

STRATEGY FOR SKILL DEVELOPMENT THROUGH OPEN SCHOOLING IN INDIA



**National Institute of
Open Schooling**
(An autonomous Institution under
MHRD, Govt. of India)

STRATEGY FOR SKILL DEVELOPMENT THROUGH OPEN SCHOOLING IN INDIA



National Institute of Open Schooling

(An autonomous Institution under MHRD, Govt. of India)

A-24-25, Institutional Area, Sector-62, Noida, U.P.

Strategy for Skill Development through Open Schooling in India

Prepared by Mohan B. Menon, Deputy Vice Chancellor (Academic-OCL), Wawasan Open University, Penang, Malaysia on behalf of the Commonwealth Educational Media Centre for Asia (CEMCA), New Delhi.

Critical Reviewer: Ashok Gaba

Language Editing: Kavita Phookan

Acknowledgements:

We are thankful to the Commonwealth Educational Media Centre for Asia (CEMCA) for organizing the national consultation workshop on developing implementation strategy for National Vocational Education Qualification Framework (NVEQF) through open schooling, and bringing together all the stakeholders to reflect and discuss the potentials of technology-mediated, open and distance learning. We sincerely recognize the contribution of all the participants in the workshop, and especially Prof. Mohan B. Menon for developing this strategy paper and facilitating the workshop deliberations. We are also thankful to Dr. Ashok Gaba for his critical reading of the document and providing valuable comments.

ISBN 978-81-92-8809-1-4

© National Institute of Open Schooling (NIOS)

This publication is made available under Creative Commons-Attribution-Non-Commercial-Share-Alike license. For details see <http://creativecommons.org/licenses/by-nc-sa/3.0/>

March, 2014 (100 copies)

Published by the Secretary, National Institute of Open Schooling, A-24-25, Institutional Area, Sector-62, Noida, U.P. and Printed by M/s Sachdeva Printing Press, A-50, Govind Park, Delhi-51.

FOREWORD



There has been an exceptional growth in the development and use of open, flexible, distance, and blended learning approaches across the world. Due to rapid growth of knowledge, it becomes important for the next generation to be aware about how they learn in a changing global environment. We know that learning is situational. It means that learning outcomes of individuals strongly depend on the situation in which they learn, particularly in vocational education and training programmes. While the learners should be aware of their own contexts and situations, the pedagogy learning activities designed for delivery of vocational education is equally important. Open schooling system can be successfully used to stimulate and intensify the authentic/work-based learning situations. A large amount of people are deprived of education and training, particularly in the unorganized sector due to several reasons. The open schooling system, especially the National Institute of Open Schooling (NIOS) in India, has emerged as a prominent organization to impart education and training as per individual needs using various forms of multiple media.

A number of Committees and Commissions have been formed in India from time to time to evaluate the prevailing educational system and implement the Vocational Education System in the country. The Ministry of Human Resource Development (MHRD), Government of India (GOI) notified the National Vocational Education Qualifications Framework (NVEQF) in September 2012 as an endeavour to build flexible education and training systems that allow individuals to accumulate their knowledge and skills through vertical mobility approach. At present, about 18 Ministries of GOI are offering skill-based programmes. MHRD notification was applicable to those educational institutions that come under the control of this ministry. Recently, in December, 2013, the Department of Economic Affairs, Ministry of Finance notified National Skill Qualification Framework (NSQF), which will be facilitated by the National Skill Development Agency (NSDA).

Keeping this in backdrop and with the support of the Commonwealth Educational Media Centre for Asia (CEMCA), NIOS has developed the 'Strategy for Skill Development through Open Schooling in India'. While the document was initially prepared keeping in view the NVEQF, it is still useful to facilitate the implementation of NSQF through open schooling.

The open schooling system, spearheaded by the NIOS, will strive to implement the NSQF to increase access to quality skill training. Towards this effect, it has signed a Memorandum of Understanding with the National Skill Development Corporation, and has been developing and updating its existing courses in collaboration with various Sector Skills Councils. It is hoped that other open schools in the country will also make use of this strategy document, and NIOS will be able to assist other institutions interested in offering skill training through technology-enhanced open and distance learning.

Sitansu S. Jena
Chairman, NIOS

ABBREVIATIONS

AICTE	All India Council for Technical Education
AVI	Accredited Vocational Institution
CAI	Computer Assisted Instruction
CBI	Computer-based Instruction
CBSE	Central Board of Secondary Education
CDA	Curriculum Development Agencies
CEMCA	Commonwealth Educational Media Centre for Asia
COL	Commonwealth of Learning
GDP	Gross Domestic Product
GOI	Government of India
ICT	Information and Communication Technology
IGNOU	Indira Gandhi National Open University
ITI	Industrial Training Institute
MDG	Millennium Development Goals
MHRD	Ministry of Human Resource Development
NCOS	National Consortium of Open Schools
NCERT	National Council for Educational Research and Training
NIOS	National Institute of Open Schooling
NOS	National Occupation Standards
NSDA	National Skill Development Authority
NSDC	National Skill Development Corporation
NSQF	National Skills Qualifications Framework
NVEQF	National Vocational Education Qualification Framework
ODL	Open and Distance Learning
OER	Open Educational Resources
OPNZ	Open Polytechnic New Zealand
OUSL	Open University of Sri Lanka
QAF	Quality Assurance Framework
RPL	Recognition of Prior Learning
SLD	Situated Learning Design
SOS	State Open School
SOVET	School of Vocational Education and Training
SSC	Sector Skills Council
SOVET	School of Vocational Education and Training
SWOT	Strengths-Weaknesses-Opportunities-Threats
TBL	Technology-based Learning
TVET	Technical and Vocational Education and Training
UKOU	Open University United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
VET	Vocational Education and Training
VQAC	Vocational Qualification Assessment Centre

TABLE OF CONTENTS

<i>Foreword</i>	<i>iii</i>
<i>Abbreviations</i>	<i>iv</i>
Executive Summary	1
Introduction	7
National Vocational Education Qualification Framework (NVEQF)	8
Comprehensive Perspective on VET in NVEQF	9
Development and Impact of Open Schooling	11
Open Schooling in India	13
Technical and Vocational Education and Training by ODL: Some Experiences	14
Critical Principles and Practices that Make ODL Systems Suitable for VET	16
Vocational Education and Training through Open Schooling	17
Action Points in NVEQF for VET Curriculum and Transaction	18
Pedagogical and Technology Applications for VET	21
VET through Open Schooling in India: SWOT analysis	26
Skill Development Strategy for Open Schooling	31
Implementation Plan	39
Conclusion	40
References	41

EXECUTIVE SUMMARY

Availability of adequate educated and trained human resources in a large range of academic, professional and technical/vocational areas is a critical factor in the overall economic and social development of individual nations as well as overall economic growth, peace and stability across all countries. For achieving sustainable growth in the economy, workers and employers need to be well-trained in the new areas of skills and information and communication technologies (ICTs) for working in the global environment. Like other forms of education and training, vocational education and training is an investment in human capital, which brings benefits in the form of enhanced labour productivity, and higher levels of output and training. In the past, development of human resources has been the responsibility of the formal system of education from school-education to higher-education stage including technical and professional education. Occupational and vocational skills were mostly developed through informal settings like workplace and traditionally within the family from one generation to the next. The second half of the last century saw a change in the philosophy and practice of education. On one hand, there has been a process of democratization of education, which questioned several rigidities of the formal system of education that created barriers for all learners to have access to education. This led to the conceptualization and practice of open learning. Along with the developments in new self-learning techniques and emergence of a variety of information and communication technologies, this led to the creation and acceptance of the open and distance learning (ODL) mode of education. The ODL mode has proved its potential for providing education at secondary and post-secondary education for academic as well as professional and skill-based courses. With the integration of a variety of technologies, ODL has made this non-formal mode as effective as the formal system of education and training. It also helps trainees to enhance their existing knowledge and skills without leaving their present job or assignment in hand.

"Belem Framework for Action" (UNESCO, 2009) adopted by 144 delegates of UNESCO member states at the Sixth International Conference on Adult Education in Brazil re-affirmed the role of lifelong learning in addressing world's development issues. The framework also explicitly mandated the member countries to develop

guidelines to recognize, validate and accredit all learning outcomes including those acquired through non-formal and informal learning environments. Although not explicitly said, this was an adequate acceptance of ODL-based education and training even for skill development. The NVEQF brought out by the Ministry of Human Resource Development (MHRD), Government of India, in September 3, 2012 strives to build a flexible and quality education and training system and allows individuals to use any mode of education, whether formal, non-formal or informal, or a combination of these three in acquiring and accumulating knowledge and skills in a progressive mode.

The NVEQF broadly acknowledges the use of non-formal mode of learning including ODL and open schooling to organize and deliver technical and vocational education and training courses at different levels. However, the framework does not provide the detailed modalities on how this could be effectively done. The present document attempts to operationalize some strategic directions for implementing NVEQF for providing TVET through the open schooling system in India. This was prepared through a consultative process with representatives from all major stakeholders expected to be involved in the formulation of policy and development and delivery of technical and vocational courses through open schooling all over India. The National Institute of Open Schooling (NIOS) has taken the lead along with the Commonwealth Educational Media Centre for Asia (CEMCA) in initiating and supporting the deliberations and consultations with stakeholders to begin with a brainstorming meeting in New Delhi. This led to the development of a discussion paper, which was later taken up in a 2-day workshop in Kochi, where the stakeholder representatives presented their experiences and views on the proposed Open Schooling Strategy for VET within the regulation and recommendations of the NVEQF, and also deliberated on the discussion paper. Based on the outcomes of the workshop and within the requirements of NVEQF, the present document has been developed. While NVEQF has been the basic framework, in the changed scenario of generic NSQF notified by the Government of India, the recommendations in this document still holds good.

