UNESCO INSTITUTE FOR
INFORMATION TECHNOLOGIES
IN EDUCATION (IITE)
8 Kedrova St. (Bld.3)
117292 Moscow
Russian Federation

IITE/MOS/RS1/00/INF.1
July 2000
Original: English

RESEARCH SEMINAR
"TEACHER TRAINING FOR INFORMATION SOCIETY"

21-22 July 2000, IITE, Moscow

PROVISIONAL TIMETABLE

July 20, Thursday

Arrival of the participants; meeting at the airport and railway station; hotel accommodation

20.00 Reception on behalf of the Director of IITE

July 21, Friday

09.30 - 10.00 Registration of the participants

10.00 - 10.45 Opening of the research seminar
Welcome addresses
Introduction of the participants
Adoption of the agenda
Election of the Chairperson
Election of the Rapporteur

10.45 - 11.10 Educational and training activities of IITE and research seminar's objectives. - Introductory speech by the Director of IITE Prof. V. Kinelev

11.10 - 11.30 Coffee-break

11.30- 12.20 IFIP proposals for "Elementary ICT Curriculum for Teacher Training":
- training objectives to be achieved
- table of contents of the complete programme
- basic technology competence. -

Presentation by Prof. A. Knierzinger (Austria) and Dr. Roesvik (Norway).

12.20 - 13.00 ICT and Teaching Capabilities. - The Scenario Model. - Presentation by Prof. B. Andresen (Denmark) and discussion

13.00 - 15.00 Lunch time

15.00 - 16.20 Continuation of presentation of the IFIP proposals for "Elementary ICT Curriculum for Teacher Training":
- logical framework for the organization of the modules
- module titles
- definition of principles regarding the internal organization of the modules.

16.20 - 16.40 *Coffee-break*

16.40 - 18.00 Thematic discussions

18.00 - 19.00 *Dinner time*

19.00 - 21.00 Moscow city sight seeing tour

July 22, Saturday

10.00 - 11.20 "Informatics in Primary Education. Recommendations". - Presentation by Dr. E. Bulin-Sokolova (Russian Federation)

11.20 - 11.40 *Coffee-break*

11.40 - 13.00 Application of "Informatics in Primary Education. Recommendations" in UNESCO Member States. Discussion

13.00 - 15.00 *Lunch time*

15.00 - 16.20 Intersectoral UNESCO project "The Status of Teachers and Teacher Education in the Information Society" and IITE educational programme. - Round-table discussion moderated by Prof. A. Semenov (Russian Federation)

16.20 - 16.40 *Coffee-break*

16.40 - 17.30 Continuation of discussion

17.30 - 19.00 Discussion and approval of the Recommendations of the research seminar

Closure of the research seminar

July 23, Sunday

Departure of the participants

IITE

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PROVISIONAL LIST OF PARTICIPANTS

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Jacques Tardif, psychologue de l'éducation, est actuellement professeur titulaire à la Faculté d'éducation de l'Université de Sherbrooke et professeur associé à la Faculté des sciences de l'éducation de l'Université de Montréal. Il participe régulièrement à des projets spéciaux dans des écoles visant à ce que les élèves puissent attribuer du sens à leurs apprentissages et se donner le maximum de pouvoir personnel dans leurs démarches de construction de connaissances et de développement de compétences. Il est fréquemment invité à des rencontres de formation continue pour des enseignants de divers ordres d'enseignement.

Il est l'auteur de : Pour un enseignement stratégique. L'apport de la psychologie cognitive, *Montréal, Les Éditions Logiques, 1992.*

Collection
Pratiques et enjeux pédagogiques
dirigée par Michel Develay
avec la collaboration de Philippe Meirieu

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Jacques Tardif
avec la collaboration d'Annie Presseau

Intégrer les nouvelles technologies de l'information

Quel cadre pédagogique ?

ESF
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23, rue Truffaut, 75017 Paris

« [...] L'histoire de l'école est l'histoire d'une mise à l'écart : mise à l'écart des enfants par rapport aux adultes, mise à l'écart de la préparation à la vie par rapport à la vie elle-même, mise à l'écart de l'apprentissage par rapport aux activités productives. » (Rey, 1996, 52)

« Learning is a consequence of thinking. » (Perkins, 1992, 78)

Avertissement : Le terme « exercisation », utilisé par l'auteur, est d'usage très courant au Québec et signifie que les élèves doivent faire des exercices répétitifs (exemple : vingt problèmes de mathématiques de même nature ou appliquer la même règle grammaticale dans dix phrases différentes) sans que le sens soit une préoccupation pour les enseignants et pour les élèves.

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Introduction

Les sociétés modernes ont atteint leur objectif de démocratisation pour ce qui est de l'accès à l'école. Sans discrimination raciale, culturelle, sexuelle ou religieuse, tous les jeunes de ces sociétés ont en effet la possibilité de poursuivre une scolarité de niveau primaire et secondaire. Il s'agit d'un grand succès qu'il faut souligner et d'un progrès notable par rapport aux quelques décennies précédentes. Il importe toutefois que ce succès ne contribue pas à masquer le fait que la démocratisation de l'accès à l'école s'arrête brusquement à la fin de la scolarité obligatoire. En réalité, lorsque l'on considère les statistiques relatives à la provenance des jeunes qui peuvent entrer dans les milieux d'enseignement postsecondaire, force est de constater que les inclus et les exclus ne partagent pas les mêmes caractéristiques et que leurs origines familiales et sociales marquent fortement leur orientation scolaire et professionnelle. Les sociétés modernes ouvriraient donc les portes de l'école suffisamment longtemps à tous les jeunes, de sorte qu'ils soient en mesure de réaliser certains apprentissages considérés comme essentiels pour s'intégrer socialement, mais elles les fermeraient brusquement à plusieurs d'entre eux lorsqu'il est question de poursuivre, afin de développer des compétences techniques ou professionnelles spécialisées.

Pour de nombreux jeunes, les portes de l'école se ferment d'une façon insidieuse qui rend cependant une telle fermeture acceptable pour la majorité des acteurs sociaux. Les jeunes en question ne peuvent pas continuer leur scolarité parce qu'ils ne disposent pas des connaissances et des compétences suffisantes, parce que les résultats scolaires obtenus sont trop faibles, parce qu'ils n'ont pas démontré un assez haut niveau d'engagement dans leurs études ou encore, selon certains, parce qu'ils n'ont pas les talents ou les aptitudes nécessaires. Dans les faits, l'impossibilité de poursuivre après la scolarité obligatoire repose essentiellement sur l'échec lamentable de l'école quant à la démocratisation de la réussite. En milieu scolaire, la démocratisation de l'accès à l'école ou la démocratisation de l'enseignement n'a pas eu comme corollaire la démocratisation de l'apprentissage, ni la démocratisation de la réussite. Beaucoup de jeunes se retrouvent en situation de difficulté ou d'échec à l'école ; certains doivent même vivre le redoublement ou la ségrégation.

Il existe une relation dynamique puissante entre l'absence de démocratisation de l'apprentissage ou de la réussite et l'impossibilité de poursuivre après la scolarité obligatoire. Les enseignants ne parviennent pas à faire en sorte que tous les élèves réalisent les apprentissages reconnus essentiels par les programmes ministériels ou départementaux. Dans ce contexte, certains ministères et certains départements recourent à l'idée d'objectifs minimaux terminaux, afin de permettre aux enseignants de disposer de points de repère explicites pour déterminer le droit de passage des élèves d'une année scolaire à l'autre et d'un ordre d'enseignement à l'autre. Cependant, à l'exception des élèves et de leurs parents, les acteurs de l'école savent que l'atteinte minimale d'objectifs terminaux ne garantit pas que les élèves aient intégré les connaissances et les compétences servant d'ancrage aux apprentissages à venir. Les objectifs minimaux terminaux constituent un instrument efficace pour la gestion de l'enseignement et pour l'organisation du travail au détriment de la qualité de l'apprentissage. L'école mettrait donc elle-même en place des cheminements scolaires qui conduisent les élèves à des impasses.

L'impossibilité pour l'école de démocratiser l'apprentissage ne semble constituer que la pointe de l'iceberg des difficultés et des limites qu'elle rencontre actuellement. Malgré le fait que le qualificatif obligatoire soit accolé à la scolarisation jusqu'à la fin du secondaire, un nombre important de jeunes, entre 25 % et 30 % dans certains pays, quittent l'école avant d'avoir obtenu leur diplôme de fin d'études secondaires. Leur décision, qui présente des conséquences lourdes sur leur avenir ainsi que sur leur intégration dans la société, envoie des messages clairs aux acteurs scolaires pour ce qui est des apprentissages que ces jeunes n'espèrent pas pouvoir effectuer dans le cadre de l'école. Un taux d'abandon anormalement élevé se retrouve également dans le milieu universitaire et les interrogations quant aux retombées de l'enseignement sur l'apprentissage sont nombreuses et pertinentes pour tous les ordres d'enseignement.

Lorsque les résultats scolaires sont pris en considération, il est vraisemblable d'estimer que plusieurs élèves réussissent dans les institutions d'enseignement et que ces dernières parviennent à susciter une évolution significative pour un grand nombre d'entre eux. Toutefois, en dépit de cette réussite observée sur un plan quantitatif, le degré d'engagement de certains de ces élèves est parfois très bas et leur motivation scolaire repose davantage sur des intentions à long terme que sur la perception que les apprentissages qu'ils sont en train de réaliser ont du sens ou contribuent à une meilleure compréhension du monde dans lequel ils vivent. Il s'agirait d'une transition obligée, de longue durée, en attendant un avenir plus intéressant. De plus, des jeunes développent la perception que l'école est essentiellement un lieu d'évaluation, par opposition à un lieu d'apprentissage, et, compte tenu de leur compréhension du métier d'élève, cette perception les incite souvent à prendre le minimum de risques en vue d'obtenir les notes les plus élevées possible. Les résultats

constituent toujours le droit d'entrée et le droit de passage. Selon une telle optique, la créativité et la marginalité ne seraient pas des caractéristiques très valorisées ni très reconnues en milieu scolaire, au moins pour les élèves.

L'iceberg des difficultés et des limites de l'école cache aussi d'autres problèmes et, dans une grande proportion, ces derniers touchent encore la démocratisation de l'apprentissage. Une impression étrange relative à l'échec de l'école se dégage non seulement des critiques à son égard, mais également des mesures que prennent certains milieux afin de contrôler les connaissances et les compétences maîtrisées au sortir d'un ordre d'enseignement donné et, dans certains cas, en vue d'offrir des modalités compensatoires si la maîtrise des connaissances et des compétences en question n'est pas suffisante. Il est étonnant, par exemple, que des milieux d'enseignement post-secondaire obligent tous leurs élèves à subir une épreuve en écriture dans le but de déterminer leur degré d'expertise dans ce domaine et qu'ils fassent de la réussite à cette épreuve une condition d'admission ou de diplomation. Les jeunes en question ont pourtant réussi les évaluations relatives à l'écriture lorsqu'ils étaient au secondaire et ils ont obtenu leur diplôme de fin d'études. À l'intérieur même du système scolaire, chaque ordre d'enseignement accorderait donc très peu de crédibilité aux apprentissages réalisés par les élèves dans un ordre d'enseignement antérieur.

Cette méfiance observable entre les ordres d'enseignement ne constitue pas un phénomène exclusif à l'école. Il existe en effet plusieurs milieux de travail qui constatent que le diplôme de fin d'études secondaires ne représente plus un document de référence, permettant de connaître le niveau d'expertise atteint par les élèves quant à la maîtrise de la langue orale et écrite et quant aux mathématiques. Selon eux, des élèves ayant terminé avec succès leurs études secondaires poseraient certaines actions dangereuses pour ce qui est de la sécurité au travail en raison du fait qu'ils éprouvent des difficultés ou qu'ils présentent des limites en communication orale, en lecture, en écriture et en mathématiques. La méfiance est également perceptible dans le cas des écoles et des districts ou des commissions scolaires qui font subir une épreuve de maîtrise de la langue et une épreuve de connaissances générales aux enseignants qu'ils veulent embaucher. Ces personnes ont pourtant complété leur formation universitaire et elles ont obtenu un diplôme officiel.

Les institutions scolaires sont également la cible de nombreuses critiques, parfois acerbes, qui proviennent de diverses sources. Bien que les orientations et les visées de ces critiques ne fassent pas consensus, elles portent sans exception sur l'efficacité de l'école. Certaines insistent sur la conclusion que les milieux scolaires ne parviennent pas à favoriser chez les jeunes une formation de base, une formation fondamentale ou générale. D'autres, à l'inverse, estiment que l'école a une orientation beaucoup trop générale ou trop insulaire et qu'elle n'entretient pas suffisamment de liens avec les milieux de travail, qu'ils soient techniques ou professionnels. D'autres encore, se préoccupant du transfert des apprentissages, s'interrogent sérieusement sur la capacité de l'école de contribuer à la construction de connaissances et au développement de compétences qui garantissent une meilleure compréhension du monde.

Il ne fait aucun doute que l'école soit en crise et qu'elle se trouve dans une situation où de fortes pressions l'obligent à revoir et à préciser, une nouvelle fois, non seulement ses finalités et ses intentions à l'égard des élèves, mais aussi ses pratiques pédagogiques et évaluatives. Dans le contexte actuel, avec le développement des technologies de l'information et de la communication, une telle remise en question prend toutefois un sens fort différent. Ces technologies changent radicalement les moyens de communication et de production dans la société et elles rendent disponibles à volonté l'ensemble des savoirs et des informations à la base de la scolarisation, qu'il s'agisse de la scolarité obligatoire ou de la scolarité postsecondaire. Les technologies de l'information et de la communication imposent donc au milieu scolaire des contraintes inédites jusqu'à maintenant et leur ignorance dans la remise en question de l'école, ne serait-ce que pour conclure consciemment à leur inutilité, constituerait une forme de cécité irresponsable sur le plan professionnel.

Tenant pour acquis que les tensions ressenties dans l'école et les critiques à l'égard de cette institution reposent sur des fondements sérieux, qu'elles sont récurrentes et additives et qu'elles illustrent des problèmes importants et incontournables, et tenant pour acquis que de telles tensions et de telles critiques, lorsqu'elles sont considérées dans une perspective systémique, sont fondamentalement génératrices de changements, ce livre met l'accent sur la compréhension de la complexité de l'apprentissage. Il n'insiste sur l'organisation du travail et sur l'enseignement que dans une relation de subordination de ces derniers par rapport à l'apprentissage. En toile de fond, le livre soutient la thèse que la logique de la complexité de l'apprentissage signifiant doit commander la logique de l'enseignement et de l'organisation du travail et que l'inversion de ces logiques constitue le grand facteur des maux de l'école. Il défend aussi l'idée que l'école doit intégrer les technologies de l'information et de la communication et que la réussite de cette intégration exige la prise en compte de la complexité de l'apprentissage.

En même temps qu'il aborde la dynamique de l'apprentissage, le livre traite de l'évaluation et des pratiques évaluatives. Fréquemment, dans le discours pédagogique, ces deux éléments, l'apprentissage et l'évaluation, sont considérés en ignorant complètement leur synergie. L'évaluation impose aux élèves une perspective particulière pour ce qui est des apprentissages valorisés par les enseignants et, dans ce domaine, il existe des ruptures importantes entre la parole et l'action, entre les pratiques d'enseignement et

les pratiques évaluatives. L'ouvrage insiste en conséquence sur les relations étroites devant être établies entre les situations d'apprentissage et les situations d'évaluation et il propose que l'évaluation soit constamment enchâssée dans les démarches d'apprentissage.

Le livre souligne le fait que les technologies de l'information et de la communication affectent la relation des élèves par rapport aux savoirs et aux informations et que, par ricochet, elles touchent les rôles des enseignants et des élèves. Il considère toutefois que ces technologies sont essentiellement de l'ordre des moyens d'enseignement et qu'elles ne sauraient être intégrées pour elles-mêmes dans la méconnaissance de la dynamique de la complexité de l'apprentissage. Dans la logique de cette optique, après avoir soutenu l'idée que l'école se trouve actuellement dans un contexte de rupture paradigmatique, le livre décrit la dynamique de l'apprentissage signifiant ainsi que les caractéristiques des environnements pédagogiques qui garantissent la prise en compte de cette dynamique, et il précise les nouveaux rôles des enseignants, de même que les orientations des pratiques évaluatives cohérentes avec ces environnements. Le dernier chapitre présente les démarches que réalisent des enseignantes d'une commission scolaire du Québec afin de mettre en place des environnements pédagogiques qui respectent les contraintes de la complexité de l'apprentissage, qui recourent aux technologies de l'information et de la communication comme moyens à la disposition des élèves, et qui enchâssent les situations d'évaluation dans les situations d'apprentissage.

1

Jusqu'à une rupture paradigmatique

« Our new understanding about learning is paralleled by radical developments in technology. The technological revolution holds the power to alter our education system, our work, and our culture. Indeed, this revolution puts learning and our traditional, conventional education systems on a collision course. The essence of the coming integrated, universal, multimedia digital network is discovery – the emporwerment of the human mind to learn spontaneously, independently, and collaboratively, without coercion. » (Abbott, 1997, 10)[1]

L'école et les enseignants subissent actuellement, de la part de la société, de nombreuses et fortes pressions pour qu'ils deviennent des agents de changements importants ; ces pressions contribuent à ce que l'école soit en déséquilibre, voire en crise. Malgré leur importance, les changements peuvent toutefois s'inscrire dans la logique des pratiques actuelles ou des pratiques conventionnelles, dans une sorte de continuité. Dans ce cas, il s'agit beaucoup plus de modifications que d'innovations ; il faut améliorer quelques actions professionnelles qui ne présentent que certaines limites ou certaines lacunes. En revanche, les changements peuvent se situer en rupture par rapport aux pratiques actuelles, exigeant alors que les enseignants inventent de nouvelles démarches et de nouveaux scénarios pédagogiques, qu'ils adoptent d'autres cadres de référence. Dans ce contexte, il devient nécessaire de créer quelque chose d'inédit parce que ce qui existe ne permet pas d'atteindre avec satisfaction les finalités et les objectifs poursuivis.

L'école et les enseignants se retrouvent présentement dans le deuxième cas de figure et tout changement opéré dans la logique et la continuité des

1. « Le développement exponentiel des technologies se produit au moment où nous disposons d'une nouvelle compréhension de l'apprentissage et une telle révolution technologique détient la possibilité de changer radicalement le monde scolaire, le monde du travail et la culture. En réalité, cette révolution entraîne la nouvelle compréhension de l'apprentissage et le système scolaire conventionnel dans un champ d'opposition et d'affrontement. En effet, la découverte, entendue dans le sens d'une augmentation du pouvoir personnel des être humains d'apprendre d'une manière spontanée, indépendante et coopérative, dans un contexte dénué de coercition, constitue l'essence même des nouveaux réseaux électroniques multimédia, qui sont intégrateurs et universels. »

Dans le cadre de ce projet, les activités d'enseignement sont centrées sur les démarches cognitives des élèves plutôt que sur l'enseignement frontal ou magistral. Les apprentissages résultent de problèmes ou de projets authentiques qui exigent des recherches dans des domaines comme les sciences, les sciences humaines, les sciences sociales, les mathématiques ou la littérature et, dans le but d'accroître le degré de signification des apprentissages, une attention particulière est constamment accordée aux relations entre les disciplines.

Il importe de souligner que, dans son évolution, le paradigme d'apprentissage est influencé par plusieurs courants de sources fort différentes : entre autres, la psychologie cognitive, la psychologie sociocognitive, le constructivisme et l'apprentissage contextualisé (*situated learning*). De plus, il est possible d'observer que les réflexions entourant l'entrée et l'usage du paradigme d'apprentissage dans le monde scolaire contribuent au fait que ce milieu s'approprie, d'une façon finalisée et « professionnalisée », des savoirs et des informations provenant de différents domaines comme la psychologie, la sociologie et l'épistémologie. C'est un pas significatif dans l'autonomisation de l'enseignement par rapport à des disciplines contributives. Les discussions épiques sur les liens de convergence et de divergence entre le cognitivisme, le sociocognitivisme, le constructivisme et le socioconstructivisme peuvent alors être poursuivies sur d'autres tribunes sans aucune conséquence directe pour les institutions scolaires et les enseignants, sans aucune conséquence non plus pour les élèves.

Les particularités du paradigme d'apprentissage

Les caractéristiques, les composantes et les exigences du paradigme d'apprentissage deviennent plus prégnantes lorsque ce dernier est mis en relation d'opposition par rapport au paradigme d'enseignement. Cette relation n'est pas arbitraire, d'ailleurs, puisque la naissance et le développement du paradigme d'apprentissage visent spécialement à contrecarrer les limites du paradigme d'enseignement en ce qui concerne l'évolution des jeunes dans le cadre de l'école. Pour cette raison, cette première partie du chapitre établit explicitement, sur une base régulière, des oppositions entre le paradigme d'apprentissage et le paradigme d'enseignement. Bien que l'établissement de telles relations puisse donner prise au dénigrement d'une orientation par rapport à l'autre, l'intention originale porte essentiellement sur la clarté de la compréhension.

Tableau 1

Particularités du paradigme d'apprentissage par rapport à celles du paradigme d'enseignement

	Paradigme d'apprentissage	Paradigme d'enseignement
Convergences en enseignement	• Développement de compétences • Réponses à des questions complexes • Création de relations	• Acquisition de connaissances • Développement d'automatismes • Mémorisation
Conception de l'apprentissage	• Transformation d'informations en connaissances viables et transférables • Intégration des connaissances dans des schémas cognitifs	• Accumulation d'informations • Accumulation de connaissances • Association des connaissances les unes aux autres
Activités de la classe	• À partir de l'élève • À partir de projets, de recherches ou de situations problématiques • Relations interactives	• À partir de l'enseignant • Fréquence élevée d'activités d'exercisation • Relations didactiques
Preuves de réussite	• Qualité de la compréhension • Qualité des compétences développées • Qualité des connaissances construites • Transférabilité des apprentissages	• Toujours la quantité d'informations retenues • Parfois la quantité de connaissances acquises
Modes d'évaluation	• En référence aux compétences développées • Portfolios	• En référence aux connaissances • Tests exigeant des réponses brèves
Orientation des rôles de l'enseignant	• Axés sur l'étayage et le désétayage • Parfois un apprenant	• Toujours un expert • Toujours un transmetteur d'informations
Orientation des rôles de l'élève	• Un constructeur actif • Un collaborateur • Parfois un expert	• Un récepteur passif • Un apprenant en situation d'interlocuteur
Attitudes et relations attendues de la part des élèves	• Entraide • Relations d'interdépendance	• Individualisme • Relations de compétition

[Tableau adapté à partir de Dwyer (1994)]

porte sur le fait que, dans le cadre du paradigme d'apprentissage, il y a des interactions constantes entre la théorie et la pratique. Cette caractéristique repose entre autres sur l'idée que « *les savoirs théoriques ne prennent une réelle signification que s'ils donnent naissance à des pratiques. Inversement du reste, une pratique ne prend toute sa signification que dès lors qu'elle est analysable avec des savoirs théoriques* » (Develay, 1994, 119). Dans les situations d'apprentissage, la théorie permet une meilleure planification de l'action ainsi qu'une objectivation plus adéquate et plus nuancée, alors que l'action garantit la contextualisation de la théorie et qu'elle oblige les ajustements relatifs à l'usage des connaissances et des compétences comme instruments. Lorsque la théorie précède l'action dans une situation d'apprentissage, les enseignants ne visent pas l'exhaustivité ; ils insistent plutôt sur les informations ou les savoirs pertinents par rapport à la problématique ou au phénomène en question. Les informations et les savoirs pertinents correspondent essentiellement aux éléments qui sont nécessaires et suffisants pour bien comprendre la situation et permettre la mise en place d'une démarche judicieuse et réfléchie.

L'intégration des évaluations aux situations d'apprentissage constitue la sixième caractéristique des environnements pédagogiques du paradigme d'apprentissage. Une première préoccupation porte sur l'idée que les pratiques évaluatives ne doivent présenter aucune rupture par rapport aux pratiques d'enseignement, étant donné que les contenus privilégiés quant à l'évaluation déterminent en grande partie les orientations que les élèves favorisent en apprentissage ainsi que les stratégies cognitives et métacognitives qu'ils déploient. Une deuxième préoccupation a trait au fait que, dans un contexte de développement de compétences et de construction de connaissances, les évaluations doivent permettre aux élèves d'objectiver les changements qui se produisent pour eux en raison de leur engagement dans la recherche d'un nouvel équilibre ou d'une nouvelle compréhension. Il est capital que les évaluations puissent déterminer et situer explicitement leurs métamorphoses sur une trajectoire développementale. Les évaluations constituent le moyen principal pour conduire les élèves à prendre conscience qu'une situation d'apprentissage particulière a provoqué l'évolution de telles connaissances et de telles compétences et cela, compte tenu de la maîtrise antérieure des connaissances et des compétences en question. Dans une perspective métacognitive, il importe aussi que les évaluations mettent l'accent sur les forces et les limites de la nouvelle base cognitive. Puisque le développement d'une compétence est un long processus et qu'il en est ainsi des connaissances construites dans le cadre de situations authentiques, les évaluations doivent être fréquentes et intégrées à la démarche suscitant les apprentissages. Selon cette orientation, les frontières entre l'évaluation formative et l'évaluation sommative s'estompent jusqu'à disparaître.

La complexité en priorité

Les rôles des enseignants

Que les cycles d'apprentissage se développent ou non en milieu scolaire, que les regroupements multiâges soient privilégiés ou non, le paradigme d'apprentissage commande non seulement une réorganisation de l'environnement pédagogique, mais il exige aussi des changements de rôles et de perceptions de la part des enseignants. On pourrait reconnaître que les attentes à leur égard sont fort différentes de celles qui prévalaient dans le cadre du paradigme d'enseignement. Elles exigent une focalisation sur l'évolution et le développement des élèves d'abord, sur les programmes ensuite, sur l'apprentissage en premier lieu et sur l'enseignement en deuxième lieu. Une telle focalisation ne signifie pas pour autant que les enseignants doivent délaisser ou ignorer les programmes et leurs objectifs. Au contraire, ils doivent avoir un très haut degré de compréhension et de maîtrise des programmes dont ils assument la responsabilité à l'endroit des élèves et, en faisant référence aux principes composant la dynamique de l'apprentissage signifiant, ils sont alors en mesure, grâce à cette compréhension et à cette maîtrise, de contrôler la prise en compte des objectifs des programmes par l'intermédiaire des diverses situations d'apprentissage. Les finalités ou les objectifs des programmes sont incontournables, mais les modalités permettant leur atteinte sont plurielles et multiformes.

Tableau 2

Les rôles des enseignants dans le cadre du paradigme d'apprentissage

Des créateurs d'environnements pédagogiques
Des professionnels interdépendants, ouverts et critiques
Des provocateurs de développement
Des médiateurs entre le savoir et les élèves
Des entraîneurs
Des collaborateurs dans la réussite de tous les élèves d'une école

Que ce soit dans le cadre du paradigme d'apprentissage ou dans celui du paradigme d'enseignement, les enseignants assument la responsabilité de créer des situations pédagogiques visant à influer sur les apprentissages des élèves. On pourrait dire que, dans l'un et l'autre cas, les enseignants créent des environnements pédagogiques. Perkins (1991) établit toutefois une distinction importante entre les environnements minimalistes (minimalist environment) et les environnements maximalistes (richer environment). Dans un environnement

rendent compte de leur évolution et qui précisent leurs progrès tant sur le plan des compétences que sur celui des connaissances. On retrouve aussi des logiciels qui encadrent les élèves dans la rédaction de leur journal comme apprenants. Un tel journal, généralement destiné aux enseignants, vise à leur préciser les apprentissages réalisés et à leur faire part des doutes et des interrogations qui restent en suspens. De plus, les enseignants peuvent recourir aux technologies de l'information et de la communication pour se transmettre des informations professionnelles quant aux situations d'apprentissage et à leur efficacité, quant aux élèves et à leur évolution, quant aux difficultés de certains jeunes et aux moyens qui pourraient être déployés pour influer davantage sur leur réussite et leur intégration.

