in the high performing range while the remaining 16 districts were categorized as low performing districts by the (Report, 2007–08). Similarly, the AESR 2005–08 reports categorize 14 districts as low performing.

The Economic Survey 2010–11(Government of Karnataka) mentions that: While the state needs to be commended for its improved rank position both in access and infrastructure at the upper primary stage, it is teacher index and outcome index of the EDI which show considerable decline at this stage. In lower Primary Education, the performance in access, infrastructure and Teacher is appreciable but the outcome is not satisfactory. This clearlysuggests that the state needs to consolidate the gains of primary education with focus on quality to sustain improvements in upper primary education. The latest survey by the National Council of Educational Research and Training (NCERT) for Class V students in government schools was undertaken in 2010. While Karnataka scores better than average for the states that were included at the same point of time, the scores are low by international standards. Gender differences in all subjects—reading comprehension, mathematics and environmental science (EVS)—are insignificant and rural– urban differences are notable for reading, which is better for rural areas as compared to urban areas. However, the ASER survey, which is not as rigorous as NCERT as it is based on a very limited number of test items and administered at home rather than the school, gives a slightly different picture.

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Table 4: Learning Achievements in all Elementary Grades, Karnataka

Reading Results	Nothing	Letter	Word	Para	Story
2006	7%	14%	16%	24%	39%
2008	5%	13%	17%	19%	46%
2011	5%	15%	17%	19%	45%
Arithmetic Results	**Nothing**	**Number Recognition_1**	**Number Recognition_11**	**Subtraction**	**Division**
2007	6%	13%	31%	26%	24%
2008	5%	13%	32%	27%	23%
2011	4%	13%	28%	28%	26%

According to ASER (2011) data, 59.7 percent children in Karnataka "can read standard one text and more" in Classes three to five, and 47.5 percent children enrolled in the same Classes "can subtract and more". This is slightly higher than the national average of 57.5 and 46.5, respectively, for the same Classes. As per the ASER, reading as well as numerical competencies in rural Karnataka are worse than in urban areas, a conclusion contrary to the NCERT survey. However, at the same time, rural Karnataka is better than the all-India average for rural areas. What is evident, however, is that although there are variations in data from different sources, and Karnataka is slightly above the national average in most cases, the learning outcome levels are generally low and therefore no cause for celebration. Table 2 shows that there has been no significant change over the years. In reading results, the state has witnessed only marginal changes over the period 2006–11 in both language and arithmetic results.

The state has been taking a number of steps to strengthen the capacities of teachers in handling classroom transactions in an effective manner and improve the outcomes. In-service training, audio and visual technology aids, and a host of innovative techniques have been introduced under the Sarva Shiksha Abhiyan (SSA), the main flagship scheme for achieving universal basic education in India. Karnataka has been one of the pioneer statesto adopt technology based solutions in teaching and learning processes at the school level by introducing radio and audio based interventions in elementary schools in 2004–05.

INTERACTIVE RADIO/AUDIO INTERVENTION IN ELEMENTARY SCHOOLS OF KARNATAKA

In 2004, the Government of Karnataka (GoK) was approached by the Education Development Centre, Inc (EDC), a global non-profit organization, to pilot radio interventions

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in Karnataka. The EDC had experimented with the idea of using radio as a medium to help students and teachers improve learning outcomes on a scale basis across various parts of the world (Somalia, Sudan, Malawi and Pakistan), and hence had the desired experience and expertise. The EDC has designed, delivered and evaluated innovative radio programs to address some of the world's most urgent challenges in education, health and economic opportunities. It was well received by the state level representatives of the SSA (2010), resulting in the collaboration between the EDC and the SSA for designing and implementing the radio programs based on school curriculum for all Kannada-medium elementary schools in the state. The intervention was known as Interactive Radio Instructions (IRI) and was implemented from the year 2005–06. The main objective of the IRI program varied from country to country. 4 In Karnataka it was adopted to supplement the existing teaching system so as to help teachers teach and students to learn the so-called "hard spots" as identified in the existing curriculum. With the existing infrastructure, it was felt that radio could be a cost effective tool to reach a large number of government schools with low expenditure and comparatively larger reach. The IRI are prerecorded programs based on the school curriculum. They are aired through satellites and radio is used for the broadcast of the programs. The content was designed after a detailed analysis of the requirements of the targeted students and teachers. Teachers are trained to conduct the radio classes and are provided with guides and reference material to operate a radio class.