NVEQF ACTION POINTS FOR CONSIDERATION

The major action points derived from the salient recommendations of the NVEQF that will have implications on the implementation of VET programmes are the following:

- a. Development of national occupation standards (NOS) by the respective sector skills councils (SSCs) in association with the curriculum development agencies (CDAs).
- b. Adoption of a modular approach at all levels of education.
- c. National level creation and adoption of credit-based system.
- d. Recognition of prior learning (RPL) or accreditation of prior learning to be part of the NVEQF.
- e. Competency standards for training of teachers and trainers.
- f. Strategic steps for promotion of suitable pedagogy and blended learning.
- g. Competency-based assessment system to be an integral part of the NVEQF.
- h. Accredited assessors to judge all the evidence against NOS.
- i. Development of a quality assurance system for competency-based education and training and assessment within a quality assurance framework (QAF).
- j. Planning for developing an academia industry alignment at the district level to ensure that the framework caters to the local contextual requirements.
- k. Implementation of the complementary policies with provisions for registration and accreditation, for enhancement of 'articulation arrangements' across levels of education.
- l. Modification and expansion of structures of the present education and training system.
- m. The reconstruction of the curriculum for schooling and higher education to be essential in order to provide necessary flexibility and get rid of the outmoded teaching learning practices prevalent in the present education system.

ODL FOR SKILL TRAINING – FEASIBILITY IN THE INDIAN CONTEXT

The open schooling systems to be developed and strengthened for cost-effective offer of vocational education courses need to take into consideration the strengths and weakness of the ODL mode and the opportunities and threats that exist in the Indian context. The SWOT analysis shows that there are sufficient strengths of the ODL system to cater to the needs of vocational education, especially with the

availability of innovative ICT-based inputs. The political will and success of the ODL mode being used by NIOS and IGNOU for technical and vocational education also indicates success of the open schooling initiative for TVET. The learning/training inputs and assessment modalities of developing the vocational skills is very critical. As ODL systems provide for limited face-to-face (F2F) experiences, it is important to plan and execute the F2F sessions to include virtual learning support and adequate human interaction and hands-on practice in laboratory, workshop and work situations. The perceived weaknesses of the ODL system with regard to skills training can be removed by providing effective support for strong hands-on experience, good resource materials and virtual learning including simulation.

SKILL DEVELOPMENT STRATEGY FOR OPEN SCHOOLING

- ❖ Develop occupational standards and learning outcomes for need-based and industry-oriented courses as per the NSQF.
- ❖ Develop courses at NIOS and state open schools using the national curriculum framework.
- ❖ Develop courses and programmes in a modular credit-based system to facilitate credit accumulation and flexible upward mobility.
- ❖ Use the Framework for Recognition of Prior Learning (2013) to develop appropriate assessment mechanisms for different skills.
- ❖ All the qualification packs need to be supported by appropriate media mix for educational transaction in ODL.
- ❖ Learner assessment and certification need to be carried out by accredited skill development centres and use the norms specified by the SSCs.
- ❖ Wide range of learner support mechanisms should be designed, and provided to the learners to sharpen their skills.

IMPLEMENTATION PLAN

NIOS, being the apex organization for open schooling in India, should take the initiative in implementing the plan. It should take the following steps:

- a) **Advocacy and Sharing with Stakeholders:** NIOS should disseminate this document to all the state open schools for further discussions, and organize a

forum at the national level to discuss the modalities further as a strategy for advocacy and capacity building of all stakeholders.

- b) Giving Responsibility to NCOS: NCOS may be given the responsibility of coordinating the implementation strategy in all open schools, while the Vocational Education Department of NIOS may initiate action as per the NSQF to align existing courses and develop new courses.
- c) Strengthening of the NIOS Academic Council with Representatives of SSCs: Select experts nominated by the SSCs may be included in the Academic Council of NIOS to help provide expert guidance in vocational course development as per the NSQF.
- d) Developing a Timeline to Align All the Existing Vocational Courses of NIOS: The Department of Vocational Education needs to develop a plan and a timeline to align all its existing courses into NSQF compliant. This may be accorded high priority and completed in the next 3 years' time.
- e) Identification of New Vocational Programmes and Courses in Different Sectors: Based on analysis of published data related to market needs, human resource requirements and employment opportunities in different skills sectors as well as occasional market surveys, NIOS should be expected to identify the demand for skilled personnel in various sectors. This could be the basis on which new VET courses and programmes are identified.
- f) Vocational Course Design and Development: While designing and developing vocational courses with existing NOS and qualifications pack, the NIOS expert team should clearly articulate the media mix, learner support and assessment mechanism as required by the SSCs. In the absence of SSCs, NIOS should involve experts in instructional design and subject matter to develop National Occupational Standards and qualification packs before developing the media mix, scheme for learner support and assessment standards.
- g) Establishing and/or Acquiring Infrastructure: Both learner support activities and monitoring will require infrastructure including buildings and equipment in the NIOS headquarters, regional centres, state open schools and in AVIs and vocational institutes at the field level for learner support practical work, and assessment of skills. NIOS may like to develop requirements for AVIs to

partner for delivery of courses, and assess their suitability through a credible system of review and physical checking. NIOS may also implement and further augment its online accreditation system for this purpose. The services and facilities available in each of the AVIs should be made public through its web page.

- h) Skills Training Material Resource Repository: NIOS should take the lead in establishing a national repository for the collection, creation and distribution of multimedia curriculum and other resource material for the use of all institutions and learners of VET. This should include all newly developed materials as well as open educational resources. NIOS already practices the OER creation and this could be further strengthened.

INTRODUCTION

India has been one of the fastest growing economies averaging around 8 percent annual economic growth during 2006-2011, with a then-projected growth of 7 percent in 2012. Contrary to this projection, the country registered only a relatively low 5 percent growth in 2012, which was expected to recover to about 6 percent in 2013 on par with the developing countries of Asia and the Pacific (UNESCAP, 2013). The Government of India has identified several areas, including manufacturing and production with 78 percent of workers in the informal economy; construction with 72 percent of workers in the informal economy, and the service industry as high growth and high employment areas to maintain the nation's economic growth. Manufacturing, which has the long-term potential to become India's strong development area, is currently responsible for only about 15 percent of the nation's GDP and almost half of the country's exports. Food products, basic metals, and electrical machinery industries are responsible for the largest shares of revenue in the Indian manufacturing sector. At the same time, the government acknowledges the importance of its service sector, which includes wholesale and retail trade and repairs, with 92 percent of workers in the informal economy (Pina et al, 2012). Nearly three quarters of India's working-age population work in the informal economy and most of them do not possess any formal education or training in their field of work.

Developing countries will have to respond to the needs of large sections of their people who are caught at the low end of the skills spectrum. Many of these countries face high levels of unemployment and underemployment. These countries also face the challenge of low productivity in both organized and unorganized sectors. There is also the need to meet the functional and administrative requirements including having an effective governance system. Many developing countries now seek to take advantage of the recent growth in outsourcing of service industries from the developed economies. Success in these competitive areas will also depend upon how their skill development strategies correspond with the needs of these industries. India is one of those few countries which have been successful in competing with others in this increasingly competitive path, thanks to the investments it made in technical education since its

independence and especially in the last two decades. However, as compared to higher technical and professional levels, India does not have the sheer number of skilled personnel required in many vocational and lower technical areas in spite of high growth in its secondary and post-secondary education. Most of the people completing secondary schooling are not prepared for productive employment or entrepreneurship in any sector. There is a need to increase production of skilled personnel in large numbers in several production sectors. In a globalized economy, a sufficient number of workers is indispensable in a variety of technical and vocational areas in attracting FDI and outsourcing from developed economies in order to create adequate employment opportunities that enhances efficiency and flexibility in the labour market. During the last couple of decades, India showed a major transition to a knowledge-based economy, thus requiring a new generation of knowledge workers and knowledge technologists who are flexible and analytical to be the driving force for this change. It is obvious from the present Indian economic scenario that there are some positive trends combined with shadows of uncertainties indicated by the weakening rupee. Production generally has to increase and human resource needs of several sectors have to be met. The educational and training institutions have not responded adequately to the employment needs in certain areas, especially in producing skilled personnel at lower level vocations and occupations. There is a growth in the production of professional and higher technical degree holders, and unemployment of this section can be seen in many sectors. On the contrary, there are less skilled personnel produced in lower technical and vocational areas including occupations in unorganized sector. There are also insufficient opportunities for updating and upgrading skills for in-service vocational personnel. It has also been found that there are gaps between demand and supply of skilled manpower in the Indian economy.

NATIONAL VOCATIONAL EDUCATION QUALIFICATIONS FRAMEWORK (NVEQF)

During the post-independence period, there have been many attempts to reform and strengthen the vocational education system in India and make it more relevant and applicable to the developmental needs of the country. Policy reforms and innovations attempted in over sixty years in the past have been extensive but not comprehensive and integrated. Hence, the impact of these reforms and innovations has not been very significant.

The long standing need for a comprehensive and integrated structure for vocational education and training has been addressed recently by the Ministry of Human Resource Development, Government of India, through widespread deliberations and consultations, leading to the formulation of the National Vocational Education Qualifications Framework (NVEQF) in September 2012 through a government notification. The framework says that the Technical and Vocational Education and Training (TVET) system in India is fragmented and lacks coordination between various stakeholders and there is lack of articulation arrangements for progression of students from school to polytechnics and universities. (The terms TVET and VET Vocational Education and Training have been used interchangeably in this document).

NVEQF is a descriptive framework that organizes qualifications according to a series of levels of knowledge and skills defined in terms of learning outcomes. These learning outcomes are a set of competencies learners must possess regardless of whether they were acquired through formal, non-formal or informal education and training. Qualifications comprise a number of occupational standards that provide the basis for judgements and assessments made for specific areas of learning (similar to modules, but more focused). This allows learners, education/training providers and employers to gain information about the broad equivalence of qualifications. It is, therefore, a nationally integrated education and training that will link one level of learning to another and enable learners to progress to higher levels from any starting point in the education and training system. The key elements of the NVEQF are to provide multiple entry and exit to TVET, transfer and progression within and between TVET and general academic education and partnership with industry/employers. NVEQF for the first time has considered all levels, aspects and modes of TVET in the country.

COMPREHENSIVE PERSPECTIVE ON TVET IN NVEQF

The framework acknowledges the fact that the enormous challenge of providing TVET courses at pre-service and in-service levels including ongoing support can never be overcome only through formal TVET institutions such as ITIs, polytechnics, engineering colleges and other such formal providers. It takes a comprehensive and inclusive perspective by recognizing the importance of acquiring TVET skills through formal, non-formal or informal education and training.