Les rôles des élèves

La mise en place du paradigme d'apprentissage a également des incidences sur les rôles assumés par les élèves. Il devient en effet impossible pour eux de se placer dans une position attentiste ou passive, en estimant que les enseignants vont prendre la responsabilité exclusive de transmettre les informations nécessaires, d'indiquer les éléments qui constitueront les objets pris en compte lors des évaluations sommatives, de déterminer les contenus à mémoriser et d'imposer les exercices à réaliser. Les élèves se voient plutôt dans l'obligation de participer activement à la vie de la classe ou de leur regroupement scolaire, en s'engageant personnellement et collectivement dans leurs démarches d'apprentissage, quelles qu'elles soient. En fonction de la modalité collective ou individuelle de réalisation de la recherche, du projet, ou de résolution du problème et selon le degré de maîtrise des connaissances et des compétences sollicitées pour accomplir la tâche, les élèves doivent assumer différents rôles.

Tableau 3

Les rôles des élèves dans le cadre du paradigme d'apprentissage

Des investigateurs
Des coopérateurs parfois experts
Des clarificateurs
Des utilisateurs stratégiques des ressources disponibles

En cohérence avec le paradigme d'apprentissage, un premier rôle qu'assument les élèves formant une communauté d'apprenants est celui d'investigateur. Dans ce cadre, il leur incombe d'apporter à l'école leurs questions, leurs doutes ainsi que leurs certitudes, et de rendre publics leurs intérêts, leurs connaissances et leurs compétences. L'investigateur, parce qu'il est constamment en questionnement et en quête de nouvelles réponses plus satisfaisantes, ose aussi émettre des hypothèses qui lui apparaissent vraisemblables, compte tenu de sa base actuelle de connaissances et de compétences. Dans cette perspective, il est essentiel que les élèves, à l'intérieur d'une démarche active, non seulement s'autorisent, mais également s'obligent à communiquer leurs compétences et leurs connaissances antérieures à leurs pairs et à leurs enseignants, de même qu'à expliciter le rationnel sur lequel ces dernières se fondent. Ils contribuent alors à se donner personnellement des points d'ancrage conscients en vue des apprentissages ultérieurs, et ils participent en outre, par le fait même, au déclenchement de conflits sociocognitifs, qui constituent des moteurs d'apprentissage. En effet, dans la mesure où plusieurs élèves font état de leur compréhension d'un phénomène complexe, il est réaliste d'envisager que tous n'en partagent pas une compréhension identique. Cette diversité des points de vue, lorsqu'elle donne lieu à leur mise en relation et à la perception d'une incompatibilité logique entre eux, provoque chez les élèves un déséquilibre cognitif les incitant à s'engager dans la recherche de nouvelles réponses, d'un nouvel équilibre. L'adoption d'une attitude critique quant à leurs propres connaissances et à leurs propres compétences, mais aussi par rapport à celles de leurs collègues et l'insatisfaction ressentie devant l'absence de réponses appropriées font en sorte que les élèves perçoivent la nécessité de créer de nouveaux liens.

En tant qu'investigateurs, en étroite collaboration avec leurs pairs et leur enseignant, les élèves concourent à conduire à bon port la démarche de problématisation, à savoir l'identification d'un problème à résoudre ou d'une question sur laquelle se pencher, en fonction des connaissances et des compétences antérieures auxquelles ils ont accès. Une fois le problème circonscrit, parce qu'ils évoluent à l'intérieur d'environnements pédagogiques transdisciplinaires, caractérisés par un niveau élevé de complexité et sollicitant de façon coordonnée la réutilisation de diverses compétences ainsi que le développement de nouvelles compétences et la construction de nouvelles connaissances, il devient essentiel que chacun des élèves coopère avec ses collègues. Parmi les principes fondamentaux qui guident la coopération en apprentissage, il ressort, en tout premier lieu, que les élèves sont en relation d'interdépendance – la réussite du groupe est tributaire de l'engagement de chacun – et, en second lieu, qu'ils poursuivent un but commun (Scheid, 1993 ; Johnson, Johnson et Holubec, 1994). De plus,

L'ordinateur branché à l'école

Scénarios d'apprentissage

Marie-France Laberge

Avec la collaboration de
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Merci!

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Introduction

Le multimédia dans l'enseignement : de nouvelles pratiques

Au fil des ans, les différentes fonctions que j'ai exercées m'ont amenée à rencontrer un grand nombre d'enseignantes et d'enseignants. Qu'il provienne de mes collègues de travail dans le milieu de l'enseignement ou dans celui de l'édition scolaire, ou encore des gens auprès de qui j'interviens comme formatrice en intégration des technologies d'information et de communication (TIC) dans l'enseignement, un même message revient sans cesse : les activités proposées aux enseignantes et aux enseignants doivent être stimulantes, pratiques, complètes et faciles à gérer.

Avec l'entrée massive des ordinateurs dans les salles de classe, de nouvelles activités pédagogiques intégrant les TIC sont à élaborer, mais plusieurs enseignantes et enseignants ne disposent pas de suffisamment de temps pour le faire. De plus, le fait de ne compter souvent qu'un ordinateur pour 20 élèves et plus pose un problème à nombre d'enseignantes et d'enseignants qui voient les activités s'éterniser faute d'équipement. J'ose donc espérer que les scénarios présentés dans ce recueil vous aideront à remédier à ces problèmes, et qu'ils sauront susciter votre intérêt et celui des élèves tout en vous simplifiant la tâche et en vous permettant de progresser à votre rythme dans l'univers des ordinateurs et du multimédia.

En ce qui concerne le travail à l'ordinateur, tous les scénarios proposés ici n'exigent que certaines connaissances de base de votre part. De plus, avec l'aide d'une personne-ressource, de collègues ou même d'élèves ayant plus d'expérience, il vous sera possible d'aller chercher l'information nécessaire et de progresser très rapidement dans ce domaine.

Même si le fait de produire son propre site Web ou de mettre en œuvre différents projets d'apprentissage interactifs sourit à certains, on ne peut s'approprier les techniques nécessaires du jour au lendemain, et à l'heure actuelle la plupart d'entre vous souhaitez plutôt faire une utilisation sérieuse (qui permettra de réels apprentissages) des logiciels et des cédéroms mis à votre disposition. C'est pour cette raison que ma collaboratrice et moi avons choisi de créer diverses activités basées sur l'exploitation de cédéroms fréquemment utilisés dans les écoles, sur des sites Internet particulièrement intéressants ou encore sur des outils d'éditique largement répandus. Ajoutons également que les scénarios présentés peuvent être utilisés comme canevas de base à modifier ou à compléter comme bon vous semble. Ils peuvent aussi vous apporter le coup de pouce nécessaire pour faciliter la création de vos propres activités.

Comme nous l'avons mentionné, l'un des principaux problèmes qui se posent dans les classes où l'on utilise quotidiennement l'ordinateur est le ratio de un ou deux appareils pour une vingtaine d'élèves. Même en travaillant en ateliers, il faut prévoir plusieurs jours pour qu'une seule tâche soit réalisée par toute la classe. Pour tous les projets s'échelonnant sur de nombreuses périodes de travail, nous avons donc prévu des activités pouvant être réalisées sur d'autres

supports à n'importe quel moment par des élèves, pendant que d'autres utilisent l'ordinateur. Il s'agit d'un moyen efficace d'intégrer l'ordinateur à la vie de la classe sans pour autant bouleverser d'un seul coup toutes nos habitudes de travail.

Le matériel offert dans cet ouvrage comprend donc des documents qui vous sont destinés et qui visent à vous seconder dans votre rôle de guides qui accompagnent et conseillent les élèves, ainsi que du matériel reproductible destiné aux élèves et qui leur facilitera la tâche et les amenera à développer une certaine autonomie. La longueur des scénarios varie afin de vous permettre d'intégrer à votre rythme les nouvelles technologies dans la salle de classe. En terminant, soulignons qu'il nous semble important d'insister sur l'esprit de coopération comme attitude à développer au sein de votre groupe-classe, puisque le travail d'équipe devient une priorité dans la société actuelle et qu'il montre aux enfants à prendre leurs responsabilités. En collaborant, les élèves apprennent non seulement à s'ouvrir aux idées des autres, mais aussi à profiter des forces et des connaissances de leurs camarades, tout en faisant bénéficier les autres de leurs propres habiletés et connaissances.

L'intégration des TIC dans l'enseignement : quelques principes

Même si plusieurs vantent, et certains depuis longtemps déjà, les mérites de l'intégration des TIC dans l'enseignement, il faut avouer qu'un tel changement — disons-le : il s'agit bien ici de modifier méthodes pédagogiques et styles d'enseignement — ne s'effectue pas du jour au lendemain. Par où commencer ? Quels sont les avantages de l'utilisation des TIC en classe ? Comment gérer tout cela ? Ce sont des questions qui reviennent sans cesse lorsque l'on aborde ce sujet avec les enseignantes et les enseignants. Tentons quelques réponses !

Quelques avantages des TIC en classe

- Étant donné l'hétérogénéité des clientèles scolaires et les besoins des élèves qui se diversifient de plus en plus, on appréciera le fait que le travail à l'ordinateur permet à chacune et à chacun de progresser à son rythme et d'augmenter ainsi sa confiance en soi.

  Dans un environnement moins traditionnel, où l'on offre aux élèves de multiples ressources (dont l'ordinateur), où l'on travaille souvent en ateliers ou par projets, l'enseignement en grand groupe est moins fréquent et plusieurs des tâches qu'on demande aux élèves peuvent être adaptées à leur rythme.

  De plus, le multimédia rejoint autant les visuels que les auditifs et les kinesthésiques.

- Étant donné l'abondance de l'information disponible, les élèves devront apprendre à développer leur jugement, et à structurer leur pensée pour traiter, utiliser et communiquer clairement cette information à d'autres personnes.

- Étant donné que souvent les élèves qui restent passifs à écouter des cours magistraux finissent par perdre de l'intérêt pour la matière enseignée, il est important de les rendre responsables de leurs apprentissages, ce à quoi le

travail à l'ordinateur (Internet, cédéroms, logiciels visant à accroître la l'efficacité, par exemple) peut contribuer en provoquant un changement d'attitude face au travail scolaire. De plus, en voyant à ce que les élèves puissent établir des liens entre leur vécu et les tâches exigées, on peut espérer une plus grande motivation de leur part puisqu'ils trouveront une utilité à leur travail.

- Étant donné le peu d'ordinateurs disponibles dans chaque classe et les nouveaux modes d'enseignement utilisés, les élèves feront l'apprentissage du travail coopératif et du partage des ressources, ce qui amène le développement de nouvelles compétences sur le plan social.
- Étant donné que les TIC rendent possibles de nombreuses formes d'échanges avec des gens d'ici ou d'ailleurs, elles favorisent la communication et donnent aussi plus de sens au travail demandé.

Les TIC, c'est aussi l'aide apportée à la production de documents, l'accès rapide à l'information, le vaste éventail de sujets vus sous plusieurs angles à travers les différentes ressources disponibles, la possibilité d'éditer et d'imprimer ce que l'on veut, etc., sans compter les compétences technologiques qui seront développées tout naturellement au fur et à mesure des divers projets entrepris par les élèves.

Par où commencer?

Probablement par l'apprentissage de nouveaux rôles et de nouvelles façons de faire autant pour vous que pour les élèves: autrement dit, adopter une approche éducative plus centrée sur la personne. Cela signifie d'une part que votre tâche est d'abord celle de guider et d'accompagner les élèves dans les différentes démarches, et que d'autre part les élèves participent plus activement à leurs apprentissages, qu'ils prennent conscience de ce qu'ils font pour ensuite pouvoir cheminer et relever leurs propres défis.

Sur le plan humain, il ne faudra pas oublier que tout changement amène des émotions, qui surgiront — autant les vôtres que celles de vos élèves — au fil des semaines. Le fait de travailler en équipes sur des projets ou encore avec une ou un camarade à l'ordinateur peut aussi entraîner diverses difficultés dont il faudra tenir compte: le conseil de coopération est alors une façon intéressante de régler différentes situations de stress au sein d'un groupe[1].

Vous jouerez également un rôle important sur le plan l'encadrement de chaque élève, car il faudra faire en sorte que chacune et chacun s'approprie vraiment les contenus sur lesquels porte le travail. Les élèves auront aussi besoin d'un soutien marqué pendant la période où ils s'habitueront à travailler avec des échéanciers ou à répartir les tâches au sein d'une équipe, par exemple.

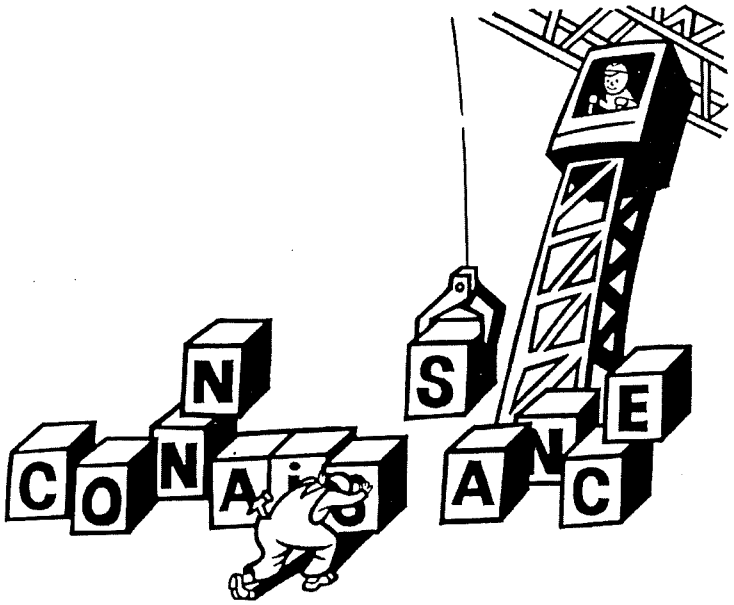
En ce qui concerne la gestion de l'espace et du temps, il faudra prévoir certains ajustements: pour que le travail à l'ordinateur fasse partie du quotidien des élèves, il devra être utilisé le plus souvent possible et servir à toutes sortes de fins; ce qui signifie que l'ordinateur doit être accessible et que vous devez

1. JASMIN, Danielle, *Le conseil de coopération. Un outil pédagogique pour l'organisation de la vie de classe et la gestion des conflits*, Montréal, Les Éditions de la Chenelière, Montréal, 123 p., 1994.

permettre le travail en ateliers ou par projets pour favoriser un roulement à l'ordinateur. On prévoira des coins pour certaines tâches, des postes de travail, on établira des échéanciers avec les élèves, etc.

Même si l'intégration des TIC dans votre enseignement appelle des changements en profondeur dans votre approche du travail, vous en retirerez une profonde satisfaction, car les enfants sont conscients de l'importance de ces nouveaux outils dans la vie quotidienne, ils comprennent rapidement le fonctionnement des divers instruments de travail, et les TIC savent éveiller leur intérêt.

La construction des connaissances



« On fait la science avec des faits, comme on fait une maison avec des pierres ; mais une accumulation de faits n'est pas plus une science qu'un tas de pierres n'est une maison. »

H. Poincaré (1854-1912)

Aujourd'hui, les modèles issus des sciences cognitives permettent de décrire et d'expliquer les processus de construction et d'utilisation des connaissances. Dans leur pratique, les enseignantes et les enseignants utilisent depuis de nombreuses années déjà un type de questionnement qui amène les élèves à réfléchir sur la façon dont ils peuvent exécuter une tâche qui leur est demandée : par exemple, déterminer les stratégies utiles dans telle ou telle situation. Depuis que le multimédia a fait son entrée dans les salles de classe, de nouvelles questions se posent concernant l'apprentissage. Bien que de nombreuses recherches aient montré le pouvoir certain des aides visuelles associées au texte dans l'apprentissage, ainsi que la nécessité d'un réel engagement de la part des élèves dans les activités qu'on leur propose, il ne suffit pas de transformer un livre en outil multimédia interactif pour s'assurer que les élèves vont s'approprier la matière qu'on veut leur enseigner.

La magie numérique

La quantité astronomique d'informations disponibles, le raccourcissement du temps d'accès à ces informations, des boutons de toutes sortes sur lesquels il suffit d'appuyer pour obtenir des réponses quasi instantanées à nos demandes font en sorte que l'ordinateur peut facilement être considéré comme un outil magique par les élèves. Raison de plus pour garder un regard critique sur tout cela ; en effet, comme l'affirme Jacques Tardif[2] : « Les TIC pourraient faire en sorte que les élèves naviguent sans arrêt d'une information à l'autre sans jamais les transformer en connaissances personnelles ; les enfants [voient] le cyber-

2. TARDIF, Jacques. (Pages consultées en mars 1998). Une condition incontournable aux promesses des NTIC en apprentissage : une pédagogie rigoureuse [En ligne]. Adresse URL : http://aquops.educ.infinit. net/colloque/14colloque/ouverture.htm

espace comme un paysage à visiter, comme quelque chose qui se passe à l'extérieur d'eux, sans plus. »

Les enfants pourraient aussi parfois se servir de l'ordinateur comme d'une base de données, toujours disponible, d'accès particulièrement rapide, et ne pas tenter de s'approprier les connaissances qu'ils doivent acquérir.

Comme on sait que les connaissances antérieures servent de filtre au moment de l'entrée de nouvelles informations dans le cerveau, il est impossible de porter un jugement adéquat sur les nouvelles informations reçues lorsqu'on ne dispose pas déjà d'un bagage de connaissances.

Les élèves actuels vivent dans le présent et ont tendance à n'être intéressés que par ce qui leur est utile immédiatement. Comme « elles se prêtent facilement à la réponse judicieuse, au bon moment et dans le bon contexte, les nouvelles technologies présentent effectivement le danger de concourir à ce que l'apprentissage soit fortement, voire exclusivement, orienté vers le développement de connaissances utiles maintenant[3]. »

Pour des apprentissages signifiants : des démarches d'apprentissage explicites, le développement d'une pensée critique

Pour que les élèves puissent se construire un solide réseau de connaissances en ajoutant de nouvelles à celles qu'ils ont déjà, ils doivent :

- avoir un projet (choisi à certains moments par eux, à d'autres par l'enseignante ou l'enseignant), un but bien défini qu'ils atteindront en travaillant à divers objectifs qui leur seront expliqués le plus précisément possible. C'est le projet qui donne un sens à l'information qui nous est offerte : il ne suffit pas simplement d'asseoir les élèves devant une pile de cédéroms ou une liste d'adresses de sites Web ;
- apprendre à sélectionner des informations, à trouver celles qui sont le plus susceptibles de donner des réponses pertinentes aux questions qui sont posées ;
- apprendre à traiter et à organiser des informations. La surinformation tue l'information : il est très facile de se « noyer » dans une mer d'informations sans arriver à en sortir quoi que ce soit d'utile. Les élèves doivent apprendre à créer des liens entre ce qu'ils découvrent et leurs connaissances antérieures, ils doivent s'organiser pour se servir efficacement de ce qu'ils apprennent, ils doivent apprendre à structurer leur pensée pour pouvoir également faire part aux autres de leurs découvertes ;
- apprendre à réutiliser leurs connaissances. Si les élèves s'approprient la matière enseignée, s'ils la « comprennent » réellement, ils pourront utiliser leurs acquis dans de nouvelles situations d'apprentissage, et ce peu importe la matière.

Avec la multiplication rapide des sources d'information et la possibilité pour toute personne équipée d'un ordinateur et de logiciels de télécommunication de publier absolument n'importe quel document et de le distribuer à l'échelle planétaire, il devient urgent que les enseignantes et les enseignants aident les

3. TARDIF, Jacques, *op. cit.*

jeunes à développer un sens critique face aux informations auxquelles ils ont accès. Par exemple, on pourra prendre l'habitude de demander aux élèves de vérifier telle ou telle information à partir de différents types de ressources documentaires.

Il ne faut surtout pas croire que, parce que l'information circule, elle est nécessairement véridique; l'éducation aux médias devient alors une *compétence transversale* (voir p. xii) de toute première importance à travailler avec les élèves.

Bref, tout comme il ne suffit pas d'avoir accès à une bibliothèque pour apprendre, il ne suffit pas de favoriser une attitude exploratoire, non linéaire, où la pédagogie semble plus active et les activités moins austères, pour s'assurer que les élèves vont s'approprier des connaissances. Il faut veiller à ce que les élèves ne soient pas tentés de *zapper* et de *surfer* sans cesse, emportés par les images et les hyperliens, s'éloignant toujours un peu plus de leurs objectifs de départ.

Le travail par projets et l'apprentissage coopératif

« Le travail en projet requiert une méthodologie qui, agissant simultanément sur des contenus, des démarches et des attitudes, amène l'élève à fonctionner de façon créatrice et réfléchie dans un contexte où il y a interaction et régulation. Plusieurs démarches intellectuelles et socioaffectives s'appliquent consécutivement ou simultanément à la démarche globale unifiée du travail en projet[4]. »

« L'apprentissage coopératif est une approche interactive de l'organisation du travail qui met l'emphase sur le travail d'équipe. Des élèves de capacités et de talents différents y ont chacun une tâche précise et travaillent ensemble pour atteindre un but commun[5]. »

Le travail par projets et l'apprentissage coopératif préparent tous deux les élèves aux situations auxquelles ils auront à faire face dans leur vie quotidienne et professionnelle. En travaillant ensemble à imaginer des moyens de résoudre divers problèmes circonstanciels débordant un cadre disciplinaire précis, l'apprentissage par projets permet de travailler simultanément les objectifs dans plusieurs matières, les élèves apprenant à considérer tous les aspects d'une situation donnée, à développer leur sens des responsabilités, à s'entraider, à gérer leur temps, leur espace, à développer leur esprit critique, leur ouverture aux idées des autres, à choisir la meilleure solution, etc.

Le rôle de l'enseignante ou de l'enseignant est moins direct ici que dans l'approche traditionnelle, mais il demeure essentiel. L'adulte doit voir entre autres à privilégier l'hétérogénéité lors de la formation des équipes, à faire comprendre à chaque élève son rôle (car les élèves doivent viser la construction d'un projet commun et non additionner des travaux faits individuellement). Lorsqu'ils sont bien gérés par l'enseignante ou l'enseignant, le travail par projets et l'apprentissage coopératif offrent une base idéale à l'intégration des TIC à l'enseignement.

4. Suzanne FRANCŒUR-BELLAVANCE. *Le travail en projet, une stratégie pédagogique transdisciplinaire*, Montréal, Intégra, 1997.
5. J. REID, P. FORRESTAL et J. COOK. *Les petits groupes d'apprentissage dans la classe*, Chronique sociale - Beauchemin, 1993.

En ce qui concerne les scénarios nécessitant le travail à l'ordinateur proposés dans ce recueil, ils font appel à la capacité des élèves à travailler en équipes de deux, de trois ou de quatre personnes (ce qui n'exclut pas évidemment le travail en groupe-classe et le travail individuel, toujours présents à certains moments de la démarche). Dans certains projets, une ou deux personnes utiliseront l'ordinateur pour recueillir des données, faire un tableau, préparer des diapositives, par exemple, pendant que les autres travailleront à différentes tâches sur d'autres supports.

Le travail en coopération à l'ordinateur signifie qu'à chaque session de travail chaque membre d'une équipe joue un rôle précis (par exemple une personne se charge d'entrer les données et de les sauvegarder, alors que l'autre est responsable de la vérification et de l'impression du travail). Les membres de l'équipe s'entendent alors sur le moment d'échanger les rôles.

Que l'on choisisse de travailler à partir d'objectifs précis tirés des programmes, ou encore à partir d'un problème particulier soumis par les élèves, les étapes de la réalisation des projets sont généralement les mêmes.

1. On fera l'inventaire des connaissances et des interrogations des élèves sur le sujet abordé (on peut employer la technique du remue-méninges, par exemple) ; on tiendra compte de leurs intérêts.
2. On fera suivre cette première étape d'un regroupement d'idées par catégories ou par sujets, en choisissant celles qui pourront servir de base pour le travail à faire.
3. Vous procéderez de votre côté à une planification globale, mais vous pourrez ensuite discuter des modalités du travail avec les élèves. Vous pourrez aussi donner à cette étape-ci des informations générales sur le mode de fonctionnement à adopter durant l'activité.
4. Les élèves auront à s'entendre sur un certain nombre de points (en groupe-classe et en équipes) : but du projet de chaque équipe, échéance finale, questions méthodologiques, stratégies de travail à exploiter, ressources et personnes-ressources disponibles, partage de ces ressources, etc.
5. On décidera des modalités d'évaluation. Celle-ci ayant avantage à être plus centrée sur les démarches et les stratégies que sur les résultats, on tiendra compte entre autres des méthodes de travail, du fonctionnement des élèves dans leur équipe et des attitudes adoptées.

Dans le cadre d'un projet ou de travaux de courte durée, les avantages du travail en coopération restent les mêmes[6].

En général
- Établissement d'un climat d'entraide
- Plus grande motivation intrinsèque
- Valorisation des différences

Pour les élèves
- Plus grande part de responsabilité et d'engagement

6. Francine BÉLAIR dans Jim HOWDEN et Huguette MARTIN, *La coopération au fil des jours. Des outils pour apprendre à coopérer*, Montréal, Chenelière/McGraw-Hill, 1997.

- Reformulation et rétention plus grande des apprentissages
- Image de soi plus positive

Pour les enseignantes et les enseignants
- Meilleur équilibre entre les savoirs, les savoir-être et les savoir-faire
- Plus grande persévérance scolaire des élèves
- Stratégies et outils d'intervention plus variés

Les compétences transversales

Pour amener les élèves à faire un pas de plus vers la maîtrise de contenus d'apprentissage et améliorer la qualité des connaissances construites, il importe de solliciter simultanément le développement de diverses compétences. Nous avons choisi de ne pas répéter pour chaque scénario la liste de toutes les compétences intellectuelles, méthodologiques, ou liées à la socialisation et au domaine de la langue qui y sont travaillées: nous les regroupons plutôt ci-dessous. Nous jugeons qu'elles sont une composante essentielle de tous les scénarios proposés (consulter à ce sujet l'annexe 3 du rapport Inchauspé, *Réaffirmer l'école*)[7].

- Compétences liées aux capacités intellectuelles
  - Compréhension des phénomènes et des situations, et développement du sens critique
  - Capacité d'analyse et de synthèse
  - Aptitude à résoudre des problèmes
  - Capacité d'entreprendre et de mener des projets à terme
  - Créativité et exercice du sens esthétique
  - Aptitude à la communication
  - Capacité d'évaluer et de s'autoévaluer
- Compétences méthodologiques
  - Capacité de déterminer et d'utiliser les sources d'information appropriées
  - Capacité d'utiliser les méthodes appropriées de traitement de l'information (avec accent particulier sur les TIC)
  - Capacité d'organiser le travail en fonction des échéances
  - Capacité de travailler en équipe
- Compétences liées à la socialisation
  - Application dans la vie quotidienne en classe des règles de vie en société
  - Développement d'un sens esthétique et moral
  - Éducation aux médias
  - Éducation interculturelle et respect des différences
  - Capacité de travailler en équipe
- Compétences dans le domaine de la langue
  - Apprentissage de la langue d'enseignement à travers chaque discipline
  - Apprentissages langagiers liés aux objectifs disciplinaires

7. Gouvernement du Québec. Groupe de travail sur la réforme du curriculum. *Réaffirmer l'école, rapport du Groupe de travail*, Québec, ministère de l'Éducation, 1997, 151 p.