The special features of this intervention include:

- Instructional tool especially designed to deliver active learning by radio.

- Identifies radio as a potential tool for learning and dissemination.

- Usually 30-minute audio lesson allowing students and teachers to react verbally and physically to questions and exercises posed by radio characters.

- Use of imaginative local themes, songs, games, role plays and activities which unite the children at the local level so as to help them overcome difficulties in learning the curriculum; it also enhances teachers' capacity to impart the so-called "hard spots".

- Interactive session between teachers and students through pauses that are a part of the radio programs.

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Karnataka also has a significant number of Urdu-medium schools (Table 3), and teachers of Urdu demanded a similar intervention for their schools. However, due to fewer Urdumedium schools, the SSA decided to provide them with Urdu programs in CD format along with multimedia players. This was known as Interactive Audio Instructions (IAI). In 2007, theSSA funded the initiative and the EDC designed the Urdu-medium programs for Classes IV and V in three subjects: mathematics, science and social science. A needs analysis was done with Urdu teachers and resource persons, leading to the adaptation of resource materials.

Table 5: Schools in Karnataka by Medium of Instruction

Schools by Medium of Instruction	Number of Lower Primary Schools in Karnataka	Number of Higher Primary Schools in Karnataka
Kannada Medium	25859	23631
English Medium	NA	2944
Marathi Medium	443	613
Urdu Medium	2392	1973
Tamil	53	144
Telugu	63	76

The IAI and IRI are similar in approach, content and objectives, the only difference being the medium of dissemination. Unlike the IRI programs where a radio is used, the IAI program uses a multimedia player.

Table 6: Coverage by IRI and IAI Interventions in Karnataka

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Coverage in Karnataka	Interactive Radio Instructions (IRI)	Interactive Audio Instructions (IAI)
Schools Covered	47,000 Kannada-medium Elementary Schools	2,294 Urdu-medium Elementary Schools
Students Covered	5,725,006	106,159
Teachers Covered	68,163	19,587
Subjects Covered	Kannada, English, Environmental Science, Mathematics, Social Science	Maths, Social Science, Environmental Science
Classes Covered	I to VIII	IV and V
Radio Programs	Chinara Chukki (I,II,III) Chukki Chinna(IV and V) Keli Kali (VI-VIII)	Chukki Chinna (IV and V)
No. of Programs (Annual)	290 Programs	50 Programs

THE ANNUAL COST ESTIMATES FOR VARIOUS OPTIONS

The CBPS study highlighted certain gaps in the delivery and recommended some changes in the implementation process to make the intervention more effective. The next section on effectiveness discusses these aspects in detail. Here, we present the cost analysis in terms of improving the present model, taking those recommendations into account. This estimate therefore refers to Policy Option 3 mentioned in the framework in the previous section. This estimate is based on 2012–13 prices. The qualitative information collected during our study forms the basis for estimating the costs for improvement. These additional costs are mainly for improving monitoring, evaluation and provisions for maintenance as these components were found to be particularly weak. We will discuss these improvements in detail at a later stage. The following heads have been added for improvement:

•Printing and distribution of schedules, teacher guides (recurring - annual).

•Training of teachers, support officials, members of school development and management committees etc. (recurring, annual).

•Monitoring and evaluation both by department officials and a third-party independent evaluation (recurring—once in three years).

•Regular funds for maintenance of equipment (recurring—annual).

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The estimation for the annual recurrent expenditure shows that per child cost without improvement is very low, at less than two rupees for the radio mode for Kannada-medium schools. Per child cost for the audio mode for Urdu-medium schools is more than ten times higher. However, when one adds the improvement costs, which include teacher-training and support materials, maintenance grants and training for academic as well as local community monitoring, the per capita costs go up significantly for both the modes and the difference comes down drastically (Table 7).