According to the NVEQF, formal education includes education (and training) 'provided in the system of schools, colleges, universities and other formal

educational institutions that normally constitutes a continuous ladder of full-time education for children and young people, generally beginning at age 5, 6 or 7 and continuing up to 20 or 25 years of age'. This form of education provides limited access due to regulations and rigidities like age specificity, full-time participation in institutions of learning and limited course combinations.

The NSQF emphasizes learning outcomes, and not the mode:

- iii. Wherever notional learning time is used, it should include all learning activities required for the achievement of the learning outcomes for a particular level, including, for example:
 - a. Formal learning, including classes, training sessions, coaching, seminars and tutorials
 - b. Practice and learning on the job-gaining, applying and refining skills in the workplace
 - c. Involvement in informal learning example: community-based workshops, youth groups, playgroups
 - d. Doing practical work in laboratories or other locations
 - e. Expected private study, revision and remedial work
 - f. Work-based activities which lead to assessment
 - g. Undertaking all forms of assessment

Non-formal education refers to any organized and sustained educational activity that may take place, both within and outside educational institutions, and may cater to people of all ages. It may cover educational programmes to impart adult literacy, basic education for out-of-school children, life skills, work skills, etc. Although not specified by the framework, the open schooling comes within this form of education.

In addition, NVEQF also brings within its purview all types of learning that take place through life and work experience, which may also be referred to as experiential or informal learning. Often, this learning is unintentional and the learner may not realize at the time of the experience that it contributed to his or her knowledge, skills and competence.

DEVELOPMENT AND IMPACT OF OPEN SCHOOLING

The emergence of the open and distance learning (ODL) system has been a natural and phenomenal evolution in the history of educational development towards the latter half of the twentieth century. While the conventional system continues to be the mainstream of educational transaction, it has its own limitations with regard to expansion, access, equity and cost-effectiveness. The focus of ODL has been laid on expanding access to learning by removing barriers to education and providing flexibility in allowing students to learn what they want, when they want and where they want. This helps in reaching the unreached such as the drop-outs, underprivileged, and all those who are out of the scope of formal educational institutions.

Experts generally included open schools with open universities and used the general term 'open and distance learning' to describe what they do as an alternative to formal system for providing education at school and university levels. The Commonwealth of Learning (COL), which has been a major advocate of open learning for school level education and a catalyst for the development of this system in the Commonwealth countries, has also taken a very broad but simple definition of open schooling. It defines open schooling as "the physical separation of the school-level learner from the teacher, and the use of unconventional teaching methodologies, and information and communications technologies (ICTs) to bridge the separation and provide the education and training" (Daniel and Phillips 2006). This definition sounds much similar to that of an open university.

However, Daniel and Phillips (2006) interpret these terms in a different way. According to them, "Open Schooling is not called open/distance schooling for a reason. Open Schooling may follow different patterns, but the most common scenario is that the learners study specially designed open learning materials on their own—at home, in their workplace, wherever it is convenient for them—and then they meet together with a facilitator on a regular basis. The term 'open' in open schooling refers to the openness of the system—seldom are there rules dictating student ages, prerequisites, content of courses to be taken or number of courses in which students must enroll." Such an understanding of the concept of open schooling provides for catering to varied needs of different types of clientele groups. For example, the openness facilitates the learning—anyone can enroll in any course at any time and study at his or her own convenience and schedule. Usually, there are no rules that regulate students' age limits, lay down prerequisites, impose

the course content to be taken or specify the number of courses in which students must enroll. This means that those who missed out on schooling in their childhood can enroll in courses that will give them the equivalence of secondary education without having the embarrassment of sitting in classrooms with much younger children. Young mothers can take secondary-level education by studying at home and attending tutorials only when necessary and when their responsibilities permit. Working adults can enroll in one or two courses at a time, and study whenever their personal and work commitments permit. Young adults can acquire skill training coupled with academic subjects while being self-employed or working as non-skilled labour.

Open schools have a longer history than open universities. Developed countries such as Canada, Australia and New Zealand have been offering educational programmes from kindergarten to Grade 12 through different forms of distance education for over 60 years. These programmes were designed using print and other available technologies to reach out to special groups such as the children living on scattered sheep farms or in families responsible for lighthouses, students in small towns and children whose schools could not offer specialized courses for want of qualified teachers. Open schooling was also used by countries at times of crisis such as when New Zealand had to shut down its whole school system because of an epidemic of measles and all children in the country studied for a period of a few weeks through the Correspondence School. The largest open school outside the Commonwealth, France's Centre National d'Enseignement à Distance (CNED), was created to serve the thousands of French children who were evacuated from the cities during World War II. These early open schools were successful mainly because at the primary school level, pupils were tutored by their parents using high quality learning materials while at the secondary level, students were usually highly motivated learners who could learn through self-learning materials.

There were attempts to establish correspondence schools in the developing countries during the 1960s. Malawi, Zambia and Zimbabwe established such schools with external funding. The Malawi College of Distance Education and the National Correspondence College, Zambia, were initially successful but could not sustain over time as the models used were based on those in the industrialized world without considering contextual needs and realities. For example, pupils in developing countries seldom had educated parents to tutor them. As a result, many of these institutions failed in their mandates to successfully deliver school-level

education through non-conventional means. A resurgence of ODL for school education happened with the success of the open school system in India.

OPEN SCHOOLING IN INDIA

Open schooling in India is a success story in the world of ODL. It began as a pilot open school project in 1978 as part of the Central Board of School Education (CBSE). Considering its successful trial run and increasing demand of its services, the Government of India established an autonomous institution in 1989 in the name of the National Open School (later renamed as the National Institute of Open Schooling) with a mission of providing 'education for all', 'greater equity and justice in the society' and 'the evolution of a Learning Society'. The main objective of the NIOS is 'to provide opportunities for continuing and developmental education to interested learners through courses and programs of general education life enrichment modules and vocational courses up to pre degree level'.

During the 1990s, the National Open School increased steadily its enrolment and expanded geographically to reach out to all parts of the country. It also diversified from academic secondary and senior secondary courses and initiated vocational education and open basic education programmes in addition to improving its quality of offerings. Its scope and function was further expanded in 2002 when its name changed to the National Institute of Open Schooling (NIOS). NIOS has become a model of successful strategies. It has pushed the boundaries and done what many claimed was impossible—making school education available through non-conventional means to hundreds of thousands of pupils with both academic and vocational courses.

As of today, NIOS has emerged as the largest open schooling system in the world and its client groups include girls and women, other marginalized groups including socially and economically backward people from rural and remote areas, the urban poor, the unemployed and underemployed, and the physically disadvantaged groups. The NIOS has almost 5000 accredited institutions (AIs) and accredited vocational institutions (AVIs) acting as learning centres for academic and vocational courses, located across India. It also has centres in five other countries outside India. The cumulative enrolment of the student exceeds over two million (NIOS, 2012).

In India, open schooling has not been adopted exclusively as a complementary schooling system to complete what the conventional schools leave half/partially

done nor is it a supplementary schooling system supporting the conventional schools in what they are doing. Instead, 'it has been chosen for the cost advantages it is supposed to offer, the operational flexibility it can accommodate, the curricular innovations and diversity it will allow and above all the extensive reach it will provide to cover immensely diverse clientele' (Rumble and Koul, 2007). It has been visualized as a major approach in the process of facilitating inclusion, modernizing educational methodology, diversifying secondary-level curricula and universalizing secondary education in India. It is in this context that the role and potential of NIOS in providing VET has to be seen and efforts to be made to tap this potential to reach out to large numbers and develop relevant courses and organize them within the gambit of NVEQF.

TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING BY ODL: SOME EXPERIENCES

Open learning in vocational and technical education has a lot to offer to the new world of work because it is responsive, flexible, fosters independent learning, can be set up in a way that encourages teamwork and allows the immediate transfer of skills in the workplace. Open learning also reinforces qualities of self-reliance, and mobility and rapid adjustment to the change needed for survival in today's fast-changing world of work. That level of quality can only be met if the objectives are very clear, and both process of learning and the system requirements for supporting that process are well understood and suitably mobilized. The potential and possibilities in the ODL mode has undergone remarkable changes that today ODL systems including open schooling with use of a variety of technologies and learner support modalities can go well beyond teaching theoretical subjects. There is enough experience around the world to show that appropriately organized distance learning experiences supported by physical presence, virtual interactions and hands-on skill development sessions can be effective to develop technical and vocational competencies. We could look at some of the TVET programmes offered through ODL to understand what makes these systems relevant and viable.

- ❖ **Open Polytechnic of New Zealand (OPNZ):** Open Polytechnic is one of the world's leading providers of VET by ODL, removing barriers of time, place and cost to deliver effective learning solutions. OPNZ has a strong track record in designing and delivering skills and competency-based learning solutions within blended and networked learning environments. It also works closely with industry to deliver vocational training to accredited national standards

and qualifications. OPNZ occupies a unique place in New Zealand post-secondary education and is most successful. With a history going back 60 years, it is New Zealand's only single-mode distance learning provider, enrolling 25,000 students, mostly working adults. OPNZ is also a pacesetter in the way that it has disaggregated the elements of its ODL system (e.g., curricula, courseware, examinations, student support) so that each can be made available to partners separately. OPNZ offers learners the opportunity to control their learning from the perspective of where to study, how to study, and what to study, using quality multimedia materials.