DRAFT

New Learning in New Contexts

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Keywords
Change, learning, education, technology, teaching,

1. INTRODUCTION

Whenever we talk about 'new' learning the old question arises "Is there really anything new?". The discussants in the focus group agreed that what is new is the rapidly changing context in which today's learners live, work and learn and the social condition that change is now a constant in our lives. These social, economic and technological changes, and the condition of constant change challenge us to re-evaluate, re-engineer and where necessary create new purposes and processes for learning.

The discussants accepted that the purposes of learning we need for an ever changing world are well encapsulated in the statement of the International Commission on Education for the Twenty-First Century, led by Jacques Delors (UNESCO, 1996). They are: learn to know, learn to do, learn to live together, and learn to be. As a general statement, it is seen to apply across nations, and in different and evolving social, economic and technological contexts.

The processes of learning most associated with 'new learning' seemed to fall into two main categories. Many pick up on processes of yesteryear which lost prominence when learning was institutionalised through the establishment of mass schooling and the paper-based technologies such as text-books shaped the nature of schooling. Such phrases include 'lifelong learning', 'learning through apprenticeships', 'just in time learning'. Others which include 'learning to learn' and 'constructivist learning' and 'scaffolded learning' draw upon new theoretical understandings but are contested in the worlds of government policy and classroom practice. These processes, along with the processes that currently dominate traditional forms of schooling, and which are considered successful by many communities, policy makers and professionals, need to be re-evaluated and re-engineered in terms of how they meet the above defined purposes of education with the changing contexts. The group agreed that the new technologies play a special role in new learning and new contexts because technological change is not only a key factor generating pressure for change, but also a key facilitator through providing new tools to enable such change.

2. THE CHANGING CONTEXTS OF LEARNING

In order to more clearly identify the pressures on 'new learning' we defined some key outcomes of the changing contexts. These are the blurring of traditional boundaries, the

redefinition of global and local, the changing role of various social groups and institutions in the enterprise of education, and the trend to client-led from institution-led education.

2.1 The blurring of boundaries

One key aspect of change is the increasing blurring of boundaries between dimensions such as time, space, and informal and formal working learning. Today workers can engage in international transactions from their home offices, children can vicariously experience a volcanic eruption on their television screen while it is actually happening and students in one classroom can co-operatively solve problems with students in classrooms in another city, country or even continent. Similarly boundaries are blurring between informal and formal learning, between levels of formal schooling, further study, work-place learning and life long community-based learning. We observe, older members of the community working within schools to hand on their knowledge and skills and wealth of experiences, younger and older learning and working together in community settings to solve social and environmental problems, and workers undertaking formal study within their workplace.

Another observation relates to the continuing blurring of boundaries between teaching and learning. As well as the recognition of teaching as a reflective practice where teachers increase their own knowledge and understanding from their experiences and their interactions with learners, students are increasingly assuming teaching roles as 'more capable' peers.

2.2 The redefining of global and local

Learners experience school as a place where they access locally known and controlled resources. With the appropriate ICT infrastructure in place, learners are able to access people, content and opportunities for learning on a global basis. The learners' relationship to the local and global contexts is changing to a situation where the distinction is blurred and they are simultaneously in both. It is now possible, and common, for students to be working with fellow learners on shared learning objectives, in real time, where they are not readily aware of their co-learner's location. As more people are able to experience both, either vicariously or for real, the learner will need to be able to operate effectively in both, moving effortlessly between the two. For example, learners of different ages and in different countries are now able to share ideas, forming part of their community, addressing the diaspora of their local communities through the internet, with for example, UK members of the Chinese community being one with other Chinese wherever they are in the world.

With a redefinition of the local and global, local forms of social community in which people of all ages engage for learning, citizenship and work, will themselves be redefined. The changing forms of social community, with learners' redefining and managing their learning environments, can lead to people forming different local communities that provide shared social values that extend beyond learning. The local forms of social communities can lead to the revitalisation of the village, whereby services that can be accessed from anywhere in the world, such as banking and health care are removed for economic reasons from local communities does not lead to the villages demise, but provides new communities of teleworkers and telelearning.

An old African proverb states, "it takes a whole village to educate a child" in the local and global village! Paradoxically the arrival of new technology could make this the slogan of the future.

2.3 The role of other players in the educational enterprise

So far main players in formal education have been teachers, carrying most of the educational activities, and state or community officials (decision makers in education) generating policy and distributing resources. Today there is growing influence of other players, such as students

themselves, parents interested in the future of their children and other institutions with special interests like churches.

However, business and commerce are rapidly becoming the very influential. They either want to influence education for their own interests (staff training) or want to sell education to make a profit. So education is going to be for sale – public education will compete with private provision. This is changing the range and nature of economic circumstances in schools and the nature of influence on education. We observe increasing numbers of private schools, charter schools run by corporations, industry funded universities, accredited private (for profit) providers of technical and further education. The sale of supplementary educational services to increase achievement in schools is also on the increase. The most recent phenomena is the trend for Internet Service providers to develop educational content, often edu-tainment, as a marketing tool for their services. Given these scenarios public schooling will either diminish or change its role and expand.

2.4 A trend to client-led education rather than institutional-led education

There is a discernible move to a client-led focus to the provision of learning opportunities. Clients in this context may be individuals or organisations. From an individual perspective the idea of lifelong learning resonates with the notion that learners will be able to avail themselves of personally relevant learning activities at their convenience. From an institutional perspective, organisations are increasingly seeing the need to develop bespoke training/learning environments for their members, e.g. the emergence of 'corporate universities'. The implication of this move will be that the balance of control will shift from the provider of learning (the teacher) to the consumer of learning (the learner).

Technology-mediated contexts will have a significant role in enabling a client led focus. The capacity of technology to 'iron out' temporal and spatial boundaries will act as a stimulus in developing an educational market in which clients can purchase educational provision provided in forms suited to their individual/organisational needs.

3. RECOMMENDATIONS

The following recommendations follow from the above observations.

a Past paradigms of learning need to be critically appraised in terms of how they facilitate the necessary learning in our changing and increasingly complex world. For example, teachers must be ready to move from an instructional role to a facilitation of learning role. In particular they need to hold onto what works, while being courageous enough to question long traditions at the same time.

b New relationship between emerging actors in the educational scene need to be explored. For example, productive partnerships between local governments and commercial agencies and between the parents and the teachers will be essential. The blurring of the boundaries between learning and work, community and school, the private and public provision of education make this essential.

c Productive relationships and partnerships need to be brokered. Educators should not wait to react once relationships are imposed.

d Change must be recognised as variable in an increasingly complex and chaotic educational process. The consequence of this is that educators need to be advocates for their own professionality and for the common good of education for all.

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DRAFT

Changing roles of the teachers and pupils with ICT

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Keywords: Teacher competencies, Teacher training, Learning, Educational innovation

1 INTRODUCTION

Whether the school of the future remains a largely physical entity or becomes a virtual presence in our future society, teachers in such schools will have very different roles from those they have traditionally exercised or, indeed, play today. Not only will their role change – so also will their relationships with pupils, with other teachers, with teacher educators and the various individuals and groups in society who are stakeholders in the education process.

2 THE CHANGING ROLE OF THE TEACHER WITH ICT

A number of "push" factors are triggering educational change and are helping to shape the way to, and the design of, the school of the future. One incontrovertible result of these synergistic processes is that the school of the future will incorporate a significant ICT component.

In many countries Governments are intent on creating an "Information Society" and are investing heavily to ensure both the technical resource base and the appropriate infrastructure is being put in place to allow complete interconnection of their societies – societies where all their citizens are conversant with, interested in, and able to use ICT in their employment activities and during their leisure time.

Already, many children, right across the globe, have grown up in our increasingly technological age – they have always known and used computers, electronic games, multimedia resources and the many, different elements of advanced communications technologies. They expect their educational experience to offer them learning environments which are fully supported by ICT. In these environments they can use ICT tools as and when desired – the computer, the Web, the mobile phone, videoconferencing and integrated media production tools. They expect all this and so, increasingly, do their parents who are fast becoming more involved in the education system.

All teachers adopt a professional approach to education. They are keen to enhance their teaching skills and to improve the learning environments and experiences they create for their learners. They wish to teach as effectively as possible and to make these experiences interesting and enjoyable. Many are convinced of the powerful educational advantages ICT offers the teaching and learning process and enthusiastically integrate ICT-based activity into a wide range of classroom activities. These teachers have often been a persuasive force in bringing ICT to the

attention of their colleagues who, convinced by demonstrations of good practice, are then prepared to adopt ICT in their classroom work.

These pressures to incorporate a growing element of ICT into the teaching and learning process are being exerted at a time when education is experiencing major pressures to change. A number of paradigm shifts including:

- From a transmissive to a constructivist approach
- From teaching based environments to learning based environments
- From a hierarchical to a networked structure
- New roles and relationships of teachers and teacher trainers
- From control to monitoring

are combining to create an educational landscape markedly different from that of a decade ago - a landscape which will inevitably be much altered in the near future.

All of the above multi-sectoral factors will contribute to the shape and structure of the school of the future. They will foster new sets of relationships between learners, between learners and teachers, and between teachers and their teacher educators.

The traditional delivery and establishment of content is becoming less important. Rather it is the acquisition and development of concepts and skills which will characterise the school of the future. This new approach should create flexible, thoughtful and creative learners – skilled in the use of educational resources (particularly ICT tools), as and when desired or required, to access information, mould this information into knowledge and then apply this knowledge to the solution of problems, the assessment and resolution of issues and the appropriate transfer of conclusions to a variety of audiences. In the near future learners will be empowered to learn how to learn.

If this learning shift is to be achieved teachers as well as teaching will have to change. The changes to the education system will set new expectations of teachers and modify the portfolio of desirable competencies and skills they will be expected to demonstrate. With an enhanced ICT component figuring prominently in the school of the future teachers will have to be ICT literate – not necessarily technical experts but confident and competent users and deployers of ICT. They will integrate ICT as and when necessary in their curricular activities and should be flexible, thoughtful and creative enough to take on new or emergent applications of ICT, decide how best they can support the learning process, and incorporate them into their teaching and learning environments – in a "just-in-time" way.

Teachers will need to be ever aware of new pedagogical developments and competences related to improving the learning process. They should be prepared to explore, accept, reject and , where appropriate, integrate these. Like their learners they will need to embrace cooperative and collaborative philosophies and become team players in the education process – able to work across a range of subjects or curricular areas and support an investigative/problem solving constructivist approach to learning. Teachers of the future will have to respond flexibly, thoughtfully and sensitively to the many needs and different learning styles of their learners. They will also need to be able to design and manage new learning environments where the development of concepts and skills can be best promoted.

These new facets of the teacher in the school of the future have important consequences for teacher educators. While many teacher educators have investigated and embraced new educational paradigms and techniques they have often appeared less than enthusiastic in their adoption of ICT. Teacher educators should respond to the challenge of ICT and be leaders in its exploration. They should actively promote ICT as a cross-curricular resource or toolset and demonstrate to their trainee teachers good practice in the use of ICT. Effectively the teacher educators should model best practice and encourage their students to view ICT as a set of powerful tools which assist their personal productivity as well as promoting their professional and

pedagogical expertise. Students should leave teacher education institutions aware of new pedagogical approaches, comfortable in the many uses of ICT and prepared to increasingly experiment with its use to support all aspects of learning.

While many powerful push factors bear on education there are other powerful traditional forces in operation which are resistant to "change in the order of things". A new pattern of education is unlikely to appear quickly and the transformation to the school of the future will be slow, unless the energies of these push factors (social, political, economic, enviromental, technical and cultural) are focused on breaking the circle of tradition which is prevalent in education.

This circle can be broken in many ways. Any initiative should start from the needs of the teachers and should be designed to build teacher confidence. Initiatives should encourage active participation of parents and social agencies – all of the stakeholders in the educational system and the school of the future. These initiatives are likely to be most effective if they are focused on creating communities and networks at many different levels – local, regional, national and global.

The world is full of such initiatives. Some of the most successful have targeted the connection of schools to allow collaborative and cooperative projects to develop between schools, teachers and pupils (notably the Enlaces project in Chile) or to provide central resource gathering centres (such as the National Grid for Learning in the UK, the European Schoolnet project and a similar initiative in Canada). In Denmark attempts to establish or develop teacher competence in ICT have been based on teacher acquisition of an Educational Drivers Licence – a development which already has included 25% of the teacher work force and has been extremely successful when a whole school approach is used. Cooperative learning initiatives have been established in France and ICT development as a communication tool has been a feature of considerable educational activity in Israel and Iceland.

It would be valuable if these initiatives were brought together and then promoted throughout the educational community. It is also vital that they are implemented with sensitivity for the socio-cultural conditions pertaining in their respective countries.

3 RECOMMENDATIONS

Cognisant of the many interacting factors which influence the development of the school of the future we would make the following recommendations which we consider would assist its creation:

- Define measures to encourage the creation and development of teacher communities.
- Encourage teacher communities to share ideas, models, methodologies, experiences, and materials.
- Encourage cooperation among the teacher community members.
- Provoke paradigm shifts in Teacher education institutions.
- Disseminate project based teacher training processes based on ICT.
- Develop ICT competencies of teachers in the context of projects in which these skills are required.
- Provide local frameworks in which teachers can find both technical and pedagogical support.

4. REFERENCES

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DRAFT

Theme 3: Schooling, School Culture, Organisation of the School, School in the Information rich Society

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Keywords

Vision, , knowledge, wisdom, school

1 INTRODUCTION

The theme of school, the school's culture, and the organisation of the school in the information rich society energised the Focus Group to consider visions of education that would apply to the many different cultures and many different goals.

2 VISIONS OF THE FUTURE

Moving into the future, the Focus Group agreed, called for a future oriented vision. While this might seem to be self-evident, a discussion of Schools of the Future must, after all, engage in discussions of the future, the Focus Group believed that it was important to begin with what should be and must be in the future instead of an alternative approach which would begin with the present, state the problems and prospects of present practice, and then work toward ameliorative plans and programs that would push toward some eventual goals. Similarly, the Focus Group believed that it was important to establish a vision that had a far reaching time span-ten-twenty, thirty or more years ahead-rather than discussing a future three or four years from now, the standard frame of reference of hardware and software providers. Similarly, the Focus Group agreed that the scope of the schools' work should be as broadly defined as possible, and goals should be directed toward many different types of school activities, policies and practices while all of those must be global in their focus and impact.

Such a broadly based vision calls for the highest degree of human interaction. So the Focus Group said that in order to achieve its vision the school of the future must strive to achieve coordination and connectedness in order to create new knowledge from the old, yielding wisdom, which is acquired through collaboration.

Such a dynamic, comprehensive vision calls for a reconceptualisation of many different but vital components of schools: their architecture, their timetables, and the types of accountability measures used. Similarly, current ideas about appropriate uses of technology must be broadened and each country's culture of schooling and of change will need to be re-examined and/or changed. Part of that culture, the role and the dynamics of the "youth culture" in each country, must be analysed with a view toward understanding the ways youth engage themselves in knowing and learning, and the ways that such engagements develop and grow.

It would be uptopian to expect that such visions could be achieved without discussion and debate. For example, it is certainly the case that from one country to another and within countries there are dualisims-idealism vs. utilitarianism and the economy as a constraint vs. the economy as a reality. Similarly, looking to the future must address the question of whether a school is a "physical entity" or is.an "idea" situated in many different places at many different times. But, while recognising that there would be inevitable debates about key issues, the Focus Group believed that peoples around the world would accept and adopt visions that moved from knowledge acquistion to wisdom attainment. Key factors in knowledge acquistion are students' interests, skills and roles, teachers' competencies, beliefs and roles, and the community's goals, beliefs and resources. Key goals of wisdom attainment are the engagement of students in authentic, important learning, the involvement of teachers with students, the community and each other, and the community's investments toward change.

Toward those ends, both the acquisition of knowledge and the attainment of wisdom call for models of change, even when those models have been shown to have been unsuccessful because lessons can be learned from both successful and unsuccessful change efforts. Moving towards knowledge and wisdom also calls for strategies for sharing stories of change, and understanding what we are moving from, where we are going and why. Visions for the future also call for identifying the scaffolding needed for change. Similarly, as schools look to the future there must be an understanding of why schools today are designed and organised as they are in order that the implications of past practice may inform future policies.

Since the creation of schools of the future will be more broadly based than today's schools, the Focus Group also agreed that future schools' planning will call for an understanding of the relation between humans but, equally important, will call for an understanding of the relation between humans and nature.

3 METAPHORS FOR THE VISION

Words often convey less of a vision than other types of representations but metaphors have the power to make comparisons that are visual and/or vital, and so the Focus Group looked for a way to convey the breadth and depth of their vision via metaphors. Discussions of the ways schools around the world planned for change and the types of schools resulting from the plans led to the question of what "school" meant in different cultures. In Sanskrit "school" means "an abode of knowledge"; in Danish "school" has the meaning of "a direction toward a vision" and in China, "a place for acquiring the knowledge of how to behave." Chile envisions school as a community of actors participating in a social enterprise while in Israel the school is " the house of the book"—"beit hasefer." All of the metaphors connoted a process as well as a place where knowledge and wisdom can be attained, and so the Focus Group agreed that such metaphors encapsulated the essence of their vision for the School of the Future—places where students, teachers, and the community would engage in activities directed toward wisdom.

DRAFT

Focus Group 4: Connectivity and Networking

Ferrán Ruiz Tarragó (Spain)(Chair)
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Keywords

A, B, C, D, E

1. Introduction

The discussions of Focus Group 4 were concerned with concepts of connectivity and networking. The discussions were concerned with a range of fundamental aspects of developing connectivity and networking in relation to emerging and new educational systems. Four aspects were considered:

- How will networking challenge school function?
- Future skills and competencies required.
- The virtual school.
- The child in the learning society.

2. The outcomes of discussions

How will networking challenge school function?

It is clear that the development of connectivity and networking to support traditional and emerging educational systems arises from two fundamental perspectives: central concerns (such as concepts of how centralist provision might operate); and individual concerns (such as concepts of the benefits and advantages to the individual learner). Currently there are a number of drivers which are likely to challenge current school function. In a number of countries, such as the UK, it is recognised that the transition from primary to secondary schools is often associated with a decline in engagement, interest, attendance, positive attitude, and learning attainment of pupils. From a student perspective, this decline is associated with shifts towards pupil disatisfaction, and parental perceptions and expectations can often also shift towards disatisfaction with current educational provision from schools. Under these circumstances it is clear that both pupils and parents could opt for alternative systems of education based outside or alongside schools. Changing attitudes towards learning engagement have been recognised when computers have been accessible on the streets of towns in Brazil, for example. Parents in some areas are already choosing to support their children at home when the time comes for them to revise for examinations (in the UK, using BBC material, for example).

For schools which have already become involved in shifts towards more provision via connectivity and networking, it has been found that often this has been associated with circumstances where there have been financial pressures for change. Schools have responded in these ways when financial resources have become more limited. Even when financial resources are not limited, positive increases in home learning have been found in some countries, such as the USA. Other countries could easily follow the models set by those countries involved in this emerging pattern.

In some countries companies and organisations have already been involved in the production of resources to support school learning at home (for example, in Spain). Under these circumstances the involvement of stakeholders, where schools are working alongside, with, or potentially in competition with provision from commercial sources, can shift significantly. The constitution of stakeholders and business involvement will be a need for consideration by schools in the future. Some countries are already considering the potential advantages or needs to shift from a subject-based to a topic-based or theme-based curriculum (in France, for example). Schools are currently equipped to provide subject-based curriculum educational provision. For a topic-based or theme-based curriculum, the internet offers, through resource links, and project-based approaches, ideal opportunities for provision to meet the needs of students who might want to pursue their learning in these ways. Development of non-subject based, relevant curricula could well be provided through internet-based resources in the near future.

Fundamentally, the challenge to school function is based upon shifts in power and control. In terms of power, the shift can be towards parents. In terms of control, the shift can be towards students.

Future skills and competencies required

In terms of future skills and competencies required, students will clearly require an understadning of facility of use in terms of literacy in handling of information, as well as appropriate skills to use and create networking. Managing continuous change will be a future skill and competency need not only for school managers, and teachers, but also for students.

The virtual school

The development in practice of virtual schools is clearly an aspect worth considering in the context of this debate. Certainly the development of such schools will require an understanding of both the strengths and weaknesses of virtual schools. An understanding of the costs of setting up virtual schools will also be needed, although costings prepared to date (in Sweden, and in the UK) suggest that costs are reasonable comparable to setting up traditional schools.

One problem which the setting up of virtual schools may face, is that many will need to start from traditional starting points. It seems important under these circumstances, therefore, that developmental experiments need to start from different positions – from traditional school, existing virtual school, and 'green field'starting points. Examples already exist of virtual schools in some countries (Distance School, in Germany, and Open School, in the UK, for example). In other countries, shifts in organisational practices have been identified in traditional schools moving towards more virtual school situations (the close-distance approach of rural schools in Sweden, for example, where students attend the school for 3 days during the week, and work outside the school for 2 days each week). The production and sale of specialist expertise and resources has also been developed by certain schools at this stage (in Sweden, for example). Revision material, supporting individual endeavour, and offering lesson objectives, resources, and schemes of work for courses run in schools has enabled some students to work on materials outside school and to attain at

substantially earlier times than some of their peers (in the UK, for example). The use of laptops is also enabling some schools to become mobile schools (in Sweden, for example).

A range of factors is affecting, and will affect in the future, the ways in which implementation and practice of virtual schools can develop. There is a clear role of vision, but where schools are subject to successive initiatives that need to be rationalised, this can lead to a response to vision which leads to a 'crisis vision' rather than an informed vision necessarily. Under such circumstances, mechanisms of integration of initiatives become more vitally important. A virtual school development will need to consider the factor of how continuity of training and development will be handled, as developments of this nature will be concerned with continuous change rather than with change moving to a plateau position. Developments will also need to consider those significant elements for change, and those not requiring change. Monitoring and review mechanisms, and frequency of review will need to be considered. Hand-over time, for example, from primary to secondary school, can be reconsidered so that the break periods between terms become more fluidic. However, if students do undertake home learning through virtual schools, then the responsibilities for home learning will also need to be addressed. In order to fulfil the needs of virtual schools, the shape of networks and the origin of networks will also need to be accommodated. Futures of physical infrastructures will also need to involved with vision and strategies for the future.

The child in the learning society

Fundamentally, a major issue for learning will be the need to reconsider and potentially reconceptualise the assessment of outcomes of learning. The origin of control of assessment, and the nature of control of assessment are central to this concern.

3 ~~6.~~ *Conclusions*

A number of key conclusions emerge:

- The development of virtual schools raises issues for all those who will be touched by this endeavour (whether they be staudents, teachers, parents, education directors).
- Providers of learning environments can be outside schools, and student needs can be sourced by a variety of providers.
- A culture needs to be developed which creates acceptance and use of the new forms of provision.
- The potential for alternative educational and school systems has to be established.
- Individual learners can now be the central focus for the provision.
- Learner-focused skills will be needed in the areas of using and creating networking, including a literacy of handling information.
- Teacher-focused skills will be needed in the areas of maintaining skills in a period of continuous change.
- Strengths of both traditional and of virtual schools need to be considered.
- Systems thinking needs to involved, to challenge current or traditional systems concepts, and to consider integrative potential.
- Possibilities of different forms of virtual schools in different contexts needs to be considered.
- Physical infrastructure needs to match virtual school needs.

- Assessment needs, methods and mechanisms should be considered in fundamental ways.
- Support of coursework or project work assessment should be considered.

Virtual school developments raise a number of challenges:

- Who holds the intellectual propert rights (IPR) of resources developed, and how the publishing processes are handled.
- The need to express these concepts to teacher educators in ways which enable them to become involved actively.
- Identifying appropriate criteria and evaluation of student outcomes.
- The relationship and linking up of the range of potential actors involved.
- The challenge for leaders and managers who will be leading the transition.

Tools for Change - building the knowledge base for macro-systemic change

(or...what to put in the bookmark of the future)

Global trends

Problematising our conclusions

Approaches to change

Building the evidence base

Missing papers

Conclusions

Global Trends

McDonalds

evidence based policy

accountability

awareness of the entrepreneur

business desire to create new uses for ICT

Global Trends in Education

shared rhetoric on education

increased focus on education

converging curricula

academic capitalism
- knowledge creation
- internationalisation of qualifications
- plurality of provision
- non-traditional providers
  - university trends
- knowledge is power

Problematising the New Intellectual Agenda

from bucket to philosopher [Everyone!]

knowledge about knowledge
- relativism (Perry)
- accepting constructivism

the 'meta' generation
metacognitive skills (Schoenfeld) (Paul)
- self monitoring
- self knowledge

knowledge of social functioning

teaching students to respond to change

working with new representations and symbol systems (TIMSS)

modelling complex processes and problems (Sigrid)
- social and environmental issues

learning to know; to do; to live together; to be

moral judgement
knowledge of self
critical self-awareness (Eduardo)

Evidence Based Practice

Campbell

what bookmarks are for...

medicine: the Cochran collaboration

Kinds of Evidence

Phenomena — Herminia case histories

this happened

Regularities

when you do <A>, then <B> happens

Models

accounts to link regularities

Uses

access

critique

A lire

MSK

UNESCO INSTITUTE for information technologies in education

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Events

Information resources

Switch to Russian Version

mail server's map search

ABOUT INSTITUTE

UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

Ladies and gentlemen!

It gives me a special pleasure to present you the UNESCO Institute for Information Technologies in Education, which has begun its work in Moscow.

The Institute was established as a result of the implementation of the decisions taken by the II International UNESCO Congress on Education and Informatics. More than a thousand representatives of UNESCO Member States, governmental, inter-governmental and non-governmental organisations, various UNESCO offices, scientists and scholars, educators, specialists in information technologies and education took part in its work.

The UNESCO General Conference and the Government of the Russian Federation enthusiastically supported these recommendations.

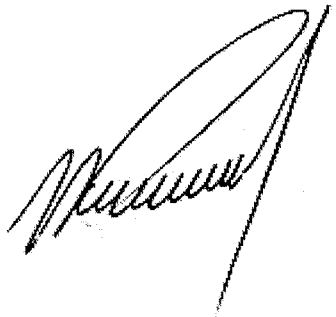
The Institute main objectives are to form policy and strategy of development of information technologies in education; monitor and support use of information technologies in the educational process on all levels; conduct research in the field of application of information and communication technologies in education; train and re-train those employed in the educational sphere; assist UNESCO Member States on their request to solve concrete problems of use of information and communication technologies in their educational systems.

The information clearing-house takes an important place in the work of the Institute. The Institute has a network of satellite communication which gives access to regional information networks and Internet. This tele-satellite network can provide communication with almost all UNESCO Member States.

Implementation of these objectives will lay a foundation for carrying out the UNESCO programmes 'Lifelong education', 'Education for all', 'Learning without Frontiers'.

When solving the major educational problems the Institute will be consistent in its attempt to consolidate efforts of UNESCO Member States, businesses and industries, scientists and scholars, education workers, all those who are interested in dissemination and efficient use of information technologies in education which serves a foundation for a sustainable development of the world community at present and in future.