Table 7: Annual Cost Estimates for the Present Model with no Change and with Improvements

Annual Cost Estimates at 2012–13 prices	IRI (Radio)		IAI (Audio)	
	Total in Rupees	Per Student Expenditure in Rupees	Total in Rupees	Per Student Expenditure in Rupees
Option 1: Present Model* without Improvements	10283500	1.79	2318200	21.84
Option 2: Present Model with Improvements	306878300	53.60	6325200	59.58

Cost estimations for changing the delivery mode to all Kannada-and Urdu-medium schools either through radio or audio show that audio is definitely not a desirable mode for any school as the per student cost rises sharply (Option 4). On the other hand, despite the small number of Urdu-medium students and high broadcast fees, the radio mode is much lower (Option 3), although still higher than the estimates for the present model with improvements (Option 2). The difference between Options 2 and 3 does not appear to be very significant, even though the costs are lower for Option 2 (Table 8. The choice of options would of course take into consideration the outcome and the ease of implementation, in addition to the costs.

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Table 8: Comparison of Annual Costs for all Five Policy Options

	Total Annual Expenditure in Rupees	Per Student Expenditure in Rupees
Option 1: Present Model* without Improvements	12601700 (IRI + IAI)	2.161 (Average Cost to State)
Option 2: Present Model with Improvements	313203500 (IRI + IAI)	53.72 (Average Cost to State)
Option 3: All Kannada-and Urdu-medium Schools with Radio	316416400	55.27
Option 4: All Kannada- and Urdu-medium Schools with Audio	37559200	353.8
Option 5: Closing Down the Intervention	0	0

Benefit Incidence Analysis in the Elementary Education Sector in Karnataka

As the Public Budget Analysis of Education in Karnataka by CBPS shows, Karnataka has invested a great deal in elementary education, as is apparent from the real increase in its allocations over the past one decade. The Sarva Shiksha Abhiyaan (SSA), the national program for achieving universal basic education, started in 2001, also contributed to this trend. Out of the total estimated population of 4.8 million children in the 6 to 10 years' age group, approximately 92 percent were attending school in 2001 (Census of India, 2001, Government of India). The attendance ratio for this age group has shown a consistent increase. However, there are concerns related to age group, location and gender. The latest report of NFHS-3 for 2005–06 shows that 73 percent of children aged between 6 and 17 years in Karnataka (78 percent in urban and 71 percent in rural areas, respectively) attend school. Eighty-nine percent of primary-school age children (6 to 10 years) attend school (92 percent in urban and 88 percent in rural areas, respectively), which drops to 77 percent for children in the age-group11 to 14 years and to only 40 percent for children in the age-group 15 to 17 years. Also, the report mentions that among children aged 6 to 10 years, there is a small degree of gender disparity in school attendance in favor of girls in urban areas and in favor of boys in rural areas. Gender disparity in school attendance in favor of boys increases with age, but only in rural areas. In the age group 15 to 17 years, a much higher proportion of boys (45 percent) than girls (27 percent) attend school.

CONCLUSION

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In the large public education system in India, as elsewhere, teachers have traditionally been very isolated. Schools tend to be geographically dispersed and there is often only one subject teacher per subject in each school. Teachers rarely have an opportunity to meet with other teachers teaching the same subject. Traditional teacher development processes do not therefore tend to offer much scope for interaction and peer learning. This research project has demonstrated that virtual networks can offer opportunities for teachers to connect with one another for peer sharing and learning. Such a PLC can also be a space for OER access and adoption, which can counter the "minor technician" role usually expected of a teacher by the education bureaucracy. A collaborative OER adoption model embedded within a PLC can provide the context for the community to come together and support a systemic model of OER adoption within a public education system. A FOSS environment can also encourage teachers to freely explore and connect digital means and ends. Teachers in this study found the creation, revision, remixing and redistribution of resources on mailing lists and the KOER platform both interesting and useful. This has made a positive impact on their digital habits and has affected the techno-social habits of certain teachers in Karnataka. It has also supported their professional development, as evidenced by their reflections on the learning that has taken place through community interaction. The nature of these discussions has enabled teachers to see the value of an online community for accessing and sharing educational resources.

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