- ❖ **Open University of Sri Lanka (OUSL):** The study system adopted by OUSL and the Faculty of Engineering Technology is based on multimedia instructional materials with strong emphasis on distance education techniques using printed material and audio-visual aids. The central element of the self-study is the printed material that offers the student the equivalent of lectures in a conventional university. They also provide a series of carefully designed activities and self-assessment questions, which help the students develop analytical skills and independent thought processes. Printed materials are supported by audio-visual materials, day schools (face-to-face discussions), tutor clinics, laboratory work, fieldwork, on-line component and seminars. Laboratory work and fieldwork form an integral part of most courses in the technical education programmes.
- ❖ **Indira Gandhi National Open University (IGNOU):** This university uses multimedia teaching–learning packages, which include self-instructional print and audio-video materials, radio and television broadcasts, contact sessions/counselling, laboratory, hands-on experience, teleconferencing, videoconferencing, interactive radio counselling, interactive multimedia CD-ROMs, Internet-based learning, use of mobile phones for instant messaging and practical/practice teaching at selected programme centres. IGNOU offers skill-based programmes through various schools of studies. It established the School of Vocational Education and Training (SOVET) in 2007, specifically for offering VET programmes. The objectives of SOVET are to (a) provide educational training for skill development; (b) meet the vocational as well as technical requirements for economic development of the country; (c) offer demand-driven and value-addition courses/programmes targeting the formal and informal sectors; (d) develop courses that encourage vertical mobility of

vocational educational training; and (e) undertake research and development for identifying societal and industrial needs. At present, SOVET offers programmes in the area of information security, business process outsourcing (BPO), communication and IT skills and pharmaceutical and sales management and develops new programmes in the area of vocational teacher education, modern office practice and hospital administration. These programmes are credit-based and supported through self-study printed materials comprising self-check exercise/activities, assignments, project work, etc. Study materials were integrated with ICT, audio/video programmes, live teleconferencing sessions, practical and hands-on experience at work situations at specialized programme centres. It is evident that although IGNOU uses ICT applications, its main approach is to optimally use the workshop and workplace infrastructure in the field that is accessible to the students.

- ❖ **The Open University, UK (UKOU):** Through the Open University Vocational Qualification Assessment Centre (VQAC), UKOU delivers vocational qualifications through a flexible, distance-learning, modular approach. In most cases, an assessor works with the learner, providing support and guidance as they progress through the qualification. Vocational qualifications are also very flexible for staff with heavy or unpredictable workloads. They can be very effective and flexible tools for motivating employees and enhancing standards and practice. Employers can use the VQAC support in setting standards expected of staff in a particular vocational sector, achieve quality and consistency, recognize staff competence, and provide a framework for preparing job descriptions, undertaking appraisals and planning training and development activities.

CRITICAL PRINCIPLES AND PRACTICES THAT MAKE ODL SYSTEMS SUITABLE FOR VET

If one attempts to study the feasibility and effectiveness of the learning/training systems presented in the previous section, it is evident that there are a few critical principles and practices adopted by these institutions that have led to its success. These include the following:

- ❖ Flexibility and openness to go beyond the existing systems and finding 'out of the box' solutions to design the learning/training system for VET based on contextual requirements

- ❖ Strong focus on designing and delivering skills and competency-based learning solutions within blended and networked learning environments
- ❖ Close partnership with all kinds of employers including large and medium industries and small business houses to deliver vocational training of accredited national standards and qualifications
- ❖ Approach in which the institution has disaggregated the elements of its ODL system (e.g., curricula, courseware, examinations, student support) so that each can be made available to partners separately
- ❖ Identification and integration of a variety of learning/training experiences provided through a logical mix of different media and methods supported by appropriate resource materials
- ❖ Use of appropriate, available and accessible technologies to provide individualized support for self-learning as well as practical training hands-on experience, including virtual support
- ❖ Optimum use of available infrastructure and resources in the community at all levels for course development, course distribution and providing varied kinds of learner support
- ❖ Tutor counsellor/assessor working with the learner continuously providing support, guidance and feedback as they progress through the qualification

VOCATIONAL EDUCATION AND TRAINING THROUGH OPEN SCHOOLING

One of the objectives of the vocational education programme of NIOS is to meet the need for skilled and middle-level manpower for the growing sectors of the economy, both organized and unorganized. The range of VET courses has been expanding over the years depending upon the needs of learners and market demands. The present vocational education courses of NIOS are meant for both urban and rural sectors. In spite of development and expansion, only about 5% of the total enrolment of NIOS is in the VET programmes (NIOS, 2012).

In spite of vigorous growth, the formal system of education has not been able to cater to the increasing demand for skilled personnel in varied productive areas and this has been acknowledged by the NVEQF. The framework considers ODL as one of the forms of non-formal education that can be used to develop technical and vocational skills. Many expectations rest on the mode's potential advantages. These

advantages include the ability to access individuals and communities on the margins, its low cost and its ability to deliver a quality product of standard similar to conventional institutions. With the growth of ICTs and their enhanced applications for ODL, it has become an even more attractive option for many countries to use this mode to provide quality education and training in a highly cost-effective manner. It is generally believed that the advances in technology fortify and expand existing arguments for ODL delivery in skill development. ICTs can increase access to information and facilitate communication as well as allow modelling of scientific and technological phenomena. All this allows for better delivery of education material and better learning outcomes. The growth of ICTs should allow students to access better quality education and training getting attached to local learning centres, whilst also providing students with good support materials and the means to access the best knowledge bases anywhere in the world. And for many fast growing countries, there seems to be no other option than using ODL to complement and supplement formal education and training.

Vocational education and training of large populations is an important aspect of the Millennium Development Goals (MDGs). But traditional systems of training individuals for technical and vocational careers often cannot meet the massive need. Among the options available to achieve the targets of the MDGs is the application of ODL methods. Over the past forty years, trainers all over the world have come to appreciate the immense value of using ODL methods to provide continuous "just-in-time" training for workers in a range of fields from farming to electronics, health to engineering, animal husbandry to automobile engineering, and teaching to social work.

In addition to acknowledging the need for adopting alternative modes of education and training, the NVEQF accepts that the curriculum transaction should be flexible enough to reach out to large populations. It emphasizes the need and importance of flexibility in the delivery of VET including a range of approaches to provide education and training, giving learners a greater choice of when, where and how they learn. The framework defines flexible delivery to include distance education, mixed mode delivery, on-line education, self-paced learning, and self-directed learning.

ACTION POINTS IN NVEQF FOR VET CURRICULUM AND TRANSACTION

VET consists primarily of practical courses or programmes aimed at learners gaining skills and experience linked to an occupation and career in future. It helps learners

to gain skills and competencies leading to certification and thereby improving their employment opportunities.

NVEQF has brought out very comprehensive directions related to various aspects of curriculum development and transaction including assessment in VET. These directions are summarized in the following list:

- ❖ Development of National Occupation Standards (NOS) by the respective SSCs of NSDC in association with the CDAs will be done. SSCs will spell out in detail NOS, learning outcomes, vertical and horizontal coordination, competency-based curricula and training packages in NVEQF.
- ❖ There will be development of a modular credit-based system at all levels of education for providing enhanced learning opportunities, ability to match students' scholastic needs and aspirations, inter-institution transferability of students, part-completion of an academic programme in the institution of enrolment and part-completion in a specialized (and recognized) institution, improvement in educational quality and excellence, flexibility for working students to complete the programme over an extended period of time, and standardization and comparability of educational programmes across the country. A common system of credit values will be applied to all units within a qualification.
- ❖ National level creation and adoption of credit-based system, that is, earning credits, credit accumulation and transfer, articulation arrangements, etc. will take place.
- ❖ Recognition of prior learning (RPL) or accreditation of prior learning will be part of the NVEQF. It will be utilized as an assessment tool for recognition of competencies acquired outside the learning path, and recognition of credits obtained through formal or non-formal learning. Recognition will be given to both whole and parts of qualifications.
- ❖ Competency standards for training of teachers and trainers for bringing about radical changes in teacher training and re-tooling programmes to suit the needs of the NVEQF will be maintained.
- ❖ Strategic steps for promotion of suitable pedagogy and blended learning will be taken.

- ❖ Competency-based assessment system, which involves the collection of evidence of what learners know, understand and can do, will be an integral part of the NVEQF. To achieve a certificate or to gain qualification, a candidate must gain credits by completing certain tasks and provide evidence to demonstrate competence development in chosen areas at the appropriate level.
- ❖ Accredited assessors will judge all the evidence against NOS. They will adopt the national guidelines for continuous competency based assessment and guide the learners towards assessment of their existing competencies before enrolling for a programme. Whatever the approach taken, performance and knowledge assessment should be directly linked to occupational standards. The existing accreditation agencies like AICTE will work with NSDC/SSCs to provide accreditation as per NVQF guidelines.
- ❖ A quality assurance system for competency-based education and training and assessment within a quality assurance framework (QAF) for providing nationally consistent high-quality education and training will be developed.
- ❖ A plan for developing an academiaindustry alignment at the district level to ensure that the framework caters to the local contextual requirements will be part of the NVEQF.
- ❖ There will be implementation of the complementary policies with provisions for registration and accreditation, for enhancement of 'articulation arrangements' between school/ITIs/ polytechnics and higher education institutions for providing vertical mobility, recognition of prior learning, quality assurance, and creating institutions to fill the current gaps in teacher–instructor training.
- ❖ Modification and expansion of structures of the present education and training system for bringing about required changes in funding arrangements, governance, buildings, classrooms, tools and equipment, faculty, teaching-learning approaches and assessment and certification system will take place.
- ❖ The reconstruction of the curriculum for schools and higher education will be essential in order to provide necessary flexibility and get rid of the outmoded teaching-learning practices prevalent in the present education system.

PEDAGOGICAL AND TECHNOLOGY APPLICATIONS FOR VET

Human learning is a very complex process. In spite of years of research in education, our understanding of how humans learn is still limited. For this reason, educators strive to use the little that is known about human learning whenever they engage in the act of teaching and learning. Out of all theoretical paradigms of learning a social constructivist approach enabling a learner to construct one's knowledge and skills through a collaborative reflective practice is effective to internalize work-related competencies. Situated Learning Design (SLD), based on the principles of social constructivism, is considered to be an effective design for professional and job-related learning and training. Learning in realistic work environments provides potential to leverage on the varied advantages of situated learning. These include providing students with opportunities to

- ❖ learn how to apply knowledge acquired in conditions mirroring real-world application;
- ❖ engage in invention and problem-solving pertinent to specialized contexts;
- ❖ see and experience first-hand the implications of the knowledge learnt; and
- ❖ provide support as they learn (Collins, 1988).