IITE Director



Vladimir Kinelev

Agreement between the United Nations Educational, Scientific and Cultural Organization and the Government of the Russian Federation Concerning the Establishment in Moscow of a UNESCO Institute for Information Technologies in Education (IITE)

The United Nations Educational, Scientific and Cultural Organization (hereinafter referred to as "UNESCO") and the Government of the Russian Federation (hereinafter referred to as "the Government"),

Aware of the rapid development of information and communication technologies and in particular their application in the field of education, and recognizing the great potential that information and communication technologies posess in the service of education, science, culture, peace and international understanding,

Cognizant of the increasing responsibility of Member States of UNESCO and the intergovernmental and non-governmental organizations con-cerned for developing national, regional and international infrastructures, programs and mechanisms aimed at promoting the use of information and communication technologies in the field of education and training,

Considering the needs of developing countries in order to bridge the gap between them and developed countries,

Recognizing the mutual benefit of closer co-operation between the pub-lic and private sectors,

Referring to the recommendations of the Second International Congress on Education and Informatics, held in Moscow from I to 5 July 1996, and to 150 EX/Decision 5.1 (paragraph 29) adopted by UNESCO's Executive Board at its 150th session in October 1996,

Have agreed as follows:

The Parties agree to establish a UNESCO Institute for Information Technologies in Education in Moscow (hereinafter referred to as "the Institute") in accordance with the terms of the present Agreement.

The Institute shall aim to promote international co-operation in the use of information and communication technologies, as well as of informatics in education, in particular by:

(a) analyzing, monitoring and developing policies and strategies in the use of information and communication technologies in education;

(b) monitoring and developing the use of information technologies in the educational process at all levels;

(c) promoting research on, and the use and development of, commu-nication technologies for educational purposes in particular distance edu-cation:

(d) providing advisory services and undertaking studies at request of Member States:

(e) contributing to the implementation of UNESCO's regional pro-grams in the countries of the Commonwealth of Independent States.

Done at Moscow on 10 February 1997.

For the United Nations
Educational, Scientific
and Cultural Organization

Federico Mayor
Director-General

For the Goverment
of the Russian Federation

Vladimir G. Kinelev
Minister of General and
Professional Education

From the Recommendations of the 2nd International UNESCO Congress "Education and Informatics"

Proceeding from the recommendations worked out by international forums held under the UN auspices as regards the implementation by all Member States concerned of coordinated actions with the purpose of defining the community's policy and types of activity for the sake of humankind's steady development,

Basing on the fact that education policy should embrace postulates included in the International Education Commission's recommendations for the 21st century: to learn to know, to learn to do, to learn to live and live together,

Recognizing that education technologies must create an environment allowing colleges and other academic, scientific and vocational training establishments to perform a critical role in the sphere of developing and accomplishing the strategy and policy of development,

Bearing in mind the necessity of applying new information technologies to education purposes for deriving advantages from a collective know-how, as well as a joint utilization of limited resources.

Participants of the Congress deem it essential to endorse the initiative to establish in Moscow a UNESCO Institute on education policy and new information technologies with the object of working out a model of global long-life education for all and everybody,

Recognizing that its activity will foster the elaboration, professional estimation, selection and world-wide dissemination of prospective education and information technologies, as well as updated means of communication.

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(d) providing advisory services and undertaking studies at request of Member States:
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Done at Moscow on 10 February 1997.

For the United Nations
Educational, Scientific
and Cultural Organization

Federico Mayor
Director-General

For the Goverment
of the Russian Federation

Vladimir G. Kinelev
Minister of General and
Professional Education

Address by Mr. Federico Mayor, Director-General of UNESCO

Excellencies, Ladies and Gentlemen,

It gives me great pleasure to be in Moscow for the opening of the UNESCO Institute for Information Technologies in Education (IITE). I extend warm greetings to the distinguished representatives of the Government of the Russian Federation, the academic and scientific communi-ties, and the Commission for UNESCO of the Russian Federation.

In all UNESCO's fields of competence, the new information and communication technologies constitute a major opportunity and a major challenge for international cooperation. They are an opportunity for the increased exchange of knowledge and know-how, for the promotion of creativity and intercultural dialogue, for enhanced civic participation, and for greater understanding among nations - in short, for the strengthening worldwide of the interactive triangle of development, democracy and peace. They are a challenge in the sense that we must ensure that the tools represented by the new technologies are equitably shared among the nations of the world, that they do not serve to increase the gap between the industrialized and developing countries, and that the globalization process of which they are part does not entail a loss of the cultural diversity which is one of humanity's most precious heritages.

The potential of the new information technologies is particularly great in the educational field. Applications such as interactive radio and television, CD-ROMs, videoconferencing, Internet virtual communities and World Wide Web publishing hold out the promise of a quantum leap in flexibility, accessibility and interactivity. They are of particular interest in the context of life-long learning, for which educational institutions at all levels must increasingly plan and cater. Through the new technologies, learning opportunities of unparalleled quality can be made available on a 24 - hour basis, at many places, to many people.

The promotion of lifelong learning linked to use of the new technologies is a central concern of UNESCO's Learning Without Frontiers program. "the aim of this program is to explore all possibilities - including both new and traditional techniques and technologies - for expanding the outreach of education. The target is to reach the educationally unreached, to include the excluded and, in general, to meet the learning needs of people of any age, anywhere, at any time and in any circumstance. Learning Without. Frontiers is closely linked to UNESCO's worldwide Education for All program, including the Nine High-Population Countries initiative, which we are successfully developing with our UN and other partners. Learning Without Frontiers, which is a transdisciplinary responsibility of all UNESCO's sectors, is not limited to basic education or EEA. In fact, the traditional distinction between levels of education is one of the barriers to learning that LWF seeks to address. The goal of LWF is preparation for living in the learning societies of the 21st century.

One of the recommendations of the International Commission on Education for the 21st Century, chaired by Mr. Jacques Delors, whose report was presented to me in 1995 was the suggestion that "a UNESCO observatory should be set up to look into the new information technologies, their evolution and their foreseeable impact on not only education systems but also on modern societies." The Second International Congress on Education and Informatics organized by UNESCO here in Moscow last July in cooperation with the Government of the Russian Federation underlined for its part the need for UNESCO to preserve its role of intellectual leadership by launching programs for the dissemination of the new technologies and by encouraging Member States, especially developing countries and countries in transition, to develop their infrastructures and capabilities in the field of infor-mation and communication technologies. Most recently, the Executive Board of UNESCO at its 150th session (October 1996) emphasized the "pioneering role" that UNESCO was called upon to play with respect to the use of the new information and communication technologies in the educational and other fields.

The Memorandum of Understanding signed between UNESCO and the Government of the Russian Federation, and the Agreement to be signed today, on the establishment of the UNESCO Institute for Information Technologies in Education (IITE) are intended to offer the international community a forum for interdisciplinary debate and research on the new applications of information and communication technologies in education.

The Institute should be seen as complementary to the existing system of UNESCO Institutes (IIEP, UIE, IBE), with the specific mandate of developing policies and strategies for the use of information and communication technologies in education; monitoring and fostering the use of information technologies in the educational process at all levels; promoting research and development in the new technologies, with particular reference to distance education; and contributing to the implementation of UNESCO's regional programs in the countries of the Commonwealth of Independent States.

The Institute and its network of associated educational and research centres will obviously draw on the considerable intellectual and technological potential existing in the Russian Federation and in the neighbouring countries. However, strong support will also be required from other countries and from international governmental and nongovernmental organizations active in the field.

The Institute should become the focal point, for a regional information technology network that can link up regions poorly served at present with international research networks in developed countries.

As you know, the introduction of new educational technologies is extremely costly and places developing countries and countries in transition at a serious disadvantage. An important function of the Institute will therefore be to bring together all possible partners - governments, IGOs and NGOs, business and industry - with a view to developing international cooperative schemes. In this as in other fields, the sharing of knowledge and resources of all kinds is the key to sustainable global development, which is itself the precondition of a culture of peace.

I have much pleasure in opening the UNESCO Institute for Information Technology in Education, and I wish it every success in its important mission.

Statement by Mr. Vladimir Kinelev, Minister of General and Professional Education of the Russian Federation

Esteemed Director-General of UNESCO Federico Major,
ladies and gentlemen, colleagues!
Allow me to express my assurance that all of us are participating in a really historic event. Today in Moscow we are celebrating the establishment of the UNESCO Institute for Information Technologies in Education and Mr. Federico Mayor and myself are signing the Agreement between UNESCO and the Russian Federation Government. Thus, the family of UNESCO Institutes in the field of education is growing, and each of them in the field of their competence is contributing to the fulfillment of UNESCO program activities.
Ten years ago UNESCO had sensed the appearing tendencies, connected with the implication of information technologies in all aspects of the life of society, including the most important of them - education. These processes had been opening unlimited opportunities and unprecedented prospects, but at the same time they had concealed challenges and threats which demanded very close attention. UNESCO has become the organizer of two International Congresses on Education and Informatics.
With great satisfaction, I would like to stress that UNESCO and its Member States made a good start in the realization of the Second Congress decisions and recommendations adopted in July 1996 in Moscow by more than a thousand participants from 89 countries of the world - and today, just 6 months later, the Institute for Information Technologies in Education is being opened.
We consider the establishment of the UNESCO Institute in Moscow a great honor for our country and an acknowledgment by the world community represented by UNESCO of merits of Russia and our system of education, the dynamism and fruitfulness of its reform. In my opinion, this Institute is a kind of symbol, a historic sign, for its establishment has become possible only in the renewed Russia that has taken the road of democratic reform. I am sure that the establishment of the UNESCO Institute in Moscow is a step toward Russia's integration into the world community and this is beneficial both for UNESCO and its Member States and especially for developing countries and countries in transition.
Russia offers the UNESCO Institute its intellectual potential, highly professional personnel, all information technologies and means of communication we have, as well as the building and equipment free of charge, and is ready to share its accumulated experience in using information and communication technologies in education.
Allow me, on behalf of the Russian Federation Government, to express our gratitude and to thank the Director-General Mr. Federico Mayor for his continuous and effective participation in the development of partnership relations between UNESCO and the Russian Federation.
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UNESCO has decided to organize meetings of high-level experts where representatives of the existing UNESCO Institutes for education and leading specialists in the field of the application of information technologies in education from different countries will discuss the aims and the program of the new Institute and also the main directions of its activity in 1997 and the coming 2-year period (1998-1999).

In Moscow

At the International meeting of experts from France, Germany, Ukraine, Russia, the European Center of UNESCO for Higher Education (CEPES), that took place n Moscow on April 23-24, 1997 under the auspices of the new Institute, questions connected with aims and program activity of IITE were discussed. The participants of the meeting stressed that the creation of this Institute was a timely and important step made by UNESCO to realize its mission to develop the implementation of information and communication technologies in education. In connection with the problems the Institute must solve, the participants addressed several recommendations to UNESCO, and proposed to include the following topics in the list, endorsed by the Agreement:
- to train and retrain the personnel involved in the sphere of education; including training of teachers,
- to monitor changes taking place in education under the influence of information technologies, together with forming strategies of modernizing education.

In Paris

On June 12-13, 1997 the UNESCO headquarters in Paris hosted the High-Level Expert Group Consultation. The experts from Bulgaria, Cote d'Ivoire, Germany, Great Britain. Egypt, France, Israel, the Netherlands, the Russian Federation, USA, and also the UNESCO International Institute for Educational Planning and the World Bank presented their interpretation of the main areas of the Institute prospective activities:

- provide expertize and analysis for the application and implementation of information and communication technologies (ICT) in education and formulate suggestions to Member States;
- promote applied research on ICT in education and training;
- work in the field of open and distance learning, primarily for developing countries and countries in transition.

The experts consider that the activity of IITE should go in close co-operation with other institutes and organizations that work in this field.
The participants of the Consultation called the Director-General of UNESCO to continue efforts aimed at establishing and developing the activity of IITE and recommended to submit the necessary documents to the 152nd Session of the Executive Board and the 29th Session of the General Conference of UNESCO, and asked the Government of the Russian Federation to continue its support for the operation of the Institute in Moscow.

PROGRAM ACTIVITY

UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

In accordance with the statute the aim of Institute is assistance to the groundwork and implementation of UNESCO program on questions of application informational and communicate technologies (ICT) in education and in this regard IITE functions are:

a) to assist in gathering, analyses, dissemination and exchange of information on ICT application in education;
b) to provide consultative services and assist to holding in them researches on application ICT in education on states-members' request;
c) to give technical assistance in development of academic programs and courses with ICT application in education on the basis of scientific resources;
d) to hold training and retraining of education employees in the field of ICT application in education, including open an distance education, in the first instance form developing countries and countries of transitional period;
e) to assist in groundwork of UNESCO regional programs on ICT application in education in all states-members and in particular- in the countries of Commonwealth of Independent States.

Aims and tasks of Institute define contest of its program activity, structure and staff of IITE. Institute **program activity** is oriented on support and accompaniment **of the main UNESCO priorities** by means of efficient application of modern educational technologies, informational and combinative technologies in education.

The Institute carries on its work in the interest of the world community, various regions, UNESCO Member States, and with special focus on UNESCO priority target groups such as women and youth, and also special groups including African and the least developed countries and states in transition.

Motivated by the desire to assist in creation an open education space, the Institute intends to supply the existing and newly created networks and superhighways with accessible quality educational product.

main UNESCO priorities:

- ∑ Lifelong education for all
- ∑ Cooperation for development
- ∑ Sharing and mutual use of knowledge
- ∑ Sustainable development
- ∑ Open access to information
- ∑ Culture of peace
- ∑ Development of human resources.

PROGRAM ACTIVITY

UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

In accordance with the statute the aim of Institute is assistance to the groundwork and implementation of UNESCO program on questions of application informational and communicate technologies (ICT) in education and in this regard IITE functions are:

a) to assist in gathering, analyses, dissemination and exchange of information on ICT application in education;
b) to provide consultative services and assist to holding in them researches on application ICT in education on states-members' request;
c) to give technical assistance in development of academic programs and courses with ICT application in education on the basis of scientific resources;
d) to hold training and retraining of education employees in the field of ICT application in education, including open an distance education, in the first instance form developing countries and countries of transitional period;
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EUROPE & NORTH AMERICA

CENTRAL & EASTERN EUROPE

COUNTRIES OF THE COMMONWEALTH OF INDEPENDENT STATES (CIS)

ASIA & THE PACIFIC

AFRICA

LATIN AMERICA & THE CARIBBEAN

ARAB STATES

COUNTRY PROFILES EXERCISE

ACTIVITIES CONDUCTED BY THE UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION IN THE MEMBER STATES OF UNESCO 1998-1999

EUROPE & NORTH AMERICA

AUSTRIA

In the framework of its information services, IITE sent to the interested organizations of this country two volumes of the Proceedings of the Second International Congress 'Education and Informatics'.

BELGIUM

In the framework of the Sub-regional Preparatory Meeting "Technical and Vocational Education and Training of Personnel in the Countries of the Commonwealth of Independent States, Central and Eastern Europe on the Eve of the 21st Century"(Moscow, 10-12 March 1999), the representatives of Belgium took part in the work of this Meeting.

In the framework of its information services, IITE sent to the interested organizations of this country two volumes of the Proceedings of the Second International Congress 'Education and Informatics'.

In the framework of its activity, the Meeting of Experts from the Countries of the Commonwealth of Independent States, Central and Eastern Europe on International Co-operation in the Field of Application of Information Technologies (ICTs) in Education was held in Kiev (Ukraine) 12-13 April 1999; a representative of this country-Chairperson of the European Association for Audiovisual Media Education (EAAME) participated in this Meeting. The main result of this Meeting was adoption of the Recommendations to the Director-General of UNESCO, to the Ministers of Education and National Commissions for UNESCO of Member States, to IITE UNESCO.

DENMARK

The UNESCO Institute for Information Technologies in Education participates in the TEMPUS Compact Project "Online Expertise Center for Pedagogical Education" in cooperation with the Moscow State Pedagogical University (MPSU), University of Twente, and the Royal Danish School of Educational Studie. IITE's responsibilities within the Project include:

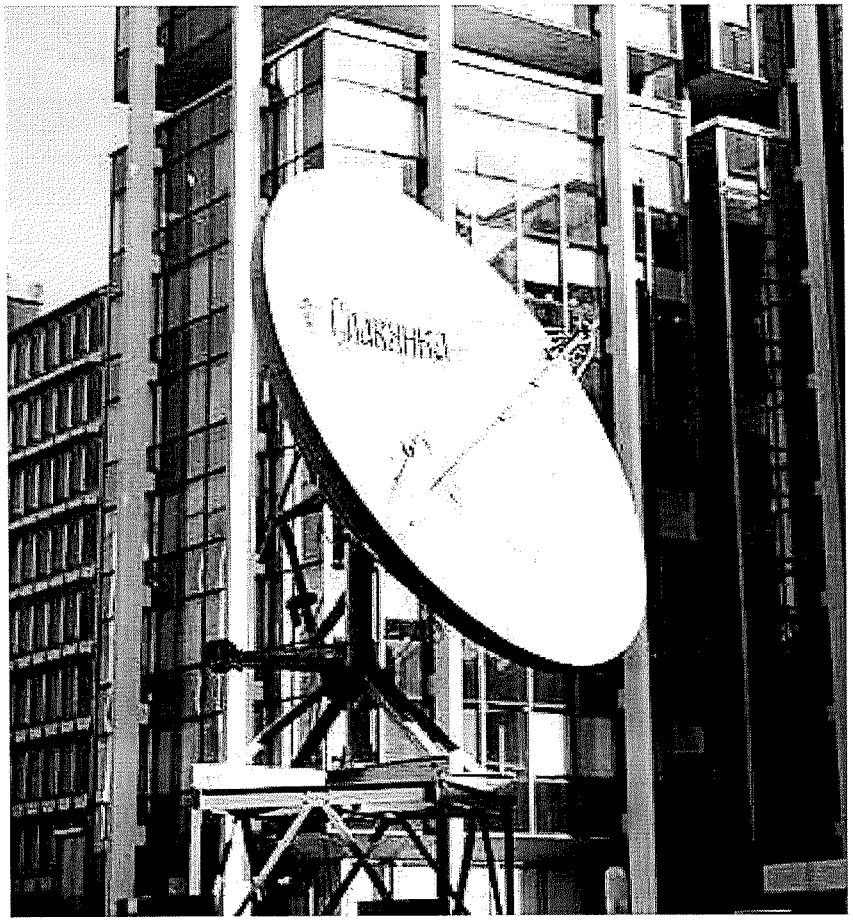
1. Scientific and technical cooperation on the establishment and implementation of the Online Expertise Center for Education.
2. Providing expertise on the dissemination of information on applications of Information and Communication Technologies in pedagogical education.
3. Assisting in the organization of the intensive courses for the clients of the Online Expertise Center.

ISRAEL

IITE signed the Memorandum on Co-operation between IITE, the Open University of Israel and the Moscow State Open Pedagogical University (November, 1998). In the framework of this Memorandum on Co-operation the project "Distance Education: Structure, Methodology, Staff Development, Legal Aspects"

IITE information and communication network

UNESCO sattelite network



Local network provides for communication within IITE, contains data banks and knowledge bases on all directions of the Institute activity.

Corporate information network - IITE Intranet unities IITE informational resourses and organizations associated with the Institute via Internet technologies.

External network of IITE established by the ***Special Research Buroeu "OKB MEI"*** on the basis of the space communication system unities IITE with the entire world.

An IITE network for space communication is being established on the basis of the IITE Teleport, located in the **Space Telecommunication Centre (STC) "Bear's Lakes"** in Moscow region. The basic elements of this network are Russian geostationary sattelites though which communication with almost UNESCO Member States can be provided as well as access to regional information networks and Internet.

The IITE teleport is connected with other STC telepotrs and uses their resourses.

Technical means of STC "Bear's Lakes" ensure commumication within the entire Eurasian continent, the most part of Africa, a considerable territory of North and South Americas.

Besides the IITE teleport, the space commutication network includes earth reseiving-sending stations for space communication ***"Slavyanka"*** as nodes, which can be located in any place of the world.

Services of the communication system "Slavyanka" in the IITE information and communication structure:

- computer exchange between educational networks of universities and other educational institutions og UNESCO Member States, including an exchange of academic programmes within the framework of distance education system;
- access to Internet and specialized computer networks of Russia and other countries with e-mail service, work in thhe

Elementary ICT Curriculum?

Short Presentation - some reflections

Moscow, 20.-22. July 2000

Sindre Rшsvik

Guidelines for Chaos?

- A digital society calls for
  - » new schooling
    - – skills and attitudes
    - – content
    - – methods
    - – organisations
    - – structures?
- Impact of ICT: Why, what and how?

Why and What before How:

- Why? The great conversation:
  - » ecological policy perspectives
    - – technological change is not additive, but transformative
      - television, car, alphabet/printing-press
- ICT and society models
  - – power related to possesion of knowledge
  - – power related to possesion of production means
  - – virtual and real societies

Micro-chips and Macro-changes

- Rear mirror approaches
  - » modern industrial society our frame of reference
    - – standards for efficiency, hierarchies, control, localisation, strutured organisations
  - » Digital society
    - – flexibility, rapid changes, reflexibility, global economy/production, flux of structures

New Economy in Global Villages

- Economy of signs
- power of knowledge versus means of production
- ICT intertwined knowledge
- from organised to disorganised economy
- from hierarchical structures to reflexive organisms
- from linear schooling to lifelong, flexible learning for all (incl. teachers)

Schooling in a Digital society?

- Industrial schools?:
  - structures, organisations: hierarchies, standards
  - content, methods: standards for average students, linear
  - book and teacher centered
  - national programmes
- Digital society schools?
  - flexible, reflexive and estetic focus
  - individual student focus
  - teacher role? Books versus ICT?

Policymaking and curriculum?

- task aiming to solve:
  - » predictable and wanted results
  - » unpredictable results
  - » unwanted results
- rapid changes of digitalisation and globalisation
  - » increase concerns about:
    - – unpredictable and
    - – unwanted future

Control versus Challenge of Flexible Responses

- When functional models don't function:
  - » extra medication doesn't work
- Exploration and experiments the only way out
  - » What does ICT amplify in the cultures?
  - » What does ICT push out of prominence?
  - » What does ICT retrieve from past (visual, auditive, physical)?
  - » What will ICT flip into when it reaches its potential?

From Why to What, and How?

- ICT curriculum:
  - » fixed, (inter-)national curriculum
  - » or explorative challenge for teachers and students?
- Learning to use: to master ICT
- Using to learn: ICT-intertwined knowledge

Some Preconditions

- Access to ICT
  - » eqiupement, software, Internet
- Removal of “teddybears”, attractors?:
  - » books?, class-organisation?, timetables?
- Development of
  - » Software and Internet sites
- ICT curriculum?

ICT Curriculum?

- elements:
  - » word-processors, spreadsheets, databases, multimedia tools, internet, ...
  - » (European Computer Drivers Licence + educational perspectives)
  - » educational projects as a framework for ECDL
  - » classroom orientation: ICT-intertwined projects
  - » mutual student and teacher programmes

Elementary ICT curriculum?

Short presentation for research seminar 20. - 22. July 2000,
IITE, Moscow

Mag. Phil. Sindre Røsvik
Norway

Table of contents

1. Introduction

This presentation deals with some curricular perspectives of schooling in a digital society. In the outset some macro perspectives and general concerns will be presented. Rather then attempting to list a detailed elementary ICT curriculum for teacher training more general considerations will be explored. Firstly to question the need of ICT and the implications of ICT in education. The paper is based on literature and the experience of the author, who has been working ICT policy of compulsory schooling in Norway for almost two decades, as chairman of the Norwegian Educational Computer Society and within school administration. This means that the Norwegian ICT policy and experiences serve as a background for the presentation.

Even if a somehow explorative style is utilised the perspective is still mainly functionalistic, referring to existing school organisations and systems. This also includes references related to curriculum guidelines. Using models to describe school the traditional school is seen to be "the industrial school", representing the bureaucratic, mechanistic type of organisations. Some organic models may also be found, representing ideas of organisations like organisms and brains. But whatever models or approaches are utilised they all represent organisational models that fit within the traditional system of education. Tendencies pointing towards a school ready to meet the challenge of digital societies with more individual design related to organisation and learning styles may be appearing. However, the school of the digital age has no elaborated model but is rather a challenge that need to be explored. Clearly more experimental approaches need to be suggested.

The paper does not suggest easy answers or shortcuts to what kind of school the digital (post-modern) society will need, or what trends that seem most vital meeting future challenges within education. The challenges certainly are not mainly technological. They are rather posing deep paradigmatic changes caused by technology with consequences to organisation, structures and learning environments. Digital technologies may be seen as driving forces within complex mosaics of networks and flows. These rapid changes are what educational strategies have to focus and handle. And this is what ICT curriculum also is all about. It is still more demanding to answer why ICT is to be an important part of schooling and what should be implemented in this respect, rather than trying to tell how it (whatever what) should be done.

2. ICT and Society: Microchips and Macro-changes

A technological change is not additive or subtractive, but ecological (Postman, 1992). Compare a milieu with and without certain insect. It will not be the same milieu without that insect, but a totally new milieu. The same happened when a new technology is added in a culture. We will not have the same culture plus the new technology, but a new culture (ibid.; 24-25). Television provides a technological example. Being more than a piece of furniture, or radio with picture, it altered not only the social life within the homes, but society as a whole.

For instance the choir movement was hit by the emerging television-culture in the 50ies and 60ies and lots of choirs died away. During the last decade the choir culture has experienced a revival, but it is claimed that the meaning of or reason for singing in choir now is different. The choir movement survives by a reconstruction, making short-time projects, and short-time obligations. Today singing in choir is considered to be a "consumer-good". It is a subjective choice, with small obligations and not very ideological based. The post-modern choir is not first and foremost for public entertainment or formed to strengthen mutual values of a society based on solidarity. It is rather a reconstruction of a social phenomenon fitting the individual needs of another society.

Technological innovations were massive also in the industrial society, but still technology most often was not emphasised in models of society. Possibly technological inventions were considered more linear, and thus became "invisible" or transparent. It could then be suggested that digital technologies represent a shift, a discontinuity that calls for special attention.

Today information technology is transforming society in such a pervasive way that it must be included in a society model. ICT cause changes of organisations, infrastructures, structures of corporations and challenges national policies (Aronowitz and De Fazio, 1997). Technological change has become a most stabile factor. ICT has intertwined with knowledge, making it dependent upon the technology. Through this alliance abstract knowledge has become the centre of the world's political economy, replacing traditional concrete products (ibid.: 194).

Currently it is experienced an emergency of a "new economy" driven by ICT, creating new industries and recreating traditional industries. Technology also influences the cultural scene very heavily by the existence of satellite communication and Internet. The global village (McLuhan) has reached new levels of development as people across the world communicate instantly in an interactive way eliminating time and space differences. Also schools are using digital technologies within the setting of the global village. The technological implications are included in this model of society, used by Daun (1998).

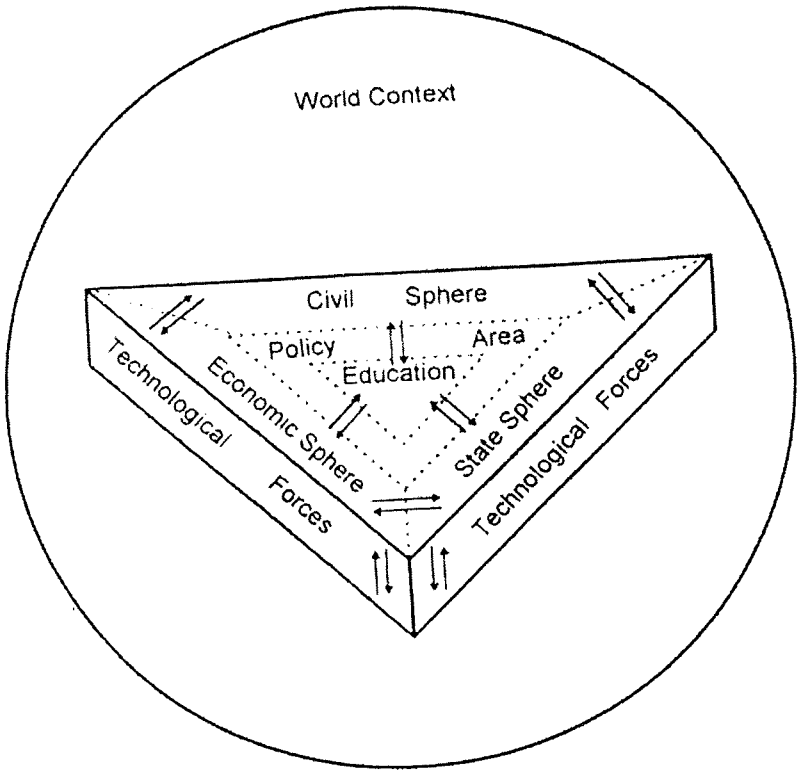


Figure 1 A model of society (Daun, 1998: 30)

He describes society as consisting of three analytical spheres: the state, the civil, and the economic spheres. Most importantly is though that technology has been introduced in a prominent place, strongly influencing all spheres, and the global, or world context are emphasised by being included in the model. Technology, in this model, is a layer underlying all spheres, constituting the environment where social and economical action takes place. He also quotes Escudero: "*social power is today more related to the possession of knowledge than to the possession of the means of production*" (ibid.: 35). Daun furthermore claims that

power has become more diffuse and fluid and less based in relations of production than it was before. Production, in this case, is may be defined as material productions not including virtual productions. Taking virtual production into consideration, power structures seem even more fluid. Where production is brain-based, companies are moved when the brain-people move.