The situated learning process would not be possible without two critical factors, namely facility for networking (facilitating collaboration and interaction) and situated learning environments (in the form of learning environment replicating real-world workplaces). Both these precepts can be leveraged to encourage participative student learning (constructivism and connectivism) that are required for developing work-oriented competencies.

The New London Group (1996) recommends that approaches to teaching and learning should recognize the emergence and importance of multi-literacy to include not only reading but also writing. It includes the following:

- ❖ Visual literacy for working with images, page layouts, screen formats, etc.
- ❖ Audio modalities to understand music, sound effects and vocal presentations
- ❖ Gestural modalities to obtain meaning from non-vocal communications
- ❖ Spatial literacy to utilize environmental and architectural spaces

The forms of expressing understanding through non-text-based methods just listed are especially pertinent to vocational and trade-based learning. Much of learning a trade or craft involves apprenticeship, guided learning and workplace-based learning. As such, the literacy required is situated in practice. A lot of skill-based learning is hands-on, skill and practice-centred and requires learning by modelling/imitation, initial guided practice, deliberate and repetitive practice, leading to eventual competency. The products of this learning are not text-based but are in the form of manufactured products, completion of tasks or customer interactions. Hence, evidence of learning in the form of products, videos of students performing a skill or feedback from customers is appropriate.

In the area of VET, the integration of ICT is not only an option but also a necessity for making the education process more attractive (Paryono and Quito, 2010). A virtual conference (UNESCO, 2013), organized by the UNESCO-UNEVOC International Centre for TVET (Bonn, Germany) involving 247 participants from 74 countries examined the potential and impact of new technologies on TVET. The deliberations highlighted that new technologies allow for better and easier access to education, nationally and across borders; enables the implementation of education and training, the provision of learning content, and communication between teachers and learners and hence should be harnessed with the purpose of providing more widespread access to TVET. There was an agreement that ICTs can greatly contribute towards improving the quality of education if used appropriately and has the potential to not only enhance people's technical skills but also to help develop 'transferrable' or soft skills supporting lifelong learning. Participants expressed how ICTs in TVET can also enhance the perception of TVET, a form of education that is often regarded as second-class. The discussion further highlighted the need for a flexible and blended approach in incorporating ICTs into TVET, recognizing the crucial role of the teachers in its delivery.

The increased use of ICTs in TVET has resulted in a major paradigm shift, from a total dependence on the objectivist paradigm to a growing adherence to the cognitivist and constructivist paradigms. For example, the use of ICTs in distance education has resulted in a pedagogy, which is constructivist, collaborative and interactive (Wonacott, 2001). Chan, Fisher and Sauer (2011) reports the findings from a project, which show an increase in student engagement brought about by a careful match of learning outcomes to the use of situated-technology-enhanced learning. The four pedagogical approaches of technology-based learning (mobile learning),

constructivists learning, situated learning and encouragement of multimodal and multi-literacy modes to showcase students' work were made possible through the capabilities of net tablets. The introduction of using net tablets, in the ways described in the project, also led to tutors' increased understanding of teaching and learning processes. Additionally, the two teaching sections (barista and automotive engineering) involved in this project reaped benefits from the ongoing teaching methodology discussions and opportunities to trial and familiarize themselves with the net tablet's educational potential. The guidelines provided in this project are to assist vocational educators to implement situated-technology-enhanced learning into their programmes/courses. It is important to ensure there are structured and supported processes for introducing students and tutors to learning activities that are matched to appropriate technology tools and delivery. The approaches detailed in this report ensure that vocational students not only meet programme and qualification outcomes, but also gain important digital literacy skills and become constructive learners (Chan, Fisher and Sauer, 2011).

ICTs are effectively removing distance from education and making knowledge more accessible to all. As such, technology-enhanced learning will play a critical role in the development of a lifelong learning culture. Technology has the capacity to empower learners by providing them with multiple pathways that offer choices and channels to meet their education and training needs (UNESCO, 2003). Therefore, a growing interest in technology-based learning (TBL) across the world can be seen. Further, the potential that technology has to increase access and enhance quality of teaching and learning for all situations including TVET is immense and fully tapped.

TBL is a broad concept, which involves a range of hardware and software used in the teaching and learning systems that include computer-based training systems, multimedia systems, electronic performance support systems, telecommunications systems, as well as the Internet with World Wide Web systems. TBL can support an open schooling system for TVET by enhancing the effectiveness of teaching and learning in a cost-effective manner as it offers great flexibility regarding time and location of training delivery (Furst-Bowe, 1996) as well as for adapting teaching and learning methods to meet learners' individual cognitive and learning styles.

Notwithstanding the known potential of ICT use for general education and learning, there is a lack of adequate literature and research regarding its implementation and use in the field of TVET. Attwell (1999) noted, "Whilst there is a wealth of studies and

debate on the use of information and communication technologies in university and higher education, there has been only limited work on the potential impact for vocational education and training." Even the database of UNESCO-UNEVOC International Centre for Technical and Vocational Education contained very limited information on the current use of ICTs in TVET. The available literature on ICT use for TVET does throw some light into the area, which could be invaluable while developing the plan of ICT use in developing an open schooling system for VET in India.

Imel (1998) identified four different applications of ICTs in adult education, namely technology as curriculum, technology as a delivery mechanism, technology as a complement to instruction, and technology as an instructional tool.

a. Technology as curriculum

When using technology as curriculum, the focus is on developing ICT literacy skills. There are two types of ICT literacy skill sets, namely generic ICT literacy skills and occupationally specific ICT literacy skills. The generic ICT literacy skills include keyboarding, word-processing, using databases, using spreadsheets, desktop publishing and using the Internet for research and communication (Kasworm and Londoner, 2000). In this network economy, every graduate from TVET programmes needs to possess these essential and generic ICT literacy skills, which will be an advantage in technology use for teaching and learning. Examples of occupationally specific ICT literacy skills are the ability to use skills such as networking equipment, working with specialized software and hardware, and operate equipment with digital system controls.

b. Technology as delivery mechanism

When technology is used as a delivery mechanism, the focus is on appropriately designing and formatting course content for digital delivery. Some common approaches in effective delivery include computer-assisted instruction (CAI), computer-based instruction (CBI), and web-based or online instruction. The ODL mode makes extensive use of technology as its delivery mechanism and hence open schooling for VET can use technology for country-wide delivery of courses, and thereby larger numbers of learners from distant and remote areas can effectively learn through this mode. It may not be able to entirely replace F2F contact and hands-on practice of the vocational competencies in a workshop or workplace context. However, self-learning through appropriate use of technology can support

theory learning as well as provide supplementary learning experiences to support hands-on practice and thereby reduce the time for F2F and hands-on practice without affecting the quality of skills training.

c. Technology as a complement to instruction

When technology is used to complement instruction, the emphasis is on providing opportunities to practice skills taught and on extending learning by working with specific software applications (Kasworm and Londoner, 2000). Simulators are often used in TVET to address safety concerns during the initial phase of training and to offset cost in renting equipment for training crane operators and truck drivers. In its simplest form, technology can be used for drill and practice to complement instruction.

d. Technology as an instructional tool

The learning process can be divided into two broad categories. The first relates to learning conditions that are internal to the learners. While this is the area where the potential to improve learning outcomes is the highest, it is undoubtedly the area that is most difficult to affect. The second condition of learning is external to the learners. People learn through the five senses and the contribution of each to the amount that we learn varies. Most of the learning happens through the sense of sight (83%) and hearing (11%) according to the analysis done by Kupsh and Mason (1986). There are a variety of audio-visual aids that can be used to maximize learning outcomes in TVET. Analysis of the retention rate through the various senses indicates that ICTs as instructional tools can be used to create a variety of external conditions that are conducive to learning and retention.

Use of Open Educational Resources

After the emergence of open learning concept in the 1960s, there has been another concept of openness that emerged in the 1990s, namely openness and free availability of resources. In the last decade, the concept of Open Educational Resources (OER) has gained much attention among educators and ODL practitioners. The pioneer OER initiative was the creation of the Open Courseware (2001) by the Massachusetts Institute of Technology (MIT). In December 2002, Creative Commons released its first set of copyright licences for free to the public. As the number of institutions offering free or open courseware increased, UNESCO organized the 1st Global OER Forum where the term Open Educational Resources (OER) was adopted.

There are several initiatives/projects taken up in the last decade for creating and digitizing open educational resources. Since the beginning of 2006, the Open e-Learning Content Observatory Services (OLCOS) project has been exploring how OER can make a difference in teaching and learning. OERs are understood to comprise content for teaching and learning, software-based tools and services, and licences that allow for open development and re-use of content, tools and services. UNESCO, along with the Commonwealth of Learning, supported and strengthened the OER movement with the release of OER Paris declaration in June 2012, which has come out with a number of recommendations for the creation and use of OER and for encouraging all national governments to develop national OER policies and make available all resources developed with public funding free under one of the open licences for use by the world community. It is expected that OERs with all types of multimedia materials will become increasingly more available for use globally and also in India. Educationists across the world are beginning to see the advantage of using and repurposing multimedia OER materials in both formal classrooms as well as for ODL course development.

VET THROUGH OPEN SCHOOLING IN INDIA—A SWOT ANALYSIS

The open schooling systems to be developed and strengthened for cost-effective offer of vocational education courses will have to take into consideration the strengths and weaknesses of the ODL mode and the opportunities and threats that exist in the Indian context (Figure 1).

The SWOT analysis shows that there are sufficient strengths for the ODL system to cater to the needs of vocational education, especially with the availability of innovative ICT-based inputs. The political will and success of the ODL mode being used by NIOS and IGNOU for technical and vocational education also indicates success of open schooling initiative for TVET. The learning/training inputs and assessment modalities of developing the vocational skills is very critical. As ODL systems provide for limited F2F experiences, it is important to plan and execute the F2F sessions to include virtual learning support and adequate human interaction and hands-on practice in laboratory, workshop and work situations. The apparent weaknesses of the ODL system with regard to skills training can be removed by providing effective support for strong hands-on experience, good resource materials and virtual learning including simulation. The following sections analyse these factors in detail. Such an analysis will help in considering the positive and negative factors while designing an ODL/Open Schooling System for VET

implementing the expectations and conditions put forward by NVEQF.

	POSITIVE	NEGATIVE
INTERNAL	<p>STRENGTH</p> <ul style="list-style-type: none"> ❖ Evidence worldwide ❖ Learning/Training while at work ❖ Well-designed and structured ❖ Cost-effective ❖ Reaching large numbers at a distance ❖ ICT enhanced systems 	<p>WEAKNESS</p> <ul style="list-style-type: none"> ❖ Relatively less F2F contact ❖ Not adequate by distance inputs alone ❖ Insufficient experience in India ❖ Relatively less used for technical and vocational education/training
EXTERNAL	<p>OPPORTUNITY</p> <ul style="list-style-type: none"> ❖ Strong ODL base ❖ Available infrastructure at field level ❖ Available trained human resources ❖ Improved ICT network ❖ Enhanced access ❖ Policy support for ODL ❖ Formal system not sufficient 	<p>THREAT</p> <ul style="list-style-type: none"> ❖ Difficulty of managing large networks ❖ Apprehensions about organizing practice ❖ Uncertainty with regard to relationship and partnership with new agencies or organisations

Figure 1: SWOT Analysis of VET through Open Schooling

a. Strength of open schooling

The strength of the open schooling system to organize effective learning environment for both academic and technical/vocational courses has been demonstrated in different geographical and developmental contexts. Appropriate instructional designs have been created to suit the needs of the courses as well as available technologies and human resources. There are success experiences of VET courses organized in both developed and developing countries (TOPNZ, NIOS, etc.) The success of VET by open schooling has been due to the effective designs that integrated inputs that were known to achieve the varied learning and training outcomes including knowledge, attitude and skills associated with each vocational

sector and also the particular vocation. An open school or ODL-based VET course can be provided to in-service personnel without taking them away for a long period from work. The effectiveness of training making an impact on work performance is known to be more if the training and learning happen when the employee is at work that allows the work-related needs emerging in real workplace to be reflected within the process of learning. This shows that the workplace needs can be thus integrated well, just in time and just in place, with the formal training inputs provided by the course. This possibility gets enhanced if the course is designed with scenarios or cases or problems that are 'situated' in the reality of the workplace. On-the-job learning is dependent on workplaces that provide quality work, in which people learn by having to undertake challenging tasks, by using their judgement, applying new knowledge and learning from their peer workers (Cedefop, 2004, p. 168-172). More informal ways of learning in the workplace, by working and while working, do not supersede more formal continuing training but rather complement it, and may stimulate motivation to further learning (Cedefop, 2011).

Open schooling is relatively more cost effective and has the potential to reach out to a larger number of learners. The Indian 'open school' model is considered to be unique because of its feasibility and cost-effectiveness for catering to the needs of very large populations in a developing country context. A study by the Commonwealth of Learning (Rumble and Koul, 2007) confirms that open schools can be either a complementary or an alternative system to the conventional school system. As an alternative, open schools can reach new markets through an expanded curriculum. The study reports the NIOS experience of strong evidence that open schools can effectively deliver secondary education to a large number of pupils that have never before had such opportunities. If organized in the right way and with an attention to cost reduction, open schools can be set up to reap the benefits of the economies of scale that distance education holds out as a possibility. The main programme of NIOS is to cater to the needs of secondary and senior secondary education with adequate flexibility and its vocational education programme has been in existence for about 20 years. However, it is considerably smaller than its academic counterpart with only about 5% of the total enrolment in the year 2012 and offers only a few vocational courses and programmes, which are mostly in soft skill areas. But in absolute number, the vocational programme of NIOS is quite large with a cumulative enrolment of over 1,15,000 students in 2012. Over 60,000 candidates passed out with vocational certificates during the last five years (NIOS, 2012). The model adopted by the vocational programme is an extension of

its academic model and most of the responsibility lies with the AVIs, which are themselves in most cases formal F2F technical/vocational institutes. Hence, the achievement is that from such a model, NIOS has been able to provide credibility and acceptance to the formal F2F vocational courses run by governmental and non-governmental institutions with very less distance learning mode and ICT-based inputs. While this model has been successful, there may be a need to modify and strengthen this model to include more learning material and ICT support.

b. Weakness for practice-based courses

Effectiveness and feasibility of the ODL system for academic education at secondary and post-secondary/higher-level education have been well established all over the world. There are also adequate successful experiences of using ODL based for developing professional and vocational skills. However, ODL systems are characterized by learning mostly at a distance with relatively less F2F contact between the learner and the institution with use of appropriate ICT applications to bridge the physical distance. The F2F component of different ODL systems would vary according to the learning/training outcomes of the programme/course. A uniform system for all vocational courses could lead to certain learning gaps in vocations where the hard skills have to be inculcated. Thus, there is a need to think of different designs of vocational instruction for soft and hard vocations. The learning gap due to the relatively less F2F component can also be compensated by using appropriate technology, which would allow human interactivity as well as individualized virtual practice including use of simulations. Hence, ODL systems, which have been designed with appropriate blend of distance learning with F2F- and ICT-based simulations can be equally effective for all types of skill development. However, in India, notwithstanding the existing models developed by NIOS and IGNOU for vocational education and training, extensive experience of ODL systems for all types of technical and vocational training are not available. Open schooling for VET, although practised in both developed and developing countries, has not achieved that level of credibility but has the potential to achieve that.

c. Opportunity existing in India

India has a long history of using alternative modes of education such as correspondence education and ODL for a variety of educational needs. It was primarily the challenge of dealing with large numbers needing education at both school and higher-education levels that led the country to opt for non-formal

modes. ODL has now emerged as an alternative as well as a complementary channel of education and training in the country. The correspondence courses in higher education were initiated in the early 1960s. However, it was actually during the 1980s with the establishment of open universities at the provincial as well as the central level that a serious effort was made to offer education through ODL mode with all required course development and delivery systems using appropriate technology in place along with required quality assurance processes and for a variety of content areas.

The ODL systems for higher education led by IGNOU and for open schooling led by NIOS have already established its credibility and recognition. The growth, both quantitatively and qualitatively, of ODL at these levels has been phenomenal during the last two decades in the past, particularly after the fast growing ICT support during the last decade. ICT applications including educational satellite television, availability and accessibility of Internet in most parts of the country, development and production of low-cost computing facilities such as Akash 1 and Akash 2 and setting up of national repositories like the National Mission on Education through ICT (NMEICT or Sakshat), IGNOU's eGyankosh and National Programme of Technology Enhanced Learning (NPTEL) gave a major boost to the accelerated development of ODL both in terms of enhanced quality and increased opportunity for larger enrolment. The role of technology-mediated ODL is going to be more and more predominant in the coming decades. The process of convergence between ODL and conventional education is becoming faster and it will continue to be necessarily so. There is an immediate need for the planners and policymakers to formulate necessary policies and strategies to enhance the quality of ODL and availability of free and open resources in India. There is also the need for development of low-cost haptic devices for providing hands-on experience to the vocational trainee in very much needed skill-based programmes in the country. They work in mobile repairing, plumbing, electrician and construction area, particularly in unorganized area.

d. Possible threats

The extent of threat expected while implementing a large and sustainable model of ODL for VET based on the requirements of NVEQF is relatively less considering the existing opportunities and general acceptance for ODL-based initiatives in the country including a positive policy environment. However, there are a few possible threats to be dealt with while developing a workable, quality assured and

manageable ODL system for VET. These include the following:

- ❖ Upscaling of known models of ODL-based VET experiences within and outside India to develop a cost-effective and quality-assured model for the whole country and for all vocations and technical occupations is not an easy task. There has to be an eclectic approach to looking at success experiences and available models on one hand and flexible and open attitude to consider 'out of the box' solutions on the other while envisaging a new model of open schooling for VET in the country. It is crucial that the opportunity that exists today with a positive outlook among policymakers and acceptability among practitioners and employers should not be lost with a shoddy approach to design the open schooling system. Rather, this opportunity should be used in evolving a new design of open schooling for VET in the country that could turn out to be a model applicable in all developing countries with large training needs like India as it happened with the general open schooling model for school education (Daniel and Phillips, 2006).
- ❖ The proposed open schooling system for VET will have to accommodate and develop strong relationships with new partners including the SSCs of NSDC, industries and technical and vocational institutes in new sectors. Its earlier experiences and main partners have been mostly from the education sector notwithstanding its limited experience with some vocational areas. Partnering with relatively new and lesser-known stakeholders such as a variety of governmental and non-governmental institutions and employers including small and large business houses can turn out to be a threat. NIOS may have to think of making appropriate changes in its policy statements to include vocational education and training as an equally important area of focus and also have representatives of vocational institutes and industries as members in its governing structures such as the Board of Management and Academic Council. It may have to constitute a national council for governing the open VET system. Apprehensions some stakeholders might express with regard to the potential of ODL for skill development in case of skills associated with hard vocations may have to be addressed with proper research, advocacy and capacity building efforts.