In strategic planning it is necessary to keep in mind these dependencies. All kinds of states in different ways "use" the school system in achieving political, ideological and economical goals. Communist regimes very clearly exerted the influence of Marxist philosophy on all aspects of education. In pluralistic democratic societies, ideologies are of corresponding importance, but have a different appearance. Pluralistic societies have to have a more open approach in order to meet different views represented in the population. These ideologies press each other and alternate in domination, causing waves and movements of change or regression. Ideologies function as guidelines for institutions, very often in the form of compromises. *If compromises are not possible, new institutions, with new dominant ideologies, may appear.*

No development takes place in a vacuum. This means that events are linked together both at a micro and macro level. International trends are transformed onto the local level and with local characteristics. Changes, local or national may be imported ideas produced by international trends. On the other hand, it is no doubt that changes also are caused by genuine local ideas developed out of the local economical, social or environmental situation. Genuine ideas always have a local origin, they are "born" somewhere, but today that "somewhere" may be in a virtual environment, consisting of people from different part of the world. Such "localities" are nowhere. In the digital society it will be exciting to see in what way such environments can contribute to changes, fertilising the educational soil.

Economical forces and crises call for changes politically as well as educationally, and economy is growing more international. Economical crises cause political challenges, starting change processes like decentralisation, privatisation, market-orientation and consumerism. Economy seems to be a part of all of them, causing individualisation, demand of resources, outcome evaluation and quality control.

2.1 Societies Based on New Economies - Digital Societies

In a rapidly changing world overloaded with signs, objects and cultural artefacts and constantly transforming and recasting of meaning, a different set of competence is needed. Order is not a structure but a "structure of flows" (Lash and Urry, 1994: 4). New images must be utilised to understand society. Reflexivity, or aesthetic reflexivity, is introduced as a term to explain or illuminate a central feature of humans in the post-modern society. Reflexivity refers the ability of being aware of ones own self and the relation to the self and society. Aesthetic reflexivity includes an ecological awareness, a self that at the same time is a being-in-the-world (ibid.: 6), both subject to, and subject of, the economy of space, and critical and reflexively aware of that. In this society design has increased value, which is another aspect of aesthetics. Applied reflexive aesthetics also introduce "invented communities", like ecological movements etc. as well as virtual societies, living their lives within electronic networks.

In societies of the new economy understanding or analysis based on objective, regulated structures may prove too limited and even unfeasible. To approach schooling of today on concepts of the functional paradigm alone may turn out to be confusing and unsuitable. This means that policymakers and others need to reflect upon some different

notions and concepts than those rooted in organisation theories and functionalism. Basic, taken for granted assumptions are not easily left behind. This is more than changing perspectives. Paradigms represent totally different both values and perspectives. If the perspectives presented by Lush and Urry are to be utilised, what consequences have to be considered within education? And why may "the industrial school" and a paradigm based on functional sociology be outdated? Or, put differently, what elements are lacking or are underestimated in the functionalist paradigm? First and foremost the pace of change and range of mobility can be mentioned. Information technologies that in a pervasive way turn our society into digital societies de-stabilise both organisations and states and make change or flux normal. Old patterns and methods of control do not work effectively, or turns out to be inadequate.

Major changes deconstruct and empty some well-defined structures, concepts and objects. But reconstruction is also a continuing, ongoing process. When organisations can be reorganised new stabilising patterns of order and regulation may appear giving new meaning to the functional sociology and paradigm.

3. Education in a Digital Society:

Construction can be considered a vital part of the learning process, and such diverse and creative learning will be more essential. Learning to obey and focus on rules and regulation may turn less important. When replacing instruction with construction creativity needs to be cultivated as a learning approach. Similarly, aesthetic values should have a prominent place.

During the last decades the ICT policy-strategies in Norway have changed due to the maturity of ICT and needs in schools. The hardware standard settled. More software has been needed but this has gradually, for the most parts, been handed over to the market. As Internet was available it came also into educational use. From periods of experiments the strategies have changed to focus on regular implementations, with more holistic approaches. Even if separate ICT-plans have been forwarded the initiatives are co-ordinated more carefully, within general educational plans. National policy initiatives concerning educational policy and governing are still strong in Norway. This means that new initiatives are expected to appear steadily. The challenge is to respond more adequately to both needs within the civil society and the education sector.

The policy initiatives during the last 20 years certainly can be seen as being responses to external and internal demands. Starting out from 1983-84 the new technology was regarded to be unpredictable. The situation could be described like "the information age was coming", and being somehow unpredictable. With few exceptions, however, the means of the policy soon focused within the field of what could be predicted. Some elements of the experimental strategy, evaluation programs and competence developments were concerned with "unpredictability". Still, mistakes were regarded to be failings, forgetting about the unpredictability of the field.

The role of the state in the bureaucratic society is that of the head of the family, administering the society. This has been working fairly well in the modern society. The post-modern global and digital society cannot be administrated the same way. Changes appear rapidly, digital technologies do not respect national boarders and regulations, made for another technologies. This has consequences to policymaking and national strategies.

The situation are illustrated in the following model (Dalin, 1995):

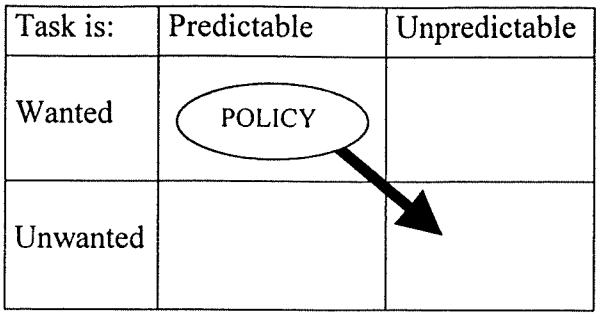


Figure 2 Policy-arena (Dalin, 1995: 210)

Globalisation ⇩ Digitalisation

Task is:	Predictable	Unpredictable
Wanted		
Unwanted		

The field of policymaking needs to focus on unpredictable and unwanted consequences rather predictable and wanted situations. The point of the model is to illustrate the shift from a policy concentrating on administration to development, which is what is required today. Underlining this point the unpredictable field is enlarged, to emphasis that the future now is less predictable than before. The policy now has to change focus from the upper left corner to the lower right. The society of today has changed the relations between what can be administrated and "controllable" and what cannot. In the old system "extra medicine" was ordained to repair failing systems. Standard solutions were the universal remedy.

Today "standards" are steadily replaced. Different solutions seem to be needed, where remedies based on professional autonomy and flexibility replace universal standards. In a rapidly changing society the unpredictable have to be handled on a daily basis. A more complete paradigm shift within educational policymaking is needed not only on formulations within plans, rather how processes of planning and performing are handled. The challenges of the digital society have to be taken fully into account to make policymaking relevant and working. Paradoxically stated: functional paradigms are no longer functional.

ICT must be included in everyday learning activities, and should be as integrated and intertwined as it is within society (Daun, 1998). ICT as media and its' implications, according is not thoroughly reflected about. The global village is certainly discovered, but not the "tetrad" or four laws of media (Levinson, 1999): What does the medium enhance or amplify in the culture? What does it obsolesce or push out of prominence? What does it retrieve from the past, from the realm of the previously obsolesced? And finally what does the medium reverse or flip into when it reaches the limits of its potential?

These questions would have been useful for a broader perspective also towards the old media, not least the textbooks. Marshal McLuhan created several strong slogans or images that all are relevant in this study. Some of the central ones were "The media is the message", "The discarnate man" and "The global village". McLuhan refused to explain his metaphors

even if he outlined them. His point was that they were to be understood as explorations rather than explanations. Several of the metaphors were consequently misunderstood or miss-interpreted by his critics (Levinson, 1999). He also claimed that understanding of society includes looking in "a rear-view mirror". By this he meant that we move into the future with our sight on the past: introducing the telephone as the talking telegraph, the automobile; the horse-less carriage, and the radio; the wireless (ibid.: 15). At the initial steps of development of new devises the widening consequences are not understood. The understanding of the school of tomorrow is based on the school yesterday. If the media is the message, we should ask what does this mean to our understanding of the traditional school, and what will it mean when introducing digital media like Internet. What consequences or impact will this media have on school?

The "exam" of Neil Postman presented in his book "The End of Education. Redefining The Value of School". Finally he suggests an examination in two parts: (i) Choose one pre-century technology (alphabet etc.) and indicate the main intellectual, social, political and economical advantages and disadvantages, and why. (ii) Indicate main advantages and disadvantages of computers, and why. The purpose of acquiring such insight should be to have a sense of how the world was made and have ideas about how it should be remade (ibid.: 193). Neil Postman spends pages rallying against ICT. His main focus is the "end" of education (double meaning), presenting two problems to solve: one of engineering and a metaphysical one. The first represents the means of education; how it should be done, the latter and most essential is about the end; why and what should be taught. Educational policy makers and most teachers are too obsessed with the means, reducing schooling to mechanical skills, he claims. Several policymakers' arguments to introduce ICT are extremely naïve, and he gives some examples (Postman 1996: 38-41) about "teacher proof" devices. What he is calling for is "the great American conversation" (about education), and this will not be about means. It would be about human struggle to understand, not about knowledge as a commodity. It would also include the need for textbooks, which he suggests should be left outside school (ibid.: 115). However, he does not propose to get rid of all technology in schools, but rather to be more aware of what they carry along. In fact he suggests also giving "technology education" where the consequences (cultural, social etc.) of using them are scrutinised (ibid.: 191).

4. ICT Curriculum

The aim of the presentation so far has been to give perspectives and arguments related to ICT curriculum of elementary education. It should be clear that lining up some elements of ICT to be taught or learned is a blind-rout to future schooling. The strategies need to be based on broad perspectives focusing on ends of education and consequences of implementing ICT schools. ICT is transforming the society quite dramatically, and so will it do to schooling. As presented above this transformation is accepted as a matter of fact throughout all societal spheres. This is also supported by the presented theories covering economy (Lash and Urry 1994); culture (Levinson, 1999); education (Daun 1998; Postman 1996) etc. This transformation gives rationale to explorative policy actions.

This lead to a paradoxical conclusion to educational planners, to stop planning and really go for experimental schooling or futuristic explorations, leaving behind clearly pre-defined means and ends. Critical attention should be paid to educational use of ICT. The development should not be described as inevitable. The challenges should be formulated about how to master ICT rather than being run by it. Questions about alternative technology

or alternative use should also be formulated. Schools, teachers and students should be encouraged to openness to find their own way.

ICT is described as a technology intertwining all human affairs and spheres: public institutions, industries, vocations, culture and private homes, and all kinds of work and learning processes are likely to change. It is sometimes declared that ICT will be the most important tool to raise efficiency, for reorganisation, innovation and improved communications. The importance is likely to grow in the years to come. Can the school nourish student curiosity and interests without including these developments and integrating student experiences and competencies in ICT into the education? It may be questioned how the school can fulfil the realisation of its aim if ICT is not appropriately integrated into the everyday learning environment, making the student an able, critical and constructive user of ICT. Students need to raise their general symbol-handling knowledge to be able to master everyday life in the future society. Use of the Web has growing importance.

These aspects seem to be in line with the needs outlined for the post-modern society (Lash and Urry, 1999). The necessity to be able to handle development of aesthetic reflexivity and knowledge accumulation of systems is clear. And the perspective of lifelong learning cannot be thoroughly emphasised.

A decentralised strategy represents a more post-modern approach aiming at getting more flexible to handle situations dominated by flux. If so, organisation models of learning organisations may be introduced, working according to holographic principles. Traditional schools in the digital society will be facing challenges that will represent experience-excesses, having no previous model-situations to lean on. If these situations queue up the system will suffer from overwhelming frustration, or metaphysical irony. Such situations will cause paradigm shifts to prevent system breakdown, or, in fact, it represents a system breakdown where a new system appears.

5. Conclusive remarks

Should there be no ICT curriculum, or will it be wrong to produce some guidelines? From the arguments above it may seem clear that the answer will be that it is unwise to develop an elementary ICT curriculum. But the conclusion is rather to immediately start working on some ICT curriculum guidelines, stressing explorative styles and experimental attitudes. Starting out with some open-minded educational experiments seems to be a reasonable opening. Some preconditions should be included directed towards policymakers stating some clear educational bottom-lines. It will most likely also be necessary to make some statements about giving teachers sufficient access to ICT, without being too specific about standards that anyhow are changing rapidly. Similarly the student should be focused. Till now most schools and teachers have not got sufficient equipment available, and are therefore not ready for any digital revolution. Realities of the resource situation in the schools must guide all strategic planning.

What are needed may not primarily be universal guidelines, or plans, but knowledge accumulative systems that take care of developmental processes. It seems to be relevant to question the role of the state in this respect. If the need is not regulations or control, but a policy focused on how to cope with an unpredictable future, what will such a policy be like? The post-modern and digital society does not wait, it is already present and schools will have to live within it. The focus has to be on how schools and students can handle their everyday challenges, and build a system that respond to their needs, not the other way round. Can the education system be organised like a brain, organised according to principles of holographic designs? It would certainly open new perspectives to educational policy. What about

removing some "teddy-bears" like textbooks and traditional exams, or introducing some new "attractors" like more powerful Internet resources allowing elementary level students to participate in well-organised virtual studies? Cultural expressions and social relations must have their space. Creative and social activities should have increased attention.

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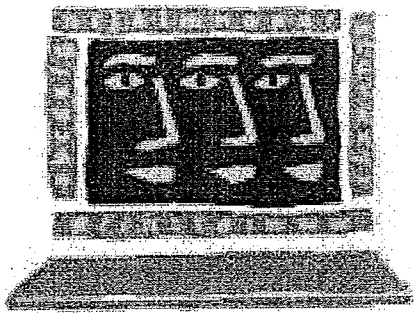

Monday, the 19th of June
Ref: BC: 2000/200

FETICHE Project

Dear colleague,

It is my pleasure to invite you to participate in the FETICHE workshop, which will take place in Grenoble, France, on 21-23, September 2000. This invitation includes the financial costs of your journey, your stay and your participation in the workshop (you are expected on Thursday night, the 21 September until Sunday 24 September).

This workshop is an initiative of the European project « FETICHE, Formation des Enseignants aux Technologies de l'Information et de la Communication : cHangements et Evolutions » (ODL Chapter of the SOCRATES programme).
The accompanying document contains a presentation of the FETICHE project followed by two documents — the « users' needs » and the « guidelines » — part of the final report of FETICHE. These two documents present the ideas and principles resulting from the work done in the project.
The principle of the workshop is to organise collaboration between experts of the partner countries (about thirty people) with the aim of producing plans for the intregration of communication and information technologies in pre and in-service teachers' training, based on the results and principles of the FETICHE project.
The workshop is planned on four half-days preceded by a welcome evening. The intended agenda includes: a keynote lecture by Bernard Cornu, the Fetiche project responsible; a lecture by an European expert not belonging to the project, and some collaborative working group sessions, groupware and web based.

On the web site, you will find some information about the Fetiche project and about the workshop.

http://www.grenoble.iufm.fr/fetiche/

This site will also be used, after the workshop, to sustain the dissemination of the results of the work done during the workshop.

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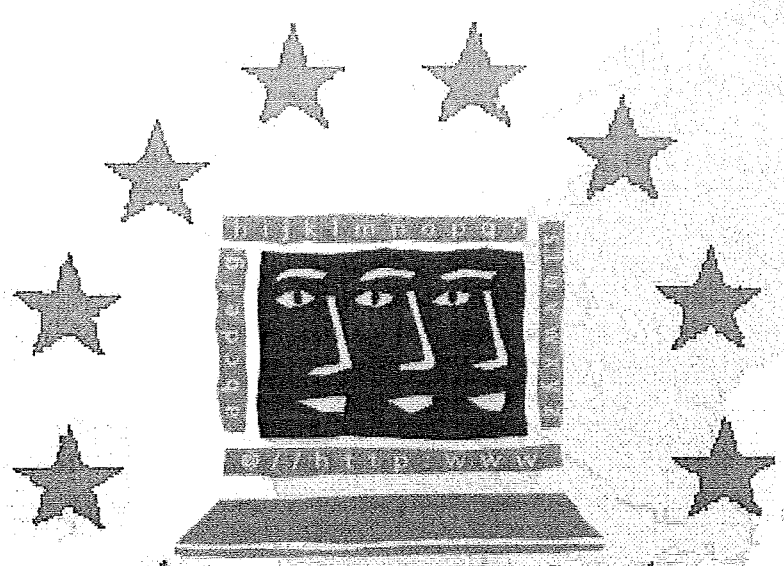

The FETICHE Project

« Formation des Enseignants aux Technologies de l'Information et de la Communication : cHangements et Evolution »

Contents:

Presentation *of the* ***FETICHE*** *project*
Users Needs *for Teachers and Teacher Educators*
Guidelines *for European Education Decision Makers*

European project SOCRATES - EOD
http://www.grenoble.iufm.fr/tic/fetiche.htm/

The FETICHE Project

"Formation des Enseignants aux Technologies de l'Information et de la Communication : cHangements et Evolution"

Background information on project partners

The following partners are involved in FETICHE:

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Purpose and objectives: a recognised need

The changes brought about by the technical and social mutations affect the field of education directly as regards professional practice and pave the way for new potential to be exploited. The characteristics of education today still correspond (at their best!) to what the needs of the industrial system of the 60's were and do not anticipate on the future needs of the Information Society. European

The main users of the project are of course teacher trainers. Within the partner institutions, about 50 teacher trainers have been directly involved in the project. The outcomes of the project benefit the whole staff of member institutions.

Conclusion:

Two main aspects of teacher training have been analysed:

- Team work and collaborative learning.
  In the traditional view, learning and teaching are quite separate. The question was to know whether telematics and multimedia tools enhance communication, teamwork and collaboration in learning and teaching.

- New ways of structuring theory and practice in teacher training.
  Teacher training is based on curricula in their respective institutions that somehow forget about sound practice and theoretical knowledge acquired through it. Practice gains meaning through tools for analysis, observation, follow up, and theoretical tools are meaningless if there is no real problem to apply them to.

Telematics and multimedia have a significant impact on the articulation between the theory and the practice of teacher training. It allows a permanent link between trainers and trainees during their periods in schools ("permanent tele-conferencing"). It also enhances and renovates the collaboration between "grass-roots" educators, professional tutors and university trainers.

Keywords

Open and Distance Learning (ODL), Virtual mobility, Pre and In-service Teachers' Training, Collaborative learning, Information and Communication Technologies (ICT)

The FETICHE Project

PRIORITIES FOR PROMOTING ICT USE IN TEACHER EDUCATION IN EUROPE

USERS' NEEDS - for Teachers and Teacher Educators

This paper draws from the experiments of the FETICHE Socrates ODL project combined with the shared reflections of the six partners in the project. It addresses the priorities required of Teacher Education to ensure an understanding of the appropriate use, role and concepts of Information and Communication technologies (ICT). In all cases, we consider ICT within an Open and Distance Learning (ODL) environment. When we refer to teachers, we include teacher educators based in institutions as well as teachers in schools; we consider teacher education as a continuum, from the initial training extending to the life-long learning and professional development perspective.

The paper, written in four sections, is a compilation of:

- the questions that need addressing;
- observations on these questions based on the results of the five FETICHE national experiments, the 'common week' experiment, and the videoconference. Some observations are inevitably contradictory, reflecting the reality and complexity of the area;
- our subsequent recommendations.

From this we have derived the list of **Priority Actions** we recommend for implementation.

PRIORITY ACTIONS

1 Understanding the use, role and concepts of ICT must be seen as essential components of, and integrated into, the curriculum of teacher training and the curriculum of subjects in schools.

2 Global networking, access through fixed lines and a full technical infrastructure and mobility, is an essential pre-requisite for all schools and teacher education institutions.

3 Initial and inservice teacher education should be merged in order to promote though the communications features lifelong learning and lifelong professional development, which are essential features of using ICT in an open and distance frame.

4 All schools and teacher education institutions should have a pro-active policy and standing committee that is responsible for the development and production of material on its web sites.

1.2.3. Teachers have available a range of materials with which to explore ICT use and understanding;
1.2.4. Teachers to conduct experiments and use materials already developed by others within education;
1.2.5. Teachers can draw upon appropriate levels of associated services to foster their explorations and learning.

1.3. Do teachers perceive that ICT may change the balance of the social group of learning between the class, the home and social life?

Observations

- The status and structure of a class is changing.
- Before ICT it was more economic to have many pupils to one teacher.
- Before ICT it was simpler to have pupils in the same place at the same time.
- With ICT a class is not only a collection of individuals but also a collaborative group.
- With ICT other types of classes - distance classes, asynchronous classes - are possible.
- Thus ICT can reduce a sense of distance, and fixed size and time, leading to the more inclusive sense of open learning.
- ICT has an impact of all areas of learning within and beyond the fixed establishment, including libraries and resource areas.
- ICT encourages the notion of "learning sites".
- Distance has social as well as geographical (space and time) dimensions.
- Open learning is a concept as important for teachers and teacher educators as for the pupils in a class.
- ODL enables expansion with different styles of teaching.

Recommendations
It is recommended that:

1.3.1. Teachers explore and use all possibilities for local and distance teaching;
1.3.2. Teachers explore and use all possibilities for synchronous and asynchronous classes through ICT;
1.3.3. Teachers use and experiment with pedagogical projects;
1.3.4. Teachers explore and use the collaborative dimensions available with ICT;
1.3.5. Teachers should be prepared to conceive of schools and other locations as learning sites.

1.4. Do teachers believe that ICT may help them innovate and change the way systems, institutional at all levels, control the flow of information?

Observation

- In the past, you could hide/ignore/ impose knowledge - now the Technology and Information is open to everyone.
- ICT does not always mean that something is "new"; it can reinforce and support existing established and valuable systems.
- Pupils, parents, the community, business and industry all can contribute different understandings of how systems respond with ICT.
- Integration and fragmentation are two different tendencies associated with ICT.
- Education has a particular strength, which can draw upon this range and variety of influences, while developing its particular 'voice'.

- It is dangerous to put materials on the Web which have been produced at a different time and for different purposes, as it creates a false and simplistic perception of the Web that does not account for new models of information handling.
- New materials are needed to support both the use but also the concepts embedded in ODL, that is the new relationships between humans, knowledge and learning.
- The absence of a more intimate teacher-student or student-student relationship makes it essential that communication tools and techniques are well designed.
- New materials suggest new criteria need to be established for their development.
- The sooner teachers start with ICT, even simplest forms like email, the sooner they can develop and extend a perspective on open and distance learning.
- Converging platforms are facilities for networks.

Recommendations
It is recommended that:

2.2.1. Careful attention must be paid to the design and development of new tools and techniques, so they reflect the more intimate relations that ODL tools can stimulate;
2.2.2. Distance education is most effective when combined with on-site instruction;
2.2.3. Communication is much easier when users have met and opportunities for this should be included;
2.2.4. The minimum installation for ICT must be a fixed line for each school and institution;
2.2.5. It is recognised and understood that fragmentation as well as integration can be associated with new technologies and in particular the different platforms and structures.

2.3. How do you integrate pedagogy with ICT?

Observations
- A full understanding of ICT is less important for teachers and teacher educators than are enthusiasm, a willingness to consider new methods, and an acceptance that it is not necessary to know everything.
- ICT may change the role of the teacher, who may develop new pedagogical methods based on constructivist or problem-based approaches.
- It is important to remember that some exciting new pedagogical/didactic methods have already been developed, in association with collaborative learning, before the advent of ICT.
- The use of ICT can support and enhance existing good practice in education.
- ICT creates a greater plurality of material development and learning evaluation within a pedagogic/didactic framework.
- Exploration of the use of ICT heuristically by teachers will inevitably have an impact upon their pedagogical practices.

Recommendations
It is recommended that:

2.3.1. Teachers must not just use ICT tools but also consider new concepts of learning;
2.3.2. Teachers must consider and reflect on evaluation methods and materials in the light of ICT use and practices;
2.3.3. Where national curricula exist, these should acknowledge the role of ICT in pedagogical practices;
2.3.4. Teachers discuss within their own subject the role of ICT in pedagogy.

3.1.2. Attention is paid to discovering more about the management and planning aspects of communications through ICT.

3.2. Are there changes which enhance the European Dimension in teachers' initial and inservice teacher education?

Observations

- It is clear that the role of language teaching and exchange offers a particular European dimension that needs to be harnessed.
- The platform for language teaching and exchange across boundaries is the clearest area of enthusiasm within teachers for further collaboration.
- The potential for a more Pan-European dimension to teaching through this medium has barely been esxplored , but this potential been at the forefront of all teachers perception, including those who are still naive users of the technology.
- Materials need to be developed which put flesh onto the pedagogic potential across languages.

Recommendations
It is recommended that:

3.2.1. A priority be given to the development of language teaching across the European languages;
3.2.2. An infrastrure for such cross fertilisation, with its effects upon material development and pedagogy/didactics, be given priority.

3.3. Are there changes in communication between trainers, teachers and students, and a change of relationships and perceptions?

Observations

- Electronic communication is fringe technology compared with static paper based knowledge.
- Communication does not necessarily take traditional teaching institutions into account as a primary source of knowledge.
- ICT have an impact on hierarchical constraints on relationships; they have a different effect, rather than a reduced one.
- Email may do away with vertical hierarchies; but video conferencing may introduce new ones.

Recommendations
It is recommended that:

3.3.1. Initial and inservice teacher education be merged as quickly as possible in order to promote lifelong learning and lifelong professional development, which are essential features of using IC in an open and distance frame;
3.3.2. All teachers and teacher educators are involved, so all will need to re-evaluate and renovate their perception of their role and job;
3.3.3. Structures are established in institutions to debate and provide an ongoing platform for discussions on the impact on teaching practices through changes in communication features.

- There are substantial concerns that economic and business factors will inhibit the plurality of use and time availability of systems.
- The profit motive of telecommunications companies can damage the very communications they are meant to facilitate; educational establishments will be a particular section of society particular who will suffer from such pricing policies.

Recommendations
It is recommended that:

4.1.1. All teachers and teacher educators should establish links between society, community and the classroom;
4.1.2. All teachers should take the necessary steps to implement action following the establishment of these links;
4.1.3. Teachers recognise the potential for new of groups from hitherto diverse styles and sections of society;
4.1.4. Teachers embrace the potential for breaking down existing cultural and community barriers;
4.1.5. Teachers be aware of the positive and negative dimensions which can influence the groupings using ICT.