SKILL DEVELOPMENT STRATEGY FOR OPEN SCHOOLING

Most of the requirements of the NVEQF pertain to changes that would impact all modes of VET including the ODL mode. There are general policy and structural

changes envisaged for the entire system of VET. The framework is not explicit enough in specific matters related to VET curriculum, curriculum transaction and assessment. These are to be done by different CDAs and SSCs. However, the open schooling system that follows the ODL mode in India has to consider some of the curriculum-specific requirements indicated in the framework as well as the transactional requirements of VET in general and some skill areas in specific. Some of the issues/challenges open schooling could deal with are the following:

- ❖ **Need for a Modular Credit-based System:** The open schooling system in India has not been following a well-defined modular credit-based system, though there has been a practice of transfer of marks in individual subjects between NIOS and state open schools as well as from CBSC to NIOS. However, IGNOU has been following a modular credit-based system, clearly operationalizing the credits in terms of study hours, accumulation of credits leading to certificates, diplomas and degrees and transfer of credits within and across levels of education. IGNOU has been following such a system for its programmes within the university and at the same time encourages transfer of credits from one open university to another. Some campus-based universities also have become part of this arrangement on a bilateral basis. However, in order to transfer credits across institutions or universities, there is a need to follow a common credit system with agreed credit hours and a scheme for credit accumulation and transfer. NIOS could take the lead in developing such a modular credit-based system for both its academic and vocational programmes. The system that could be developed by NIOS along with other vocational institutes in the formal and non-formal modes could be followed across the VET system.
- ❖ **Recognition of Prior Learning (RPL):** An implementation scheme for RPL for first two levels is already developed by NIOS as required by NVEQF. The present system provides guidelines for RPL comparable to Level-1 and Level-2 certification to enter Level-3 courses/programmes. NIOS has already developed framework for recognition of prior learning and planning to implement it at the national level.
- ❖ **Designing an Open VET System:** NIOS is a pioneer in blended learning, combining distance learning with face-to-face support for academic school education as well as vocational education and training. It has over 20 years of experience in offering vocational courses and subjects at secondary and

senior secondary school levels. Open learning systems abroad (such as OPNZ and UKOU) have also shown how innovative ICT and blended learning can be effectively used for developing technical and vocational skills. However, experience of NIOS has been more extensive in general secondary and senior secondary programmes as compared to vocational area. Only about 5% of its enrolment is in the vocational programmes. Hence, it has to build on its limited success combined with the experiences from other countries and the available and accessible ICT facilities to design a system of open schooling for VET that will suit the contextual requirements and resource conditions. This is probably the most difficult challenge that open schooling in India has to deal with, especially considering the large numbers to be trained.

- ❖ **Competency-based Assessment Systems:** There are several workable examples of competency-based assessment systems used in the ODL mode across the world. The open schooling system in India has been mostly following the assessment modalities used in the formal system. With its international linkages, NIOS could bring in experiences and practices from institutions abroad to develop a contextualized system for India.
- ❖ **Developing an Academia–Industry Alignment:** Linkage with workshops and work situations for skill development has been the critical factor for the effectiveness of vocational programmes. NIOS has successfully used the academia–vocational institute partnership and to a limited extent the academia–industry partnership. This model has been used by IGNOU too in many of its programmes requiring practical training and practice in workplace situations.
- ❖ **Modifications in Teaching Learning Approaches:** Globally, ODL systems have been relatively more receptive to all innovative pedagogical approaches and learning technologies. Formal systems have been more rigid regarding change. This is true of both academic and probably more so in the formal vocational institutions. There are a number of innovative and technology-based learning approaches and learner support practices used in ODL institutions across the world that could be adopted for open vocational education in India.
- ❖ **Need for Flexibilities:** NVEQF has shown a very positive approach to flexibilities in many aspects including flexibility of modes, credit transfer, and

modular approach in the learning approaches and/or environment. The concept and practice of open schooling itself emerged because of the philosophy of openness or flexibilities in student enrolment and learning. Today, we are into the second type of openness namely open educational resources (OER) and it is expected that the large resource of digitized multimedia materials with open licences is expected to facilitate development of vocational competencies especially in the ODL mode.

The NIOS, as the national agency coordinating the open schooling system in the country through NCOS, has a great responsibility in promoting NVEQF compatible courses in all state open schools and provide appropriate capacity building assistance to them apart from aligning its own courses to the NVEQF. Considering the features of NVEQF, recommendations can be categorized under two headings: Curriculum and Resources System (CRS) and Student Support System (SSS).

a. Curriculum and Resources

This operational area constitutes all functions related to curriculum development, instructional designing, designing of learning environment, resource material development and adoption/adaptation and learner assessment, identification of market demands and clientele need assessment related to various vocational areas, identifying relevant VET areas, programmes and courses, entry requirement for each programme/course and corresponding target population, formulation of curriculum framework including learning outcomes and national occupational standards for each occupational area, designing instruction and media mix, creation and curation of learning and training materials, formulation of generic and occupation specific curriculum transaction requirements, formulation of assessment criteria and techniques.

- ❖ **Market Demand and Learner Needs:** This is a continuing process of regular assessment of market demand and learner needs mainly looking at the secondary data made available about human resource requirement in the country. National-level data on manpower requirement projections brought out by the Government of India can be the basis on which initial identification of vocational areas within each vocational sector can be made for starting vocational courses. This is expected to be done by the individual SSCs.
- ❖ **Occupational Standards and Learning Outcomes:** This is already clarified in the NVEQF that the responsibility of defining the occupational standards and

learning outcomes for vocations under each skill sector will be with the concerned SSCs. While NOS is being developed by various SSCs, there may be certain areas, where there is no SSC or an already existing programme of NIOS does not fall under any SSC. In such a situation, NIOS should take necessary steps to develop appropriate NOS and qualifications pack as per the NSQF norms, and work with NSDC and NQSC for their approval.

- ❖ **Curriculum Framework and Content Stipulation:** This responsibility will remain with the CDA for school level, like NCERT. This has been clarified in the NVEQF. NIOS, being a certifying board, should develop its curriculum and content taking the national frameworks available for school education into consideration.
- ❖ **Modular Credit-based System:** This is a novel proposal made in the NVEQF. Such uniform modular credit-based system does not exist today for the VET system. NIOS could take a lead in this task along with other stakeholders such as SSCs and agencies such as NCERT and SCERTs who are responsible for schooling. NVEQF strives to build a flexible vocational education and training system in the country, thereby allowing individuals to accumulate their knowledge and skills in a progression mode. The framework allows for formal, non-formal and informal modes of education for VET and recommends the creation of a modular credit-based system in VET, which would operationalize the accumulation and transfer of credits. The open schooling system led by NIOS, though implemented innovations such as the grading system and the modular approach, it is yet to adopt a modular credit-based approach. NIOS needs to create courses and programmes in VET with notional credit value to align with NVEQF.
- ❖ **Multi-level Framework for Recognition of Prior Learning:** NIOS has developed a Framework for Recognition of Prior Learning (2013) with the objectives to facilitate the implementation of RPL that will facilitate the integration of skills acquired through formal, non-formal and informal educational modes. RPL is a method of assessment that considers whether individuals can meet the assessment requirements for a competency or a set of competencies that they already possess.
- ❖ **Content Transactional Requirements:** Theoretical and practical (skill) related content for each vocational course is decided primarily by the CDAs as per the stipulation of the NVEQF. The organization and sequencing of the content will

have to be carried out by NIOS or the SOSs. The various components of a course need to be delivered using ODL approaches, and NIOS will define these as an extension of qualification packs through appropriate instructional design and media mix.

- ❖ **Instructional Design and Appropriate Media Mix:** Instructional design and media mix will be the responsibility of NIOS and SOSs taking into consideration the national occupational standards (NOS) and the learning outcomes formulated by each SSC and the content requirements given by the CDAs. The design will also consider the contextual conditions including the infrastructure and technology considerations. For example, the notional credit of a level needs to be articulated in terms of the use of different components of ODL. A typical example of the media mix can be as indicated in Table 1. The decision to arrive at the media mix need to involve a course design team consisting of instructional design experts, media experts, and subject matter experts, including professionals from the SSC and respective industry.

Table 1: A Media Mix for a VET Course by Open Schooling Mode

		Media & Materials				Assessment		Total Study Hours
THEORY		Offline self-instructional materials	Offline other multimedia resources	F2F tutorial	LMS-based interaction	Formative-assignments	Summative-theory exam	650 hrs
	Location	Home	Home	AVIs	AVIs or home	Home		
	Study hours	275 hrs	100 hrs	100 hrs	100 hrs	60 hrs	15 hrs	
PRACTICE		Workshop-based practice	Workplace-based practice	Technology-enhanced practice		Portfolio of work done	External assessment by AAs	350 hrs
	Location	Workshop or laboratory at AVIs	Industry or other employers	AVIs		AVIs or industries	AVIs	
	Study hours	150 hrs	100 hrs	25 hrs		50 hrs	25 hrs	

Note: The hours in the table are only indicative.

- ❖ **Assessment and Certification:** Learner assessment and certification is one of the critical areas in the operationalization of the VET system. The credibility and acceptability of assessment will depend on two factors: one, quality of assessment using and integrating the latest approaches and techniques of assessment and two, the acceptability and credibility of the assessment for employers and other stakeholders. The quality of assessment could be achieved by the processes given in Table 2.

Table 2: Assessment Details for a Typical Course

	Assessment Techniques/Tools Used and Weight	Venue of Assessment	Persons and Agencies
Theory	60–65% (based on curriculum hours assigned by NVEQF for theory)		
Continuous assessment	Teacher Marked Assignments and Computer Marked Assessment in addition to self-assesses questions and problems in the materials given	AVIs, online/offline	Tutors/facilitators
Terminal assessment	Course-end written examination	AVIs and examination centres	NIOS at identified exam centres
Practical	30–35% (based on curriculum hours assigned by NVEQF for practice)	Industry/work centre/laboratory	NSDA/NIOS certified assessor
Continuous assessment	Assessment of performance in small tasks/practical work given during the training and workplace attachment period. Use of portfolio approach 50%	Workshops and workplaces	Tutors, facilitators and instructors
Terminal assessment	Course-end assessment of performance on work-related skills in specially organized sessions 50%	Workshops and workplaces	Accredited assessors along with internal assessors

The NVEQF does indicate the need for close participation of SSCs and the national/state boards in operationalizing all required assessment processes and final award of certificates to successful learners. There are conflicting views expressed during the consultative process prior to the development of this document. There is agreement on the assessment of the theory component, where all agree that NIOS or SOS board that has extensive experience in organizing theory-based examinations will be able to perform this task effectively. The difference of

opinion is with regard to the assessment of the practical component. The SSC representatives think that this will be done by assessors accredited by the concerned SSC. They also want assessment of the practical component to be carried out by the concerned SSC and the certificate will be jointly given by the SSC and the Board (NIOS or SOS) in the case of open schooling mode. All agree that the assessment framework and nature of questions and tools should be broadly decided by NIOS/SOS with the approval the relevant SSC and the practical assessors to be trained and accredited by the relevant SSC. However, many think that it will be extremely difficult or even impossible for each SSC to conduct the practical assessment for a large number of candidates spread all over the country on a regular basis, at least twice a year. The NSQF has clarified on this aspect and stipulates that assessment will be carried out by the respective training providers (in our case NIOS and state open schools), and the assessment and certification norms will be developed by the respective SSCs.

b. Student Support System

Once learning materials have been developed and distributed to the learners, they are passed over to the learner sub-system. This sub-system comprises all of the activities, staff and other resources that are involved in facilitating learning by students and managing their progress through a programme. Some possibilities of student support are indicated in Table 3.