4.2. What related ethical issues and other problems come with the management of ICT

Observations
- Copyright issues must be considered and respected.
- There are questions of control, both open and closed issues, that need both further debate and more universal recognition.
- Web pages and their material reflect both the good and bad that are available generally in the world.
- Teachers need to recognise the problems and ensure that a pedagogically sound interpretation is made of this plurality of material.
- There can be a balance but also imbalance of information provision on the Web.
- There is a need for a discussion on setting limits on Web access within educational environments.
- There is a need to respect the privacy of students using email.
- Careful thought must be given to the use of photos and names on Web site.

Recommendations
It is recommended that:

4.2.1. All schools should have a pro-active policy and standing committee that is responsible for the development and production of material on its web sites;
4.2.2. There is a pedagogical solution to material access on the Web;
4.2.3. Institutions that host Web sites are responsible for validating their content;
4.2.4. Teachers should encourage through partnerships the increase rather than constraint upon communications.

4.3. How much does ICT break down traditional barriers?

Observations
- ICT plays a complimentary role to normal and everyday situations.
- Email has done much to break down artificial barriers.
- Information overload and an absence of substantial reflection on the information available is in danger of creating a false understanding of the complexities and potential of the medium.

The FETICHE project

INTEGRATING ICT INTO TEACHER TRAINING

GUIDELINES - for European Education Decision Makers

The experimentations carried out by the different partners of the FETICHE project were based on the use of information and communication technologies (ICT) in order to improve open and distance learning (ODL) in teacher training. It was both an aid for teacher training, enabling trainers and trainees to keep in contact during the school practice, and enhancing collaborative working between educators, trainees, and tutors, but also a way to integrate new technologies as a content in teacher training. In teacher training, ICT is both an object and a tool. But it should not be anew subject: it has to be integrated in the whole teaching/learning process of all subjects, across the different school levels.

From the experimentations, we have made observations and analysis, and we have shared the reflection among the six partners in the project, taking into account their expertise and experiences. The present guidelines are the fruit of this work; they are addressed to teacher training institutions, policy makers and decision makers (national and local authorities) in European countries: they may help the teacher educators who want to integrate information and communication technologies in their teaching and practice.

The Guidelines are directly related to the three main objectives of the action plan for a European education initiative " Learning in the information society ":

- provide access to technology in schools,
- train the teachers,
- produce tools, resources and services.

3. Curriculum development and open learning: new and integrated tasks and activities.

- Teacher training curricula need constant redesign, in terms of content and methodology.
- Implement training activities that serve as hints for teachers' future work. In their training, student teachers should have experience of activities, which can be re-used and further developed.
- Time is necessary! And free time is necessary. Give time to people, to decision makers, to users. Make a clear statement about the length of time needed. Have time for free access to resources, self-service activities, etc.
- Most teachers are enthusiastic, keen on learning new things. They may be fearing technology, but communication technology seems to be less threatening than computers were.
- It is essential that teachers discuss within their own subject the role of ICT in their pedagogy.
- Integrating ICT in teacher training must be activity based, task oriented and problem centred, with a view to project based learning.
- Teachers must be encouraged and supported to learn autonomously, rather than always be trained.
- It is essential that a range of ICT projects continues to be developed within teacher training.
- Teachers must adapt evaluation materials by using ICT.

4. Experience for yourself new ways of learning!

- Make teacher trainees, educators and tutors have their own experiences of ICT tools:
- Make them experience by themselves learning something new in their own subject through ICT; make them experience by themselves learning in new ways (collaborative learning, learning by project...). It is only if they experience it by themselves, during their training, that they will be convinced that it can work with pupils. Projects should be integrated into the development of teacher training. To work collaboratively and not be fixed to tied static knowledge, there must be a re-thinking of teacher training.
- Train the trainers! And consider that all the competencies and abilities needed from trainees are first needed from educators! All teacher educators must have a comprehensive understanding of the use, role and significance of ICT within the pedagogy of their own subject.

7. Conditions: certain levels of equipment and human resources are necessary in order to produce progress.

- ICT, like videoconferencing, help organisational integration by making geographical, educational and administrative boundaries less visible.
- Technical conditions, equipment, facilities are necessary. Proper technical infrastructure is necessary for ICT to progress. First of all, a network access and multimedia facilities in every learning site.
- Schools and teacher education institutions should keep up with a technological development, in order to give teacher education a sound basis for the integration of ICT and pedagogical practice.
- Human professional resources are necessary as well, in training institutions and in schools. Technical and human competencies must be embedded within teacher education.
- Heads and Principals must create conditions where there will be incentives to use ICT. And they should challenge teachers to be involved in ICT projects.
- More generally, decision makers should be persuaded to promote ICT projects.
- Teacher educators must be involved in an ongoing evaluation of the training process.
- There must be Internet providers specific for education in each country.
- Pre- and in-service training Internet tools for all teachers must be developed.

CURRICULUM VITAE

After studies of mathematics, astronomy and mathematical statistics at the University of Geneva, Raymond Morel taught during 25 years at the College of Geneva after being certified by *Etudes pédagogiques of DIP.*

Director these 13 last years of The Geneva Educational Technology Centre (**CPTIC**), a Service of the Geneva State Education Department (DIP), he achieved the cursus " organization and human resource management " as decision maker of the State de Genéve. Since 1969, he introduced information and communication technologies (ICT) into the schools.

On the national level, he set up and chaired during 20 years the Swiss group of coordination for ICT, organizing more than one hundred of teacher training education courses for the Swiss teachers and more than one dozen of national symposia.

Acting expert and Swiss representative in the organizations such as the IFIP, OECD, UNESCO, etc, for more than 20 years, he is currently vice-chairman of the TC-3 (education and ICT) of the IFIP (International Federation for Information Processing) and has contributed since 1981 to the scientific organization of many meetings and international conferences.

In the research field, he led, as Swiss partner, since 1989 several projects within the framework of the European R & D programs (Delta I and II, SOCRATES, etc). He is with the CPTIC the Swiss member for EENet (The European Experts' Network for educational technology).

Raymond Morel received in 1994 the IFIP Outstanding Service Award for his whole of his collaborations and international work.

http://wwwedu.ge.ch/cptic

IS PEDAGOGY OF INSTRUCTIONAL MEDIA LIFE-LIKE, LIFE-WIDE, AND LIFE-LONG?

(Experiments of information technology with poor children)

A PAPER PRESENTED
IN
THE RESEARCH SEMINAR
AT
IITE MOSCOW

B. K. PASSI[1]
INDIA

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IS PEDAGOGY OF INSTRUCTIONAL MEDIA LIFE-LIKE, LIFE-WIDE, AND LIFE-LONG?

(Experiments of information technology with poor children)

CONTENTS

IS PEDAGOGY OF INSTRUCTIONAL MEDIA LIFE-LIKE, LIFE-WIDE, AND LIFE-LONG?
(Experiments of information technology with poor children)

Dr.B. K. Passi[2]

1 The Abstract

The present paper gives an overview of increasing importance of educational technologies in our learning systems. A niche area of research and development has been identified wherein it is demonstrated how the uncoordinated growth of learning resources could be useless, sometimes, even harmful for the cognitive growth of children. The five learning resources must develop hand in hand. We may require appropriate marriage/jelling of different technologies for this purpose.

In India, the growth of education and educational technology has accelerated beyond expectations. The technology has pushed the educational sector and transformed the nature of traditional low-tech-environment to high-tech-environment. The recent policies of information technology and support to computers and educational television are going to pay its dividend. The project in the form of CLASS Project of eighties and the Smart School Project of this millennium are creating new waves.

The University Innovative School was one of the first schools, which has introduced computers for the children of first grade. Many of my colleagues were hesitant to do so. We wanted to activate the sleeping community in favor of computers. We thought of a strategy of involving the parents. We asked the parents to purchase 'computer floppies for their wards who were studying in our school' (please note that this word/object, called floppy, was totally new to almost all the parents). This experiment had created new reactions of awe and curiosity in parents. (Interestingly, the awe and curiosity was more in parents and less in children).

The paper gives interesting pedagogical implications of the development of technologies such as the induction of printed book. The introduction of the book has changed the monopoly of the teacher and even question the sole monopoly of spoken modes of education. The computers has questioned the roles of the teacher and even demonstrated that children (even the slum children) can learn of their own. In fact, children could work out many pedagogical moves as shown in the NIIT experiment of Delhi.

The paper also claims to show that the children can construct their own knowledge, use their own language to interact, use appropriate media to communicate their ideas, and even test the

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http://www.geocities.com/athens/pantheon/6584/index.html

acquisition of knowledge acquired by the learners. This is evident from the experiment of the Washerwoman's son.

We have also shown that Indian Teacher Educators are alert about the developments in information technology. The Annual Conference of AIAER passed nine out of fifteen resolutions, which were connected, with information technology.

At the end of this paper we have given many more details related to our experiments in elementary education, especially at the University Innovative School. The reader who is interested only in information technology may avoid these details.

2 Information Explosion is Fast and Deep

Dhanarajan Gajarajan3 quotes that the total amount of information that becomes available doubles every four to five years. Stating it another way, the total of all human knowledge that was available to an undergraduate in 1997 would be less than 1% of what would be available to a student in the year 2050. Teachers have to become experts in helping learners navigate through this sea of information rather than pretending to be effective transformers of that information into knowledge for their students. Students must be trained to bring about that transformation. Those who survive this information explosion will be able to deal with it effectively, even more importantly, turn it into knowledge.

3 Five Learning-Resources

Multiple Learning-Resources are operating within formal, non-formal, and informal systems of any society. Formal systems have assumed self-styled responsibility of organizing Learning-Resources. Formal system of education is over-playing its role. It is high time that alternate systems are also explored in terms of new functions. We want to say that the claims of formal system as an exclusive resource center of learning need to be questioned when seen in terms of new socio-economic developments.

Over the years, we have seen that the agricultural-cum-industrial society is being transformed into a service-oriented one. The 'information age' has brought new forms of learning in the society. The rate of obsolescence of information is multiplying.

Today, new forms of Learning-Resources are evolving. Often, these resources are not well coordinated for the development of the individual and society.

[3]Dhanarajan Gajarajan 'Teachers, Technology and (Re) Training' The COL Workshop on Integration of Information and Communication Technologies (ICTs) through Teacher Professional Development December 1999.

The left hand does not know what the right hand is doing. There is very little sharing of experiences and expertise. Uncoordinated Learning-Resources do result in creating cognitive dissonance. Consequently, the behavior of children gets distorted. Such uncoordinated use of media cannot be allowed to proliferate. Preferred direction of growth has to be designed deliberately. What do we do to overcome this problem of uncoordinated growth of Learning-Resources?

These Learning-Resources can be classified into: (i) Teacher-Based Formal Learning-Resource, (ii) Home/Mother-Based Informal Learning-Resource, (iii) Community-Based Non-Formal Learning-Resource, (iv) Media-Based Open Learning-Resource, and (v) Computer-Based Virtual Learning-Resource. Let us briefly examine the nature of each of these Learning-Resources with respect to their purposes, learning activities, outcomes, and acceptance. We also need to question whether these Learning-Resources will perform complementary, supplementary, parallel, or contradictory functions in different spheres of learning? We need to identify the strengths and the weaknesses of the existing and the emerging Learning-Resources so as to conceptualize and operationalise innovative methods of integrating virtual learning institutions.

(a) Teacher-Based Formal Learning-Resource represents the formal school resource. It is wide spread having been in existence since a few centuries in our society and attained its peak glory along with the industrial wave. It has high levels of acceptability from the providers and the receivers alike. The curriculum is formal and well accepted representing various subjects like languages, mathematics, social sciences, sciences, work experience, physical education, and so on. The objectives of these learning-resources are well-stated- cognitive development and personality development. They are highly structured with formal annual calendars, linearly maintained time-scale and promotions, pre-determined methods of admission and groupings of students.

(b) Home/Mother-Based Informal Learning-Resource is an age-old learning-resource based upon instinctive biological qualities of motherhood. The social components too have contributed to its potentialities. This learning-resource received its formal shaping during the agricultural and industrial waves of development (these terms were coined by Alvin Toffler). The early social groups, extended families, and even the nuclear families of today operate this Learning-Resource; the interactions are informal. The learning environment is 'life-like, life-wide and life-long' wherein infants, children and adults influence each other in a cooperative fashion. The formation of basic habits, learning of language, development of belief systems, acquisition of culture, participation in recreation activities, caring about health, and learning many other life skills, are implicit contributions of this Learning-Resource. The impact is life-long and deep regarding the lifestyle and outlook of the learner.

(c) Community-Based Non-Formal Learning-Resource is as old as the formation of society itself. The over-dominance given to teacher-based resource does not allow community-based Learning-Resource to receive a respectable position in the domain of learning. The playgrounds, the community halls, social agencies, do operate as Learning-Resources. Of course, family, which has been treated separately as an agency, too, plays its vital role. All the members of the community and the peer-groups are the beneficiaries. The children, peers, and adults interact over a variety of situations. They acquire communication skills, work skills, social negotiations, recreation skills, occupational skills and many life related values and attitudes. The approach of this learning-resource is non-formal in certain situations and informal in some others. The community learning is provided through the non-formal and informal systems.

(d) Media-Based Open Learning-Resource- while this type of resource is quite old, the meaning and scope is changing continuously. The meaning of media determines its scope and operations. This Learning-Resource is struggling to gain its due respect. In this Learning-Resource, all persons of all ages follow their own learning paths. They follow their own choices of media. This Learning Resource provides general awareness, and helps to develop the social and cultural aspect of the personality. It also provides information for work skills, cultural development, interpersonal relationships, and social negotiation skills.

(e) Computer-Based Virtual Learning-Resource is one of the newly emerging forms. They can be virtual institutions where the users are willing partners. Such Learning-Resources enhance the information/knowledge base, academic skills, research skills, skills of integrating individual studies and teamwork, and values of cooperative endeavor.

4 Coordinating Learning-Resources

These diverse Learning-Resources are operating in the society. In this milieu, electronic media is proving cost effective and affordable. Learners are motivated to use this media, but the software is to be fine-tuned with the needs of viewers. In order to achieve this goal of optimum utilization of the electronic media for imparting information, it is necessary to understand the roles of learning environment(s). After clearly specifying the expected roles it is necessary to spell out the inter-agency, inter-media, and inter-institutions coordination for achieving the overall welfare of the beneficiaries including children, teachers, support staff, and community. The challenge before us is to create self-guided coordination. Let us understand the potentialities of these five types of Learning-Resources.

Five Learning-Resources

Learning-Resources	Acceptance States	Agency	Approach	Users/ Beneficiary	Learning Outcome
(a) Teacher-Formal Learning-Resource	Existing And Well Accepted	School	Formal	Formal Students	Cognitive Development through Formal Curriculum
(b) Home/Mother-Based Informal Learning-Resource	Old But Not Well Cared	Home	Informal	All Infants And All Adolescents	Habits, Language, Beliefs, Culture, Recreation, Life Skills, Health Care, Body Development, Other Aspects of Life, etc.
(c) Community-Based Non-Formal Learning-Resource	Old But Less Accepted	Community	Non-Formal	All Children And All Adults	Work Skills, Culture, Social Negotiations, Recreation Skills, Effective Development, etc.
(d) Media-Based Open Learning-Resource	New And Struggling For Recognition	Media	Open	All Persons	General Awareness, Culture, Recreation, Negotiating Social Reality, Recreation Skills, etc.
(e) Computer-Based Virtual Learning-Resource	Emerging, Less Access, Accepted by Groups	Virtual	Virtual	Participating Members / Groups	Knowledge, Academic Skills, Values, Developmental Work etc.

Let us ask a few questions about the coordination of these Learning-Resources. What are the general, special, and unique features of these Learning-Resources? Perhaps, much more serious understanding is needed, especially from the point of view of self-coordination so that the child and the society are properly served. We should find feasible and acceptable solutions of coordinating the existing Learning-Resources. Our solutions must be less cumbersome than the original problems. Following questions can help us in this regard. To what extent and in which manner are these Learning-Resources

formal, non-formal, open, virtual, or unique in their form? What are their extrinsic goals? What are implied goals? Who are the beneficiaries and who will fall within their specified boundaries of influence? Where and how do these Learning-Resource-Centers represent the culture of work-sites, homes, schools, media, cyber-space, or others? How do they influence the society in general, and school going children in particular? How can new technologies and innovative styles of socio-educational management create virtual systems for learning? Can we afford this type of virtual learning system? There is another question to ask. Is this exercise worth doing?

Education is a complex process using dynamically growing children and dynamically operating environment. How do we integrate the multiple Learning-Resources for an ever-learning society and thus, an ever-transforming society? We must remember that education has to handle multiple, evolving and dynamic situations? The learners are changing. The society and technical environment around these learners are also changing. The resultant interactions between the changing individuals and their environment are in a state of continuous flux and evolution? We need professional groups to work on these mega-sized frameworks.

5 Smart Schools in India

The role of Information Technology (IT) in education, training and human resource development has been well recognized in the IT Action Plan of the Government of India[4]. The Task Force on IT perceives information technology as a tool that has the power to transform the country into a prosperous and self-confident nation.

This section deals with a blueprint for Smart Schools in India. Maheshwari5 defines that schools, which support students' learning and thinking skills with programs, infrastructure, tools, teachers and management, aided by information and communication technologies are Smart Schools. In a Smart School, students are autonomous learners; they learn 'how to learn'. Smart Schools enable children to acquire abilities of constructing knowledge from available information. Maheshwari writes that the children of primary classes will: (a) learn at their own pace, (b) participate in collaborative work, (c) discriminate between objects, letters, figures, (d) associate objects with words, words with sounds, match figures, picking odd ones out, (e) operate a computer system to the extent necessary for performing the above tasks, and (f) use special input devices meant for young children, such as concept keyboard, illuminated keyboard (in addition to the regular keyboard) and the mouse and earphones/headphones that would confine the audio output to the user of a computer terminal.

Upper primary and middle school will continue to learn to be around traditional school subjects, but relevant innovative practices will be introduced for children to: (a) work together on projects like creative writing, making posters, etc. using word processor, graphics

[4] Government of India. 1998. *Information Technology Action Plan.*
[5] Maheshwari, A.N. 1998. *It's time for Smart Schools.* Computers Today.

programs, etc. (b) create web pages and disseminate their own ideas, and (c) acquire skills and attitudes of autonomous learners.

Pupils will acquire skills to: (a) boot the system, run a program, use help menu and tutorials, (b) handle the operating system to create, modify, save, copy, print files while using a word processor, database and graphics programs, (c) generate tables and charts, (d) plan layout of documents and utilize features of desk top publishing by inserting images, tables, charts and graphic objects along with text, (e) scan images using scanner, (f) log on to the Internet, (g) send and receive electronic mail, (h) attach files with email, (i) send and receive fax using the computer and a modem, and (j) create html files incorporating text, graphics and scanned images so the files can be read on a browser program..

The school as a whole will undergo changes in order to support the new practices. It will equip itself with the necessary technology, furniture appropriate for computers and accessories and special furniture for small children using IT facilities. The school will: (a) create a stimulating environment for students and teachers, (b) develop an alternative set of learning activities using learning technologies, (c) work as a team with students, parents, teachers, technical staff, managers, etc. for making the Smart School concept functional and implement the technology to bring about short-term and long-term changes in the schooling process.

6 University Innovative School- UIS

We have given details of this school at the end of this note. I wish to share with you one anecdote. In the eighties of the last century, the UIS got launched in a city called Indore. The general population was not computer literate. There was hardly any thing like computer literacy amongst the parents of the wards of this school. We purchased a few PCs and introduced computers for the students of first standard. The age group was around five years. We introduced computers with the help of practice teaching students of the Bachelor of Education.

As a strategy we asked children to bring their own floppy disk. The request was communicated to parents through children and a small note. The parents did not understand the requirement, its cost, the quality, and the availability. I recall that I received many phone calls from parents about this floppy. This event created a small awareness in the mass of parents who were illiterate, as far as computers is concerned.

7 Pedagogical Implications of Media

Each media has its unique structure and unique characteristics. This uniqueness of media generates particularized functions. A particular media has a particularized pedagogy.

7.1 Textbook and changes in pedagogy

Let us take the example of introducing textbooks for the instructional process. A textbook represents organized knowledge through accepted symbols. This intervention has influenced the status of the teacher who previously used to be the provider of all. Prior to the textbook, a

teacher was the only source of knowledge. The textbook has reduced the overarching monopoly of oral pedagogy. The skills of reading and writing thus received new and added attention along with speaking and listening skills. The ordinary textbooks, however, excluded blind learners from the educational scenario. In fact, we should know that later brailed and audio textbooks were introduced to overcome the limitations of ordinary textbooks. The exclusive learning objectives of memorization have to now accommodate the additional objectives of critical analysis and reflections. We may appreciate the fact that one could conduct analysis and reflections in pre-textbook pedagogy. The important point for us to focus on is that the over emphasis on memory was cut to size. Many more pedagogical principles can be listed similarly.

7.2 Computer-pedagogy of slum children

Since tools by themselves cannot operate, the specific media pedagogy would have to be selected. As an illustration, let us take one example of the new pedagogy of using computers in school learning. It is a medium where we know that the computers have taken over the controls of learning from the teachers and have handed over the controls to the learners. The providers of information have thus taken a back seat, with the learners in the driving seat. The learners are monitoring the learning interactions. The learners are in command. The controls on the substance of learning, space of learning, pace of learning, and also the context of learning are in the hands of the learners even though they are isolated and distributed all around. New relationships between teachers, learners, and computers are emerging. It appears as though, while staying back in their homes or workplace or some other place, the computers are helping the learners to learn even when the traditional teacher is not present.

To illustrate this point further, the other day, the senior Vice-President of NIIT was explaining the possibilities of self-learning through computers. He was describing an experiment of learning behavior of children living in a slum area of Delhi. He quoted an experiment conducted by NIIT, New Delhi. It was found that the slum children learnt Internet-browsing by unsupervised self-efforts. He further researched into this learning feat and discovered that the children played a few proactive-tricks. Apart from trial and error, these learners had identified a local boy of that very slum, Nathu (as a surrogate teacher), who was working as a peon in an office where computers were installed. This peon-boy became "the grand-teacher" of the enthusiastic slum-learners, who were learning browsing on a computer installed by NIIT. The researchers asserted, that as a result of this experience, young children can learn new things through their own efforts; and further they have the capacity to teach, what they have learnt, to their elders including teachers. This experiment has turned the tables upside-down and the young learners have become the "teachers of teachers". This has truly created a new environment.

In this new environment of self-learning, the hierarchical relationship between the teacher and the taught has melted into "relationships of equality". In fact, the children and the teachers have acquired a new sense of camaraderie. The computers have introduced a humanizing effect in a situation that was predominantly impersonal and bureaucratic. Is this not an interesting phenomenon? How do we use these findings for a new pedagogy of cooperative learning? Accordingly, how do we design new support systems for creating

friendly environments? Let us extend it further to the four pillars of learning- learning to learn; learning to be; learning to do; and learning to live together.

We have to understand that each tool has its own pedagogy and tool-specific procedures developed to use it. We should be looking for an interface between-tool-specific-pedagogy and subject-structures. We are aware of the fact that each subject has its own discipline structure. A given subject organizes its knowledge structure in its own manner. Each subject develops its concepts, principles, and generalizations in a very unique fashion. For example, methods of observation used in geography are useless in mathematics. The methods of historical analysis may not be useful in the disciplines of languages. Thus, subject-pedagogy depends upon the nature of the subject. The nature of the subject further depends upon the substance of the subject and the special methodology of constructing the knowledge of that subject. We should be clear that we are talking about specific-methods of research in specific disciplines. We ought to understand the specific pedagogy of the respective media. We shall, therefore, have to explore the special characteristics of the tools of the media for delivery systems. In order to design instructional systems one should have a deeper understanding of the above-mentioned four components- subject substance, subject research method, specific media characteristics, and media specific pedagogy.

Advocating the use of technology to deliver training will require some fundamental changes in the way things are done. These changes will challenge institutions that provide the educational service; they will test user capability of such services and question government policies and regulations pertaining to the facilitation of that training.

7.3 Washerwoman's-son and pedagogical issues

A group of researchers representing pedagogues, computer professionals, and experts from development agencies conducted half a dozen experiments with high and low income family children. We are reporting here the experiences of Raja -- a 9-year-old son of a computer specialist who migrated from South India; and Nathu -- a 9-year-old son of a poor washerwoman who migrated from UP. The mother tongue of Raju was Tamil but could speak English fluently. The mother tongue of Nathu was Hindi and he did not know a word of English and Tamil. Raju was living in Delhi and could understand a bit of Hindi, of course, with difficulty. These experiments aimed at finding whether these heterogeneous students want to teach each other.

The answer was yes. Secondly, we wanted to know whether these students know some teachable substance. The answer was that the Tamil boy thought of teaching the details about the "Sun" with the help of PowerPoint and Paintbrush. He prepared the topic from books, Internet and even the friends of his father. The poor boy, Nathu picked the topic called "Charcoal" used for their traditional iron press, which the mother used for bread-earning. He was quite confident about the subject matter. He used the real objects and demonstration method coupled with verbal explanation in Hindi, which was the link language between the two.

Thirdly, the experimenters wanted to check if the boys could use appropriate language for purposes of teaching each other; whether their teaching resulted into meaningful learning on the part of learners? We observed this didactic classroom with care and caution. We even tested the learning outcome with the help of a teacher made test. Observations were also used to support the oral test organized by the team of researchers.

In the end, we found that children belonging to rich and poor can construct their own knowledge and can communicate by using appropriate language and technology. Results of these experiments were appreciated in an international conference held in Malaysia in Y2K.

8 Information Technologies and Teacher Education

We are convinced that Indian teacher educator is aware of the importance of instructional technology. In this direction we may note the contents of the resolutions of the recently held XIII Annual Conference of All India Association For Educational Research (AIAER). It is evident that the teacher educators tended to focus their energy on educational technology even while the theme of the conference was 'curriculum development'. As many as nine resolutions, out of a total lot of fifteen, were related to educational technology.

Resolutions of AIEAR at the XIII Annual Conference
(Nine out of fifteen resolutions are related to technology)

a. The Association may seek the financial support of NCTE, UGC, and other funding agencies to organize orientation and advanced programs for researchers, teachers and activists for undertaking research in different sectors of the curriculum for different personnel like teachers, parents and administrative staff.
b. The Association may provide a quarterly newsletter through a Web Page/Bulletin providing the developments within the Associations' State Chapters and Institutional Chapters.
c. The Association may seek the financial support of NCTE, UGC and other funding agencies to develop local literature regarding indigenous practices in the Curriculum. Textual Material, Stories of Good Teachers, Methods of Teaching, Methods of Evaluation etc.
d. The Association may seek the financial support of NCTE, UGC and other funding agencies to organize local workshops, seminars and conferences in the areas of Teacher Education for Information Technology, Yoga Education, Work Education, Education of the Poor (Especially those in slums), Environmental Education, and Value Education.
e. The Association may seek the financial support of NCTE, UGC and other funding agencies to undertake Case studies of institutions that design innovative programs following the Approaches of Behaviorism, Cognitivism and Constructivism.
f. The Association may seek the financial support of NCTE, UGC and other funding agencies to encourage the development of the substantive literature and pedagogical literature about Critical and Creative Thinking

Resolutions of AIEAR at the XIII Annual Conference
(Nine out of fifteen resolutions are related to technology)

Skills. Institutions and members may be supported and encouraged for preparing micro and macro projects with financial support.

g. The Web Page Manager of the Association may improve the quality of the page with a view to facilitate the possibility of undertaking a pilot project with the support of PVDT of SNDT and the info-tech group from the community, especially at Pune, along with help from any such agency.
h. UGC, NCTE, and NCERT may be approached to launch a program for developing Minimum Levels of Information Technology (IT) facilities in all the Teacher Training Institutions and the advanced IT programs in 100 such institutions in the next two years.
i. Distance Education, Open Education and Networking Education Methodologies may be utilized for the development of teachers, support staff, educational writers, parents and others on a continuing and a long-term basis MHRD. UGC and other international bodies may be approached for providing academic, administrative and financial facilities.

Further it was resolved that the fourteenth Conference of AIAER is going to be organized around the theme on information technology. We need to train our teachers at all levels so as to make the dreams of educational technology a reality. May be we do need to collaborate with international institutions for such a task.

Dhanarajan Gajarajan says that any rearrangement in the training of contemporary teachers can neither ignore skills development in learning technologies in the curriculum nor a role for learning technologies in the delivery of that training. There are many reasons why this is so such as a) the short supply of talent, (b) an unmet demand, (c) changing patterns of learning, (d) just-in-time training, (e) information explosion, and (f) the ever-changing nature of learning technologies.

9 Annexure –Experiments at Indore (The Story of UIS)

At Indore, we conceived a program of providing education to the prenatal child. We named it Abhimanyu Gyan program. On ad hoc basis, we conducted a few talks and programs around a concept that child can be educated even in the womb of the mother. My wife, Dr. Subhashini Passi and I asserted that birth is too late for learning. Abhimanyu Gyan program was well received by the pregnant mothers. A few prospective grandmothers also became the recipients of this program. They were planning and hoping to participate in the developmental process of their potential grand children. They liked the program all the more, may be, because of their experiences of parenting. The activity continued for a year or so. We thought of transforming this informal program into an institution. We sought the help of some philanthropists and donors. A very well known group called T. Choitram Foundation was approached. We proposed to start an interdisciplinary childcare institution. This group has an excellent hospital, an institute of nurses and a very reputed school. The proposed institute for the child could work in collaboration with such relevant institutions. The so-called dream of having an Abhimanyu Institute of Child and Parent Care started to play with our fantasies. This institute was supposed to have seven stages and two major phases. Pre-natal and post-natal phases were planned to cover the period of pre-natal nine months and pre-primary childcare school of five years. The new name having seven stages corresponding to seven colors of "rainbow" was also proposed. Acronym, VIBGYOR embodied the structure and spirit of the proposed institution.

At one stage, I was brainstorming with the idea of seven colours RAINBOW: VIBGYOR, pre-school educational programs

Seven-Color-Rainbow Of Abhimanyu Gyan

SN #	Rainbow Stages	Phases, Stage -Name & Description	Duration	Purpose Curriculum Methodology
Phase- I – Pre Birth:				
1.	V-Violet	Victory: From pre conception to conception	Conception	-
2.	I-Indigo	Inborn-born: From conception to prenatal care to birth	- 9 months	-
Phase-II– Post Birth				
3.	B-Blue	Birth to cradle: From birth to day-care	0-1 year	-
4.	G-Green	Growth motor skills: From day care to play centre	1-2 year	-
5.	Y-Yellow	Yearning for sensory development: From play centre to nursery	2-3 year	-
6.	O-Orange	Odyssey with reasoning and social play: From nursery to lower kindergarten	3-4 year	-
7.	R-Red	Reaching school: From UKG-entry to primary school	4-5 year	-

We believe that birth is too late a stage to start learning. We further believe that reading, writing, and arithmetic are important yet minor tools of learning. The area of learning is life long and life-wide. Currently, we are toying with the idea of developing mother-based, family-based, and child-based for the all round development of the child. Age-wise curriculum for the child covering pre-natal stage to an age of five years is being planned. The agencies, and other co-workers, like marriage partners, mothers, fathers, grand fathers, grand mothers, councillors, media groups, doctors, paediatricians, gynaecologist, yoga workers, neurologists, nurses, paramedical personnel, play peers, food technologists, social workers, psychologists, teachers, principals. You may like to have an overview of the same. The time scheduling too was also worked out. The idea was to be implemented through a school-cum-hospital. The fee proposals ranged from Rs.100, 000 to Rs.2, 00,000 per child for the package of about eight years.

school children were responding to our indigenous efforts of Indianisation through our processes and activities related to: Indian music and games, values and valuing, meditation and introspection, need for material success and urge for simplicity, productive work and personal enjoyment, analysis of real social cases, value dilemma analysis through Panchtantra stories, high-tech-and-high-touch environment, long-day and year-round educational support, etc.

Now I realize that we have silently conducted a series of planned and spontaneous experiments in child education. My interactions with Mirambika School of New Delhi, observing children from schools in Kohlapur and Akola, my visits to Leningrad Nursery Schools and the Pioneer Palaces of Russia, my research experiments on Suchman's Inquiry Training Model and Piagetian Model of Teaching, my study of futurists like Alvin Toffler and writers like Ivan Illich, my assimilation of the views of down to earth thinkers, like Gijju Bhai and Gandhian thinkers, my discussions with Professor E.Paul, Torrance, my study of institutions like Kibbutz of Israel and Ghotul of tribals of Jhabua, my participation with Hoshangabad Science Teaching Project team now taken over by Eklavya, my inspirations from the Schools of J.Krishnamurti and Gyan Prabhodini of Pune, my understanding and formulations of Bal Bhavan Society, my study of our ancient thinkers, my silent appreciation and introspection about many unsung slum school teachers, like Mr.Joshi of Indore, and many more discourses with friends from missionary schools have been creating inner discomfort and tension leading to creative worrying. Concrete and lasting ideas have yet to emerge and blossom. My grounds of child pedagogy are explored, and ploughed but are still barren.

Where did we falter and why? I do not know. May be, we brought changes too fast? May be, we lacked our understanding of the socio-political environment around. May be, our teamwork had a very narrow scope of academics alone.

10 Acknowledgements

I am thankful to Dr (Mrs.) Subhashini Passi for her help to prepare this paper in many ways. I am also thankful to Dr.M.S.Sodha, Dr. Bharat Chapparwal, Dr.U.C.Vashishta, Dr.S.K.Tyagi, and Mrs..M.Padmanabhan for their help regarding the University Innovative School and to Mrs. Rama Raghu for her help to conduct the Delhi Experiment of Washerwoman's son.

Styles of Modelling

Analytic

Systemic

Macro-systemic

predictable

unpredictable

	Analytic (cf. classical physics)	Systemic (cf. biology)	Macro-systemic (c.f. evolution)
Learning Theory	Skinnerian conditioning	models of memory	Piagetian and Vygotskian cognitive development
Ecology	field trials	predator-prey relations	ecology changes
Education Systemic Reform	expts/quasi expts	?	?

Macro-systemic Change in a Relatively Stable World

Ecological restoration requires:

vision

rich and accurate descriptions of:
- **elements (environments, plants)**
- **communities of plants**
- **plant*environment match**

evaluation systems for health and diagnosis

knowledge of
- **stable systems**
- **transitions**
- **time lines**
- **pathology**
- **fixes**
- **resource implications**

Promoting Macro-systemic Change under Relatively Stable External Conditions

Knowledge of Where You Are Now

descriptions of elements and settings

descriptions of systems

A Vision of Where You Want to be in 1 year, 2, 5 and 10 years David P; working group

Ideas on Plausible Transition States

Descriptions of treatments: what does it NOT include?
- **prerequisites**
- **resource needs**

fine grained descriptions
klaus; Alnaaz; Dor

What is easy or difficult to do?
- **effect sizes**
- **treatment lifetime**

Jef

Feedback tools

More Vision!
Bernard; Toni; Lilian + Marcela;
Cella + Tania Mara; Antonio
Ana Luiza

How do we ENGINEER Macro-systemic Change in Unstable Worlds

satisficing not optimizing

exploring affordances

fail forwards; ready, fire, aim; fail fast, fail often:

Gail

cybernetic feedback

change goals en route

fast dissemination

Centers for Evidence Based Policy and Practice

clarity about knowledge claims

vivid descriptions of phenomena and effects (separate from theoretical accounts)

rival epistemologies

Problematising Analytic Methods

the 'treatment' is ??

dilution and corruption

non-uniform effect sizes

new goals, and multivariate goals

(systemic and macro systemic issues about the knowledge engineering and user communities)

Problematising EBP in Systemic Reform

system definition

Vittorio on MED

generalisation and system capacity
teaching via LOGO
competent teachers?
accommodation?

Lea on EducaD

parameter estimation
time
effect size as function of treatment
costs

systems issues
unexpected outcomes
financial implications of de-schooling
time on ICT trivia
faster asset stripping of poor countries

Jimmy

Problematising Macro-systemic Change

research is just one sense making activity

challenge to 'academic' knowledge
engineering versus science

Papers the Printers Forgot from Poland and Peru

Why 20 years of ICT has had only modest effects

The negative impacts of ICT Iliana; Anaaz; Wing

The 10 worst ICT-based lessons I ever saw

A battery of assessments for new educational goals

How to distinguish valuable/useless classroom activities

How teachers use on-line support Jan (2003)

Conclusions

Practical Urgencies

we need bookmarks to help EVERYONE

educational engineering is at least as important as theory

the school of the future is a complex system
located in a local, national and global system

we need to consider systems issues seriously
macro-systemics seriously

we need to create centres for Evidence Based Practice
explore users uses
support all communities

we need 'utopian thought'
vivid exemplification
appropriate assessment systems
robust quality assurance

We need to get real...
analyse failures
demonstrate real learning gains

Theoretical Urgencies

we need a new science of change

we need to understand knowledge creation and implementation

to order to create the 'meta' generation

we need to revisit
- the development of ideas about knowledge
- cognitive development
- the development of metacognition
- the development of morality and ethical behaviour

we need to explore the development of 'new intelligences'
- Machiavellian intelligence'
- Sternberg, Gardner

Jaap

"Intelligence is the ability to use existing tools in new ways"

EDUCATIONAL MULTIMEDIA

- WHAT TEACHERS NEED TO KNOW TO CARRY THROUGH THE SOCIAL CONSTRUCTION OF INFORMATION TECHNOLOGY

BENT B. ANDRESEN (ED.)

ROYAL DANISH SCHOOL OF EDUCATIONAL STUDIES

1999

TABLE OF CONTENT

INTRODUCTION

The three major themes of this book are teachers' competences, pedagogical innovations, and the application of educational multimedia into schools[1].

Pedagogical innovations are a constant theme. Currently, pedagogical innovations are often made possible by the application of educational multimedia into the classrooms. Their potential for improving the quality of learning is significant and there is already a growing body of evidence that the integration of multimedia can foster learning[2].

Consequently, producers of educational multimedia have an essential role in the process of integration. By providing multimedia tailored to the needs of students and teachers, the producers potentially can foster innovations in schools.

Even more important, however, is the role of teachers in the modernisation of education. Since the teachers are in charge of the planning, running and evaluation of the use of information technology, they can transform the potentials of educational multimedia into reality in educational settings. The social construction of the information technology performed by the teachers is crucial to the way students may benefit from the digital tools and media.

Hence, teachers should be offered pre-service and in-service education in order to initiate them in the ways in which multimedia can be used to respond to the needs of the students.

The teachers have to learn how to locate, evaluate, and select appropriate teaching/learning resources and curriculum materials for various content areas and audiences of students. This includes multimedia-based products, texts, reference books, and other sources.

The teachers also have to know how to organise the use of such products and to make sure that it is appropriate for teaching objectives, relevant to students, and based upon principles of effective learning. Therefore, teachers need knowledge about 'best practice' with educational multimedia.

In other words, teachers need to know how to incorporate multimedia for teaching and learning purposes where appropriate, and to support student expression using a variety of multimedia tools. To be able to do this, teachers need a new type of competency – an ability to produce useful changes and results – requiring a combination of concepts, skills, and pedagogical capability. They need knowledge and skills about current multimedia products and tools to be able to use these products and tools by themselves. And they need didactical

[1] This book arouses out of the project PEDACTICE concerning educational multimedia in compulsory school (EEC Project MM1043).

[2] Abbott, C. 1995. *IT helps*. London: NCET.

competency – pedagogical knowledge and capabilities and an appropriate skill set – with respect to the application of multimedia into education.

The first competency includes familiarity with, among other things, word processors, painting and drawing tools, compression of images, digital cameras, scanners, and camcorders. The conceptual knowledge, intellectual capabilities, and appropriate skills needed by the teachers also include the ability to plan, record, digitise and edit video and plan, input and digitise sound from microphone and audiocassette player/recorder. In addition, it includes knowledge about how to access and use resources on CD-ROMs, DVDs, and the Internet. This includes knowledge about how to compose, search and send requests for information, retrieve, read, and process information of various types including text, numbers, images, animations, sound, and video clips. It also includes knowledge about the role of these tools and media in effective communication, i.e., the characteristics, strengths, and weaknesses of the different means of expression and communication.

Taking the best scenario (as the teachers are used to do), which often includes activities with educational multimedia, teachers can improve their teaching. Therefore, teachers need to be familiar with possible scenarios of integration of multimedia into education. They need knowledge about different types of learning situations with multimedia. In particular, teachers need to know some of the answers to the questions essential to pedagogical practices with multimedia, i.e., questions like "How can students use multimedia, for what purpose, in which ways, and with which results?"

The answers to such questions cover knowledge about 'best practice' with multimedia. This includes knowledge about scenarios concerning the students' reception of multimedia with different content and structure as well as scenarios where the students use multimedia communication tools to present their results.

The material in this book consists of three articles. The first article is *The Art of seeing the Forest and the Trees: Teachers' Information Technology Literacy and Multimedia didactical Competency* by B. B. Andresen. It reports from research, currently in progress, concerning the best way to identify, characterise and communicate knowledge about the use of multimedia in education to teachers. The article presents four sets of answers to the important questions related to the current widespread use of educational multimedia. The answers are identified as four distinct pedagogical scenarios:

1. Reception of the content of linear multimedia products;
2. Reception of the content of non-sequential multimedia products;

3. Reception of the content of multimedia products aimed at teaching;
4. Production of the students' own multimedia presentations by means of proper tools to handle texts, graphics, video, sounds, etc.

Best practise in line with any of these four scenarios, or with a combination of these, requires that the students and teachers become information technology-literate. They need certain knowledge and skills to be able to use educational multimedia effectively and appropriately. This includes the knowledge and skills needed to use the information technology to locate and collect information, analyse information, draw conclusions, and communicate results clearly in a variety of formats.

In the first article of this book, the application of multimedia pedagogical practices is considered in relation to new literacy. The article review the literacy needed to use information technology – in particular, educational multimedia – in teaching and learning. The perspective is twofold; the students as well as the teachers need this new literacy.

The third part of the article deals with teachers' pedagogical competences. It considers multimedia pedagogical practices from the point of view of teacher education, since teachers need suitable competences to be able to apply educational multimedia into their pedagogical practices. The article specifies these new requirements in pre-service as well as in-service teacher education.

The teachers' selection and application of multimedia products and tools should be driven by pedagogical considerations rather than technological. This means that the teachers need knowledge about learning principles that goes well along with the use of multimedia and are able to fully exploit the learning potentials of these new media. The second article of this book, *The Challenge of Problem-based Learning: How to practice Student-centred and Self-paced Project Work* by Signe Holm-Larsen, considers the learning potentials of project-based learning.

As for the project method this article is concentrated on three main aspects: the methodical key concepts, the central points in the students' working process and the role of the teacher in a student-centred and self-paced learning strategy. In each area, the project method and the use of educational multimedia can be combined in order to support students' responsibility of own learning giving more room to independence in choice of what to learn how and when.

The article represents findings from studies about the essential concepts of problem- and project-based learning needed by teachers to fully exploit these learning principles. In particular, the article defines terms as *problem and product orientation* and summarises the relations between project and curricula content, and outlines the important themes of interdisciplinarity and subject proficiency.

Moreover, the second article deals with different aspects of evaluation and assessment.

In particular, it deals with the different phases of project work in the classroom situation underlining how to develop the students' capacity to structure own learning process. It considers the whole spectrum of activities from the introductory event in the very beginning, through the range of activities directing the work such as choice of topic and working pattern, problem formulation and use of information, until the presentation of the final product.

The role of the teacher in project-based and self-paced learning is new for many teachers. Traditional teaching relies upon the principle of teacher directed activities, but in project work the goal is the student directed learning process. It demands a range of guidance competences such as how to support without overtaking the students' work. Therefore, the teachers have to assume suitable attitudes and roles. It includes the roles as adviser of the process, expert in special subject matters, inspirer when spirits are low, arbiter at group discussions, critical friend in order to provoke students to seek beyond the easy solutions, and evaluator with the objective to improve the students' learning capacities in general.

Information technology-literate students and teachers possess knowledge about terms such as hypertext, multimedia, and linear and non-linear narratives. Furthermore, they are able to localise and apply the information from linear multimedia presentations and non-linear, hypermedia presentations.

The third article of this book reports research concerning some of these basic technical competences a teacher must possess to be able to apply multimedia effectively into teaching and learning situations.

Considering the literacy, most of the multimedia products are built on a platform with a graphical user interface. Therefore, it is necessary to be familiar with the use of such user-interfaces, e.g., teachers must know how to handle files, windows, dialogue boxes, system-breakdowns, etc.

Still considering the literacy, teachers need the ability to understand and use the different symbols presented in multimedia products. To fully exploit a multimedia CD-ROM or the World Wide Web, it is necessary to possess knowledge about navigation in hypermedia. Search techniques are essential to the use of most hypermedia products and especially the web. Therefore, knowledge about the most basic techniques when using a search-engine is essential to find a particular piece of information on CD-ROM or on World Wide Web.

As mentioned above, teachers (and students) need to learn how to use and produce digitised material, in order to convert between digital and traditional, analogous material. For example, if the students are using a multimedia product, they may find a photo on a CD-ROM (Scenario No. 2), which they want to use in their essay or report. In addition, if

they produce their own multimedia-product (Scenario No. 4) it is a core-activity to produce and handle digitised material.

Together the three articles summarise findings from research on the teachers' competency in the field of information technology – in particular, educational multimedia. The target audience of the book includes decision-makers in the educational system, researchers, persons in charge of pre-service and in-service teacher education, and producers and publishers of multimedia products for education.

December1999

Bent B. Andresen

ICT and Teaching Capability

- The Scenario Model

Bent B. Andresen
Research Centre for Education and ICT
Danmarks Pædagogiske Universitet

Research Seminar
"TEACHER TRAINING FOR INFORMATION SOCIETY"

Agenda

@ Introduction
@ Theoretical Framework
@ The Concept of Learning Scenarios
@ The Educational ICT Driving License
@ Concluding Remarks

Introduction

Teacher education:

@ Development of teaching capabilities regarding the integration of ICT
@ New literacy

Theoretical Framework

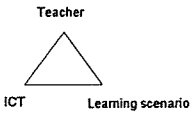
Classical approach:

@ Optimal match between the learner and:
  - *the material*
  - *the teaching techniques*

ICT ⟷ Teacher

Alternative:

@ Optimal match between the learner and the domain of practice



Analogy of a Driving License

"Trinagulation"

@ Car
@ Driver
@ Traffic

Core Content

@ Knowledge about the function of the engine
@ Not about the construction of the engine

The Scenario Model

A postulated sequence of imagined events aimed at learning.

Each scenario is characterised by particular roles of:

@ Teachers
@ Students
@ ICT

Example Scenarios

Scenarios with Educational Multimedia

Role of student	*Scenario*
End-user	1. Reception of the content of linear multimedia products
	2. Reception of the content of non-sequential multimedia products
	3. Reception of the content of multimedia products aimed at teaching
Producer	4. Production of the students' own multimedia presentations by means of proper tools to handle texts, graphics, video, sounds, etc.

Student as "producer"

The student as creator, inventor, producer, and designer

Process-oriented approach:

- Students make several drafts before they finish the product
- At each stage, the teacher supply advice or comments
- The students then rethink and improve their design

Educational Policy and Objectives

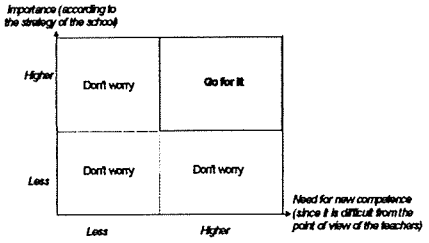
The central learning scenarios have to be grounded in

- Policy
- Objectives
- Innovative practice

Some tendencies:

- Full integration of ITC
- A shift of focus from teaching to learning;
- Increased cooperation between teams of teachers
- New learning content, in particular new literacy
- Student-centred activities, interdisciplinary work, and project-based learning;
- New relationships between schools and their surroundings

The "Target of difficulties"



Symbols and new Literacy

Literacy

- The ability to understand and produce the symbols of a culture.
- The literacy of the information society includes:
  - *Reading*
  - *Writing*
  - *Mathematic*
  - *ICT literacy*

Implementation Considerations

The Danish Educational ICT Driving License:

- *Changing role of the teacher and the student*
- *Changing learning content, in particular new literacy*
- *New ways of organising the learners' work, communication, and learning*
- *Technical competences regarding the use of computers and the Internet*

The Construction of Scenarios

A. Learning and communication using E-mail and an electronic conference system
B. Learning and process-oriented writing using a word processor with response on drafts from the teacher and some students
C. Learning and looking for information using a web browser
D. Learning and handling a questionnaire using a spread sheet

More ...

The Construction of Scenarios (2)

E. Learning and communication using a word processor to desktop publishing and graphical design
F. Learning and communication using a multimedia tool
G. Learning by producing and/or using database software
H. The implementation of ICT into schools; development of team teaching capabilities

Approval and Response

The tutor gives feedback to the learning scenario regarding:

- The objective of the learning process
- The theme of the learning process
- Description of the students' previous experiences and knowledge
- Considerations concerning the introduction of the students to new activities and software
- An overview of the organisation and flow of the learning process, etc.

Details of the Content

A. Getting started with computer supported communication and cooperation
B. Writing with the computer in a process oriented manner
C. Surfing on the Internet
D. Calculating and dealing with mathematical models
E. Further use of the computer for word and image processing
F. Multimedia productions and other representations on the screen
G. Information handling and internal and external databases
H. ICT and innovative schools with team teaching

Evaluation

The teachers are positive regarding:

- Relevance of pedagogical and technical content
- Course form (E-learning)
- An enormous interest: around 25 pct. of the Danish teachers (grade 1-10) in 1999/2000

They are not so positive regarding:

- Number of hours of course work

Concluding remarks

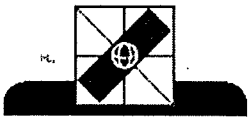
Guidelines for course design:

- Qualify the teachers to:
  - *Develop innovative learning scenarios*)*
  - *Take part in the social construction of ICT*

**) Learning scenarios:*

- *A postulated sequence of imagined events aimed at learning*
- *Focus on the (changing) roles of teachers, students and ICT*

United Nations Educational, Scientific and Cultural Organization.



IITE –
UNESCO Institute for
Information Technologies
in Education

Research Seminar
Teacher Training for Information Society

"Elementary ICT Curriculum for Teacher Training"

Anton J. Knierzinger

As we move from book culture to digital culture, we are on the brink of being able to rethink the entire process of teaching and learning

As we move from a print culture to a digitised culture, we move from stable information to moving information.

Dale Spender,
IFIP Congress Canberra 1996

Whenever trying to integrate IT in education the main intention should be to draw the attention of the people teaching in schools to the great potential and the benefits of the use of Information- and Communication- Technology in classroom. It is important to show them that IT is not only a tool which might help them to teach and learn easier an d faster, but it is a vehicle to change the whole learning process and at the end will totally change the role of the teacher.

This concept is based on the experiences and results of various school-experiments which were carried out in Austria as well as in other European countries and the standards for teacher training in IT for the USA published by ISTE.

This concept is aiming to discuss curricula and didactic principles as well as to derive the necessary conclusion for the teacher's education and in-service teacher training. The concept should create a basis for discussion in this seminar which should lead to further decisions how to perform teacher training for a successful use of IT in schools.

Reason/Motivation and Educational Goal

Computers are increasingly becoming an elementary part of children's lives (e. g. in order to play games, study, communicate, etc.) and schools have to confront themselves critically with those new technologies and a society which is greatly influenced by IT.

Taking a responsibility for the current development of our society, schools have to deal with modern Communication- and Information Technologies in a way which suits the children's age and their needs. Therefor teachers should try to teach knowledge and competence by using computers in various lessons rather than in a separated subject. Teaching ICT should also deal with the problems of the specific society and the different access of students to technology caused by the different levels of economic development.

Improved differentiation and individualization in the learning process should lead to an increase in efficiency of learning. The integration of computers can also improve the education of children with special needs.

Each elementary kid should have the opportunity to work with computers in order to learn about the character if this technology, learn the skills which are necessary to master it and discuss the consequences it will bring to our society. .To live and learn successfully the information society children must be capable users of the new technology.

Children should be able:

- to effectively use technology as a tool in classroom and at home
- to find, analyze, use and evaluate information with the help of ICT
- to understand the basic operations and concepts IT is based on
- to use ICT tools for communication and collaboration
- to understand the main function of ICT in society and to discuss the social, ethical and human issues related to this
- to employ ICT for problem solving

A Paradigm Shift in Classroom Methodology

"The concept of organisations is a product of the mechanical age. Now that we are living in an electronic age, new organising principles are necessary.

***The ideas* presented here help us to make the transition and meet the challenges of this new reality."**

(Morgan, 1997)

By introducing information and communication technology (ICT), or digital technology, education are transformed into the digital reality. This means that the technology is not merely an add on; it transforms education to a digital society with substantial consequences to the school system, organising the learning environment, methods and content of learning.

But the result of this transformation is not given by the technology, rather by the choices made by policymakers, educationalists and learners. Keeping in mind that the digital technology have inherited values, pros and cons, benefiting some and representing new obstacles to others, people in charge should be determinedly active introducing ICT to schools in a critical but constructive way. Teacher education programmes will no doubt be the most critical factor for successful results, with wide-ranging consequences to the development of the prosperity of the future society.

IT can been seen as a vehicle in the development of methodology used in classroom. This paradigm shift can be characterized by different new strategies:

Traditional New Strategies	**New Learning Environments**
Teacher –centered instruction	Student –centered Learning
Single-sense Stimulation	Multisensory stimulation
Single-path progression	Multipath progression
Single media	Multimedia
Isolated work	Collaborative work
Information delivery	Information exchange
Passive learning	Active/exploratory/inquiry-based learning
Factual, knowledge-based learning	Critical thinking + informed decision-making
Reactive response	Proactive/planned action
Isolated, artificial context	Authentic, real-world context

Source: ISTE Concept for National Educational Technology Standards for Education

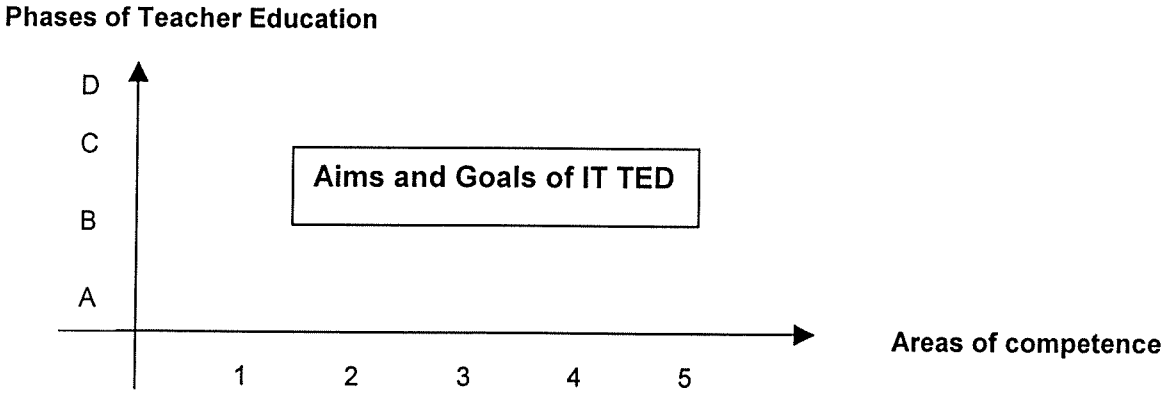
Consequences for Teacher Education

Accompanying measures in order to assure a successful involvement of IT in the classroom must be identified. Based on one hand on the needs of the children and the other hand on the experience in traditional education the integration of IT in classroom can empower the outcome of the learning process if certain prerequisite factors are observed.