Table 3: Student Support Possibilities

LEARNER SUPPORT Functions in the Area	Lead Stakeholder	Supporting or Participating Stakeholders	Any Organizational, Procedural or Technical Arrangement
Programme/course enrolment	NIOS, SOS	VET institutes	
Recognition of prior learning	NIOS		Assessment modalities for RPL
Learning material provision (online)	NIOS, SOS	Partners having online interactive materials	Providing virtual learning platforms and resources
Interactive learning support	NIOS, AVIs	Governmental and non-governmental vocational institutes	F2F tutorials, online synchronous and non-synchronous modes, teleconferencing
Observation and practice of skills in occupational situations	NIOS, SOS	Industries, business houses	Work attachment, internship, simulations, virtual vocational practice
Formative assessment and ongoing feedback	NIOS, SOSs, AVIs		e-portfolios constituting all types of continuous assessment by tutors and instructors
Summative assessment	NIOS, SOSs, AVIs,	SSCs	Terminal theory examination and testing vocation-related skills by AAs

IMPLEMENTATION PLAN

This section discusses in detail the steps to be adopted by NIOS for implementing the NSQF/NVEQF strategy for open schooling. As the main apex organization in the country, the role of NIOS is to initiate action towards implementation bringing together the different stakeholders at each stage. Initiation and implementation of the strategic and operational details given in this document could be carried out following the sequence of activities presented here:

- a. **Advocacy and Sharing with Stakeholders:** NIOS should disseminate this document to all the state open schools for further discussions and organize a national-level forum to discuss the modalities further as a strategy for advocacy and capacity building of all stakeholders.
- b. **Give Responsibility to NCOS:** The NCOS may be given the responsibility of coordinating the implementation strategy in all open schools, while the Vocational Education Department of NIOS may initiate action as per the NSQF to align existing courses and develop new courses.
- c. **Strengthen NIOS Academic Council with Representatives of SSCs:** Select experts nominated by the SSCs may be included in the Academic Council of NIOS to help provide expert guidance in vocational course development as per the NSQF.
- d. **Develop a Timeline to Align All the Existing Vocational Courses of NIOS:** The Department of Vocational Education need to develop a plan and timeline to align all its existing courses into NSQF compliant. This may be accorded high priority and completed in the next 3 years' time.
- e. **Identification of New Vocational Programmes and Courses in Different Sectors:** Based on the analysis of published data related to market needs, human resource requirements and employment opportunities in different skill sectors as well as occasional market surveys, NIOS should be expected to identify the demand for skilled personnel in various sectors. This could be the basis on which new VET courses and programmes can be identified.
- f. **Vocational Course Design and Development:** While designing and developing vocational courses with existing NOS and qualification pack, the NIOS expert team should clearly articulate the media mix, learner support and assessment mechanism as required by the SSCs. In areas where no SSCs are present, NIOS

should involve experts in instructional design and subject matter experts to develop NOS and qualification packs before developing the media mix, scheme for learner support and assessment standards.

- g. Establishing and/or Acquiring Infrastructure:** Both learner support activities and monitoring will require infrastructure including buildings and equipment in the NIOS headquarters, regional centres, state open schools and in AVIs and vocational institutes at the field level for learner support practical work, and assessment of skills. NIOS may like to develop requirements for AVIs to partner for delivery of courses, and assess their suitability through a credible system of review and physical checking. It may also implement and further augment its online accreditation system for this purpose. The services and facilities available in each of the AVIs should be made public through its webpage.
- h. Skills Training Material Resource Repository:** NIOS should take the lead in establishing a national repository for the collection, creation and distribution of multimedia curriculum and other resource material for the use of all institutions and learners of VET. This should include all newly developed materials as well as open educational resources. NIOS already practices the OER creation and this could be further strengthened.

CONCLUSION

This document is developed after extensive interaction with various stakeholders who are involved in policy making and implementation of the NVEQF. The present document attempts to all aspects involved in the implementation of NVEQF within the context of VET certification at level 5 and below. This document should be shared and discussed among representatives of all stakeholders. This document provides broad recommendations for each aspect of implementing NVEQF/NSQF in the open schooling context in India.

REFERENCES

- Attwell, G. (1999). CDEFOP research resource base on ICTs and vocational education and training: An introduction and guide. Germany: CDEFOP, p. 1.
- Cedefop (2004). European perspectives on learning at work: The acquisition of work process knowledge. Luxembourg: Publications Office. (Cedefop Panorama series; 56), from http://www.cedefop.europa.eu/EN/Files/3033_en.pdf
- Cedefop (2011). Learning on working: Success stories on workplace learning in Europe. Luxembourg: Publications Office of the European Union, from http://www.cedefop.europa.eu/EN/Files/3060_en.pdf
- Chan, Selena, Fisher, Katrina, & Sauer, Peter (2001). Situated-technology—Enhanced learning through development of interactive etextbooks on net tablets. National Centre for Tertiary Teaching Excellence, from <http://akoatearua.ac.nz/download/ng/file/group-7/guidelines-for-developing-interactive-etextbooks-on-net-tablets.pdf>
- Collins, A. (1988). Cognitive apprenticeship and instructional technology (Technical report no. 6899). Cambridge, MA: BBN Labs Inc.
- Daniel, J., & Phillips, S. (2006). Open Schooling for Better Working, Processing of the International Conference on Vocational Education and Training through Open Schooling: Challenges and Future Strategies, Kovalam, Kerala, India, 8–10 February 2006, p. 9.
- Furst-Bowe, J.A. (1996). An analysis of competencies needed by trainers to use computer-based technologies and distance learning systems. *Performance and Improvement Quarterly*, 9(4), pp. 57–78.
- IGNOU (2013). IGNOU Profile 2013, New Delhi, from <http://ignou.ac.in/userfiles/English%20Profile%20Book%20All%20Page%202013.pdf>
- Imel, S. (1998). Technology and adult learning: Current perspectives. ERIC Digest No. 197, from <http://webpages.marshall.edu/~skeens24/ATE%20628%20Reflections/Unit%208/Techology%20and%20Adult%20Learning.pdf>
- Kasworm, C.E., & Londoner, C.A. (2000). Adult learning and technology. In Wilson, A.L., & Hayse, E.R. (Eds.), *Handbook of adult and continuing education*. San Francisco, CA: Jossey-Bass.
- Kupsh, J., & Mason, S. (1986). Designing Technical and Skills Training Programmes. In Birnbrauer, H. (Ed.), *The ASTD Handbook for Technical and Skills Training*, (pp. 25–35). Alexandria: American Society for Training and Development.
- Ministry of Finance (2013). National Skill Qualifications Framework, from http://www.skilldevelopment.gov.in/sites/default/files/resources/NQSF_Notification_English.pdf
- Ministry of Human Resource Development (2012). National Vocational Education Qualification Framework, New Delhi.
- Ministry of Human Resource Development: National Policy on Education (1986). Government of India.

- Moore, M., & Kearsley, G. (1996). Distance education: A systems view. Belmont, CA: Wadsworth Publishing.
- National Programme on Technology Enhanced Learning (NPTEL), from <http://nptel.iitm.ac.in/>
- New London Group (1996). A pedagogy of multiliteracies: Designing social futures, *Harvard Educational Review*; 66 (1); pp. 60-92.
- NIOS (2012). National Institute of Open Schooling: A Profile 2012, from <http://www.nios.ac.in/media/documents/comosajournal/NIOS-A-Profile-2012.pdf>
- OLCOS, The Open eLearning Content Observatory Services project (1/2006-12/2007), from <http://www.olcos.org/english/about/>
- Open Courseware (2001). Massachusetts Institute of Technology, from <http://ocw.mit.edu/index.htm>
- Paryono & Quito, B. G. (2010). Meta-analysis of ICT integration in vocational and technical education in South East Asia, from [http://www.voctech.org.bn/conference/papers/\[VOCTECH\]%20Paryono%20&%20Ben.pdf](http://www.voctech.org.bn/conference/papers/[VOCTECH]%20Paryono%20&%20Ben.pdf)
- Pina, Patricia, Kotin, Tim, Hausman, Vicky, & Macharia, Edwin (2012). Skills for employability: The informal economy, Results for Development Institute (R4D). Retrieved November 10, 2013, from <http://r4d.org/sites/resultsfordevelopment.org/files/resources/Skills%20for%20Employability%20in%20the%20Informal%20Economy.pdf>
- Rumble, G., & Koul, B.N. (2007). Open schooling for secondary and higher secondary education, Commonwealth of Learning, Vancouver.
- Sakshat, National Mission on Education through ICT (NME-ICT), from <http://www.sakshat.ac.in/>
- UNESCAP (2013). United Nations' economic and social survey of Asia and the Pacific, from <http://www.unescap.org/pdd/publications/survey2013/index.asp>
- UNESCO (2003). The use of ICTs in technical and vocational education and training: analytical survey. UNESCO Institute for Information Technologies in Education, Moscow, from <http://iite.unesco.org/pics/publications/en/files/3214613.pdf>
- UNESCO (2009). Belem Framework for Action, from http://www.unesco.org/fileadmin/MULTIMEDIA/INSTITUTES/UIIL/confintea/pdf/News/confinteavi_final_report_eng_1_online.pdf
- UNESCO (2013). Implications of the ICT revolution for technical and vocational education and training. UNESCO-UNEVOC virtual conference on ICT and TVET, from <http://www.unescobkk.org/en/education/news/article/implications-of-the-ict-revolution-for-technical-and-vocational-education-and-training-unesco-unevo/>
- Wonacott, Michael E. (2001). Implications of distance education for CTE, ERIC Digest No. 227, from <http://www.calpro-online.org/ERIC/docs/dig227.pdf>



National Institute of Open Schooling

(An autonomous Institution under MHRD, Govt. of India)

A-24-25, Institutional Area, Sector-62, Noida, U.P.