There are many way to become a teacher in different countries. Also the level of technology you may find in a school varies from one country to the other. Therefor this paper is dealing with teacher education a very general way. Doing this you can identify for phases of teacher education and five levels of competence in using IT a teacher student is running through.

In order to prepare student teachers to use IT in classroom effectively they must have skills and knowledge in all 5 areas of competence.

The following two-dimensional model shows that learning to use technology must become an integral part of the education of future teachers. The principles must be observed in every institution where teachers are educated.



Phases of teacher education:

A General education for teacher students
B Professional teacher education
C Guided practice and classroom experience
D Job entry phase

Areas of Competence:

1. Basic technology competences
2. IT production tools
3. Teaching and learning
4. Assessment and evaluation
5. Social, ethnical and human issues

1. Basic Technology Competences

Teachers should have a sound understanding of the basic concepts IT is based on. They should be able to identify the main hard- and software components of the IT environment used at school. They must have skills in using common hard- and software in the classroom. All this in order to enable them to design a suitable technological infrastructure and to cope with hard- and software problems in the class. Teachers should be able to follow the rapid changes in the IT world.

Prospective teachers should:

- Understand the principles and concepts IT is based on. **(A)**
- Know the basic hardware components of modern computers and peripherals as well as their main functions. **(A,B)**
- Be able to master the main function of the operating system mainly used in schools. **(A)**
- Connect new hardware and technology resources specially designed for educational use. **(A, B, D)**
- Install new software and media products especially those which are produced for educational use. **(A, B, D)**
- Develop trouble shooting strategies to master routing hard- and software problems during the use of IT in classroom **(A, D)**
- Able to evaluate hard- and software concerning their usability in classroom and to make an appropriate choice between different products. **(A,B,D)**
- Use digital media devices and software interfaces for them like CD-ROM, DVD, digital cameras and scanners. **(B,C,D)**
- Design to technological parts of a technology enriched classroom environment. **(B,D)**

A	**General Teacher Education**	**C**	**Practice + Classroom Experience**
B	**Professional Teacher Education**	**D**	**Job entry phase of a teacher**

2. IT productivity tools

Teachers should be able to use common ICT tools to enhance the productivity of the learning process. They should be able to evaluate existing tools regarding their usability in classroom. Students and teachers should be able to use the modern information tools in order to have access to updated data and information. They should know the possibilities and advantages of having data in a digital form. Teachers should know how to handle new communication tools to be able to collaborate with students and fellow teaches and to share experiences.

Prospective teachers should:

- Be able to master the useful software products up to a level which is suitable for their work. The most important software applications for classroom activities are:
  + word processor
  + spread sheet calculation
  + simulation
  + graphical applications
  + data handling
  (A,B)

- Be able to locate, evaluate, collect and reuse information on the internet and via other IT channels. **(A;B)**

- To use IT for all kinds of communication and to handle the hard- and software tools needed to interact with peers, students and parents. **(A;D)**

- To identify and use tool for preparing and design publications and to produce material for teaching and learning purposes. **(A)**

- Use a variety of media formats. **(A,B,C,D)**

- Use multimedia productivity tools in order to produce multimedia material for the use in classroom. **(A)**

- Design, manage and facilitate tools for data-handling including features to create reports. **(A)**

- Use IT to facilitate problems solving, decision making and knowledge construction. **(A)**

- Have an idea what programming is and know the basic structures and principals of software production. **(A,B)**

A	**General Teacher Education**	**C**	**Practice + Classroom Experience**
B	**Professional Teacher Education**	**D**	**Job entry phase of a teacher**

3. Teaching and learning

Teachers should be familiar with the great potential of ICT and new media regarding to improve the teaching and learning process. They should be able to use their technical knowledge to design and change curriculum plans including methods and strategies for an appropriate use of IT in order to enhance the outcome of their work with the kids. They should be able to identify the key factors of the changing role of the teacher in the learning process.

Prospective teachers should:

- Have a sound understanding of the main learning theories and consequences and relation to the use of ICT in classroom. **(B)**
- Find a positive attitude towards technology and be able to identify the big advantages and benefits of the use in teaching and learning. **(B)**
- Know the special methodology of using IT in different subjects and find and collect examples of good practice. **(B, C, D)**
- Identify and evaluate information sources available for students. **(B, C, D)**
- Identify and evaluate applications suitable for classroom activities. **(B, C, D)**
- Plan lessons that meet current standards for best practice in using IT for teaching and learning like
  * student-centered learning,
  * collabarative leaning,
  * individualized learning,
  * project oriented learning

  (C, D)
- Discuss the advantages and problems of distance learning and have their own experience in the use of this method
  (B)
- Be able to use IT for information of parents and cooperation with them. **(D)**

A	**General Teacher Education**	**C**	**Practice + Classroom Experience**
B	**Professional Teacher Education**	**D**	**Job entry phase of a teacher**

4. Assessment and Evaluation

Teachers should be familiar with different assessment and evaluation strategies. They should be able to use IT in the assessment of teaching and learning. IT can be used in collecting and analyzing data and to display and communicate the results. They should be able to define criteria for the evaluation of IT tools and products used in the classroom.

Prospective teachers should:

- discuss assessment and evaluation strategies. **(B, C, D)**
- integrate IT based assessment into plans for use of IT in classroom. **(B)**
- be able to decide if methods integrating IT are appropriate. **(B)**
- evaluate the information sources used by students (relavance, accuracy,..). **(B, C, D)**
- find criteria for the evaluation of IT products for the education market. **(B)**
- know criteria for the evaluation of courseware products. **(B)**
- use IT for reporting of results of the evaluation to students. **(D)**

A	**General Teacher Education**	**C**	**Practice + Classroom Experience**
B	**Professional Teacher Education**	**D**	**Job entry phase of a teacher**

5. Social, ethnical and human issues

Teachers should know that the integration of IT in school as well as in our society raises a lot of legal, social, ethical and human issues. They should be able to communicate these problems to their students. In classroom they should be able to pay attention to the problems of cultural diversity, gender issues and equitable access to IT. They should take care of a safe and healthy use if IT.

Prospective teachers should:

- understand and discuss the legal, ethical, cultural and societal issues related to the use of IT in our world. **(A, B)**
- understand and discuss the legal, ethical, cultural and societal issues related to the use of IT in education. **(B)**
- be aware that the global village is a multicultural entity and cultural diversity on the internet is a big chance. **(A,B)**
- know the main legal problems related to IT like
  * copyright
  * privacy
  * security of data

  (B)
- know the main societal problems related to IT like:
  * gender issues
  * equitable access towards technology
  * workplace needs

  (B)
- discuss ergonomic problems and be able to improve the technological infrastructure of the school from that point of view. **(B)**

A	**General Teacher Education**	**C**	**Practice + Classroom Experience**
B	**Professional Teacher Education**	**D**	**Job entry phase of a teacher**

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RESEARCH SEMINAR
"TEACHER TRAINING FOR INFORMATION SOCIETY"

21-22 July 2000, IITE, Moscow

RECOMMENDATIONS

On July 21-22, 2000 the UNESCO Institute for Information Technologies in Education (IITE) held in Moscow (Russian Federation) the research seminar "Teacher Training for Information Society". The participants from 12 countries (Armenia, Austria, Denmark, Estonia, Finland, France, India, Japan, Netherlands, Norway, Russian Federation, and Switzerland) were invited by the Director of IITE in personal capacity *(Annex 1 – List of Participants)* to discuss the main trends of development of the IITE educational/training activities and make their proposals on this matter.

The following topics were considered: IITE educational programme; IFIP proposals for "Elementary ICT Curriculum for Teacher Training"; "Informatics in Primary Education. Recommendations"; Computer Driving License for teachers.

The participants were informed about the UNESCO strategies designed for providing education for all throughout life, which were confirmed and updated at the World Education Forum (Dakar, Senegal, April 2000) and in its documents "The Dakar Framework for Action. Education For All: Meeting our Collective Commitments" and "A UNESCO Strategy for Education For All", as well as reported about statutes' goals of IITE and its programme activities in line with the UNESCO Programme (30 C/5) and, in particular, with the Intersectoral UNESCO project "The Status of Teachers and Teacher Education in the Information Society". The discussion was based on the Working Document prepared for the research seminar, other materials and presentations made by the partakers.

The participants:

- discovered the convergence between the IITE activities and those of different international organizations, namely EU programmes, OECD projects, and IFIP actions (as the last Working Conference on the "Bookmark of the School of the Future");
- showed their confidence that the application of information and communication technologies (ICTs) influencing and changing the world and human being and giving rise to information society should be used as a productive tool for positive transformations in all areas. It was underlined that the mastering of ICTs in education should not be backward, but go beyond all alterations and be supported by the development of New Literacy for

Considering that the teacher training plays a key role in provision learners with quality modern skills and knowledge and that at the same time the staff development needs upgrading and even changes in order to match the requirements of emerging information society, the participants gave their support to the IITE efforts in working out an educational programme on ICTs in education, which should comprise various modules and be set up on the solid research and methodological basis.

The participants shared their experience and visions, made remarks and comments to the topics discussed and when summarizing suggested to IITE the following:

- to continue preparation to the training activities and design of the IITE educational programme of modular character, aimed both at tuition educators in computer literacy and wider – in New Literacy for Information Society and at teaching them to apply ICTs in educational process. The core of this programme consisting of basic course on ICTs in education should be encircled by different special modules varying by their specific subject, content, target groups (professional categories, including policy- and decision-makers, heads of national and regional educational systems; heads of teacher training institutions, trainers of trainers for ICTs in education; teachers, ICT school coordinators and other educational personnel) and terms of learning;

- to consider the "UNESCO/IFIP Recommendations - Informatics in Primary Education" as a timely prepared and helpful document, which could be of use in training of teachers, trainers and other educators;

- to form in co-operation with IFIP an international editorial team consisting of prominent specialists from different UNESCO regions for the development of the "Elementary ICTs Curriculum for Teacher Training" correlating with above-mentioned "Recommendations" and designed for implementation in UNESCO Member States, in particular in developing countries; to authorize the editorial team to elaborate the concept, structure and table of content of the "Curriculum" in view of the results of the discussions at the seminar;

- to observe a prospect of launching a feasibility study on the development of the "International Information Technologies (IT) Driving License for Teachers" with the international examination within its framework of possibility and facilities for creation, spreading and localization of the IT Driving License, bearing in mind a high value of such activity for the development of modern competences and academic mobility and the need for joint efforts in the situation of economic and cultural diversity and variety of traditions and states of affaires in national educational systems.

Annex 2

"Simplification"

(Generalization and Integration of ICTs in Education)

In conjunction with the summarizing reflections, among them:

- an urgent need for reducing the gap between countries and inside a country in regard of development of strategies, policies and action plans on ICTs in education;
- the changes in the social and educational needs, which calls promoting the "New Literacy" (at least updating of actual literacy in a view of approaching to the "New Literacy");
- the necessity to facilitate the ways to changing the role of the teacher with an accent on new teaching style, including communication competencies,

the following projects were proposed for action:

I. Holding 4 international workshops on elaboration of the framework for the complete special courses (face-to-face, resource on-line, on-line courses, etc.):

- for training **Teachers of Teachers,**
- for training **Methodologists** (including tutors, technicians, managers, etc.),
- for training **Managers/Headmasters,**
- for enrolling **Decision-Makers.**

II. Forming an international working group acting as a pilot project for identifying the needs and tasks for established Focal Points for IITE in the field of teacher training.

III. Outputs from working groups:

1. **Working group 1 on the elaboration of the IITE educational programme**:
   - the main target group at which the IITE educational programme should be oriented is top-level educators (including politicians, decision-makers, ministers, etc.). IITE as an integral part of UNESCO should use the opportunity to gather high-level experts and operate though this maximal/optimal way for the Member States' capacity building;
   - IITE could organize for the top-level educators a set of workshops and seminars, which should be both of teaching and sharing character and run by the international group of high-level experts and trainers, on the following study programmes:
     - strategies of application of ICTs in education; policy formulation, programme building;
     - implementation of the strategies;
     - evaluation of the results and effects, including problems of security;
     - innovations and transition from innovations to generalization;
     - social and ethical aspects of application of ICTs in education (ICTs as a factor changing knowledge itself; specifics and responsibilities of public educational systems in changing situation; right balance between equipping – training – resources as a political question; identifying what is the school (pupil, teacher) of the future; school as learning organization; balance between common values and local cultures, etc.);
     - resources for continuous changes in application of ICTs in education;
     - scaling (collecting data on strategies, action plans, curricula) and scaling-up practices;
     - sharing experience in all above aspects (including successes and failures) which cold lead to elaboration of national plans;

2. **Working group 2 on the development of the "Elementary ICT Curriculum for Teacher Training":**
   - the work on the "Curriculum" should be accomplished by IITE and IFIP, correlated with "UNESCO/IFIP Recommendations - Informatics in Primary Education";
   - prepared document should be published in two forms: in paper and on Web-site for its permanent updating.

3. **Working group 3 on the preparation of the International Information Technologies (IT) Driving License** (basing on existing Computer Driving License):
   - the preparation should be started by production and dissemination of information materials about Driving License with:
     - explanation of its importance in the situation of differences in educational systems;
     - definition of national and school level of their implementation for in-service teacher training;
     - description of the development of professional competences in the field;
     - clarifying of target groups, namely teachers and trainers of teachers.

4. **Working group 4 on the Document "UNESCO/IFIP Recommendations - Informatics in Primary Education":**
   - it should be published at Web-site for collecting success stories, national experiences and various curriculum;
   - the work for preparation teachers for realization of Recommendations should be started.

2 ≅ 4 redundant

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21-22 July 2000, IITE, Moscow

DRAFT MEMORY NOTE

On July 21-22, 2000 the UNESCO Institute for Information Technologies in Education (IITE) held in Moscow (Russian Federation) the research seminar "Teacher Training for Information Society". The participants from 12 countries (Armenia, Austria, Denmark, Estonia, Finland, France, India, Japan, Netherlands, Norway, Russian Federation, and Switzerland) were invited by the Director of IITE in personal capacity *(Annex 1 – List of Participants)* to discuss the main trends of development of the IITE educational/training activities and make their proposals on this matter.

The following topics were considered: IITE educational programme; IFIP proposals for "Elementary ICT Curriculum for Teacher Training"; "Informatics in Primary Education. Recommendations"; Computer Driving License for teachers.

The participants were informed about the UNESCO strategies designed for providing education for all throughout life, which were confirmed and updated at the World Education Forum (Dakar, Senegal, April 2000) and in its documents "The Dakar Framework for Action. Education For All: Meeting our Collective Commitments" and "A UNESCO Strategy for Education For All", as well as reported about statutes' goals of IITE and its programme activities in line with the UNESCO Programme and, in particular, with the Intersectoral UNESCO project "The Status of Teachers and Teacher Education in the Information Society". The discussion was based on the Working Document prepared for the research seminar, other materials and presentations made by the partakers.

The participants:

- discovered the convergence between the IITE activities and those of different international organizations, namely EU programmes, OECD projects, and IFIP actions (as the last Working Conference on the "Bookmark of the School of the Future");
- showed their confidence that the application of information and communication technologies (ICTs) influencing and changing the world and human being and giving rise to information society should be used as a productive tool for positive transformations in all areas. It was underlined that the mastering of ICTs in education should not be backward, but go beyond all alterations and be supported by the development of New Literacy for Information Society corresponding to the challenges of the cyber age.

Considering that the teacher training plays a key role in provision learners with quality modern skills and knowledge and that at the same time the staff development needs upgrading and even changes in order to match the requirements of emerging information society, the participants gave their support to the IITE efforts in working out an educational programme on ICTs in education, which should comprise various modules and be set up on the solid research and methodological basis.

The participants shared their experience and visions, made remarks and comments to the topics discussed and when summarizing suggested to IITE the following:

- to continue preparation to the training activities and design of the IITE educational programme of modular character, aimed both at tuition educators in computer literacy and wider – in New Literacy for Information Society and at teaching them to apply ICTs in educational process. The core of this programme consisting of basic course on ICTs in education should be encircled by different special modules varying by their specific subject, content, target groups (professional categories) and terms of learning;

- to consider the "UNESCO/IFIP Recommendations - Informatics in Primary Education" as a timely prepared and helpful document, which could be of use in training of teachers, trainers and other educators;

- to form in co-operation with IFIP an international editorial team consisting of prominent specialists from different UNESCO regions for the development of the "Elementary ICTs Curriculum for Teacher Training" designed for implementation in UNESCO Member States, in particular in developing countries; to authorize the editorial team to elaborate the concept, structure and table of content of the "Curriculum" in view of the results of the discussions at the seminar;

- to observe a prospect of launching a feasibility study on the development of the "International Information Technologies (IT) Driving License for Teachers" with the international examination within its framework of possibility and facilities for creation, spreading and localization of the IT Driving License, bearing in mind a high value of such activity for the development of modern competences and academic mobility and the need for joint efforts in the situation of economic and cultural diversity and variety of traditions and states of affaires in national educational systems.

In order to concretize the needs, several lines of actions were proposed *(see Annex 2).*

Annex 2

Towards "Banalization" (Generalization and Integration)

In conjunction with the summarizing reflections, among them:

- an urgent need for reducing the gap between countries and inside countries in regard of development of strategies, policies and action plans on ICTs in education;
- the changes in the social and educational needs, which calls promoting the "New Literacy" (at least updating of actual literacy);
- the necessity to facilitate the ways to changing the role of the teacher with an accent on new teaching style, including communication competencies,

the following projects were proposed for action:

I. Holding 4 international workshops on elaboration of the framework for the complete special courses (face-to-face, resource on-line, on-line courses, etc.):

2) for training **Teachers of Teachers,**
3) for training **Methodologists,**
4) for training **Managers/Headmasters,**
5) for enrolling **Decision-Makers.**

II. Forming an international working group acting as a pilot project for identifying the needs and tasks in the field of teacher training for established Focal Points for IITE.

III. Outputs from working groups on:

- Elaboration of the IITE educational programme with a view of starting training of educational personnel at IITE;
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- Preparation of the International Information Technologies (IT) Driving License (basing on existing Computer Driving License);
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117292 Moscow
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RESEARCH SEMINAR
"TEACHER TRAINING FOR INFORMATION SOCIETY"

21-22 July 2000, IITE, Moscow

DRAFT MEMORY NOTE

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IITE EDUCATIONAL PROGRAMME

To organize pre- and in-service training, including open and distance education, for educational personnel on the use of information and communication technologies in education, giving priority to developing countries and countries in transition»

(Statutes of IITE, Article II, par.2 (d))

PROGRAMME TARGET GROUPS (TG)

A. Policy- and decision- makers in educational sphere, Heads of national and regional educational systems

B. Heads of pre- and in- service teacher training institutions, Trainers of trainers for ICT in education

C. Teachers, ICT school coordinators and other educational personnel

STRUCTURE OF IITE EDUCATIONAL PROGRAMME

BASIC COURSE	for A, B target groups
SPECIALIZED MODULES	for B, C target groups

BASIC COURSE

- Present goals of education and the ICTs role in their attainment (TG A,B)
- ICTs in education: state-of-the-art, problems and international experience (TG A,B)
- UNESCO recommendations on national and regional strategies for ICTs implementation in education (TG A,B)
- ICTs and New Literacy for Information Society (TG A,B)
- Basic ICT knowledge and skills (TG A,B)
- Methodological aspects of ICTs in education (TG B)
- ICTs in teaching, practical training and achievement evaluation (TG B)
- Integrated information environment of an educational establishment (TG A,B)

SPECIALIZED MODULES (TG B,C)

- Informatics in primary education
- ICTs in education for people with special needs
- ICTS in distance education
- Telecommunications in education and Internet educational resources
- Multimedia in education
- CAD systems and computer design
- Audio-, video-, other high technologies in education

RESEARCH SEMINAR
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Questions for Discussion

Question	***Cross-cutting topic:*** Elaboration of the IITE educational programme with a view of starting training of educational personnel at IITE	Development of the "Elementary ICTs Curriculum for Teacher Training" for its dissemination and potential implementation in UNESCO Member States	Preparation of the International Information Technologies (IT) Driving License (basing on existing Computer Driving License)	Dissemination and application of the prepared Document "UNESCO/IFIP Recommendations - Informatics in Primary Education"
Background	Agenda (Item 5)	Agenda (Item 5)	Agenda (Item 5)	Agenda (Item 5)
	Presentation by the Director of IITE Prof. V. Kinelev	Presentation by Prof. A. Dr. Roesvik (Norway) and Knierzinger (Austria)	Presentation by Prof. B. Andresen (Denmark)	Presentation by Dr. E. Bulin-Sokolova (Russian Federation)
	Working Document, p. 1-3, 6 and Annexes 1, 2, 3	Working Document, p. 5-6	Paper by Prof. B. Andresen (Denmark)	Working Document, p. 3-5
Moderator	Prof. A. Semenov (Russian Federation)	Knierzinger (Austria) and Dr. Roesvik (Norway)	Prof. B. Andresen (Denmark)	Dr. E. Bulin-Sokolova (Russian Federation)
Participants				

Questions and Sub-Questions for Discussion

Question	***Cross-cutting topic:*** Elaboration of the IITE educational programme with a view of starting training of educational personnel at IITE	Development of the "Elementary ICTs Curriculum for Teacher Training" for its dissemination and potential implementation in UNESCO Member States	Preparation of the International Information Technologies (IT) Driving License (basing on existing Computer Driving License)	Dissemination and application of the prepared Document "UNESCO/IFIP Recommendations - Informatics in Primary Education"
Sub-Questions	• Is IITE to elaborate and implement its own educational programme? • What are the main goals of such a programme? (Tuition of educators in computer literacy and wider – in New Literacy for Information Society and/or teaching them to apply ICTs in educational process?) • What structure? (Its core is a basic course on ICTs in education encircled by different modules – as a variant) • What modules are more important for Member States? • What target groups (professional categories)? • What terms of learning? • What mechanism of elaboration and testing of such a programme is more correct?	• Possible concept, structure and table of content of the "Curriculum" • Target groups • Potential users • Mechanism of preparation of the "Curriculum" (How to form an international editorial team consisting of prominent experts?)	• Is it worth to create, spread and localize the Information Technologies (IT) Driving License in the situation of national and cultural diversity and variety of state and public standards in education, as well as those admitted by the professional communities? • If yes, how organize the activity for its preparation (feasibility study, international working group, etc.)? • Possible concept, structure and table of content of IT Driving License	• What is the best way for dissemination and application of this Document in Member States? • Could a process of Recommendations-based training of trainers be organized by the requests of Member States? • What is the role of IITE in assisting Member States in implementation of the "Recommendations"? (Possibly, monitoring, consulting through national pilot locations?)

Организация Объединенных Наций по вопросам образования, науки и культуры
United Nations Educational, Scientific and Cultural Organization

ИНСТИТУТ ЮНЕСКО ПО ИНФОРМАЦИОННЫМ ТЕХНОЛОГИЯМ В ОБРАЗОВАНИИ (ИИТО)
UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION (IITE)

Ref.: IITE/MOS/DIR/00/289 14 June 2000

Subject: Research seminar in Moscow

Dear Prof. Morel

I am very pleased to invite you to participate in the research seminar **"Teacher Training for Information Society** " which will be held by the UNESCO Institute for Information Technologies in Education (IITE) in Moscow from 20 to 22 July 2000 in accordance with the intersectoral UNESCO project "The Status of Teachers and Teacher Education in the Information Society". This seminar is organised in close co-operation with the International Federation for Information Processing (IFIP), the Ministry of Education of the Russian Federation, Moscow Committee of Education and the Council on Co-operation in Education of the Countries of the Commonwealth of Independent States.

We are going to invite up to 15 experts from different countries.

We suppose to discuss the next themes:

1. Teacher education in the information society:
Main issues of the day and their settling. Current practice with information and communication technologies (ICTs) in education, basic technology competence, and teacher's readiness to shift from instructor to organiser and guide.

2. Role and policy of IITE UNESCO in training and retraining of teachers.

3. IITE educational programme "ICTs in Education". Elementary ICTs curriculum for teacher training and IFIP proposal for it's development:
   - training objective to be achieved;
   - table of contents of the complete programme;
   - logical framework for the organisation of the modules;
   - module titles;
   - definition of principles regarding the internal organisation of the modules.

If you agree to take part in the seminar, please inform us. All the participants will receive a working document and other materials as a base for discussion in a good time. The Institute will cover all costs related to your travel and accommodation. For your visa support please send us necessary data (see Annex 1) and a copy of first pages of your passport with your photo and passport number as soon as possible.

For further information please contact with Irina Obukhova (info@iite.ru, obuhova@elnet.msk.ru fax (095) 129-12-25).

Sincerely yours,

Vladimir Kinelev

Director IITE UNESCO

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RESEARCH SEMINAR
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PROVISIONAL AGENDA

1. Opening of the research seminar
2. Adoption of the agenda
3. Election of the Chairperson of the research seminar
4. Election of the Rapporteur of the research seminar
5. Presentations by keynote speakers on:
   - IITE educational programme;
   - Proposals for "Elementary ICT Curriculum for Teacher Training";
   - "Informatics in Primary Education. Recommendations";
   - Computer driving license for teachers
6. Thematic discussions
7. Adoption of Recommendations of the research seminar
8. Other matters
9. Closure of the research seminar

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LIST OF DOCUMENTS

Working Documents

☐ IITE//MOS/RS1/2000/DOC.1	Provisional Agenda (E, R)[1]
☐ IITE//MOS/RS1/2000/DOC.2	Working Document (E)

Information Documents

☐ IITE//MOS/RS1/2000/INF.1	Provisional Timetable (E, R)
☐ IITE//MOS/RS1/2000/INF.2	Provisional List of Participants (E)
☐ IITE//MOS/RS1/2000/INF.3	List of Documents (E, R)

Reference Documents

☐ 30 C/5	UNESCO General Conference. 30th Session (Paris 1999). Programme and Budget 2000 - 2001. The status of teachers and teacher education in the information society (par. 0124) (E) The UNESCO Institute for Information Technologies in Education (par. 0144) (E)
☐	Informatics in Primary Education. Recommendations (E, R)
☐	Proceedings of the Second International UNESCO Congress on Education and Informatics. Moscow 1996. (Two books) (E, R)
☐	Educational Multimedia. What teachers need to know to carry through the social construction of information technology. (E)

[1] Available in English (E) and Russian (R)

(8)

ANNEX 2

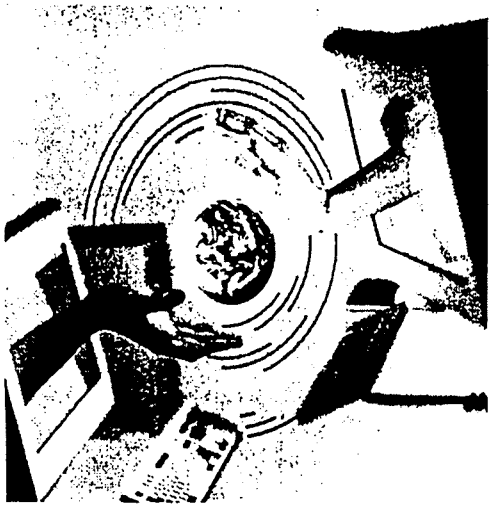
IITE EDUCATIONAL PROGRAMME

Moscow, 2000

"To organize pre- and in-service training, including open and distance education, for educational personnel on the use of information and communication technologies in education, giving priority to developing countries and countries in transition"

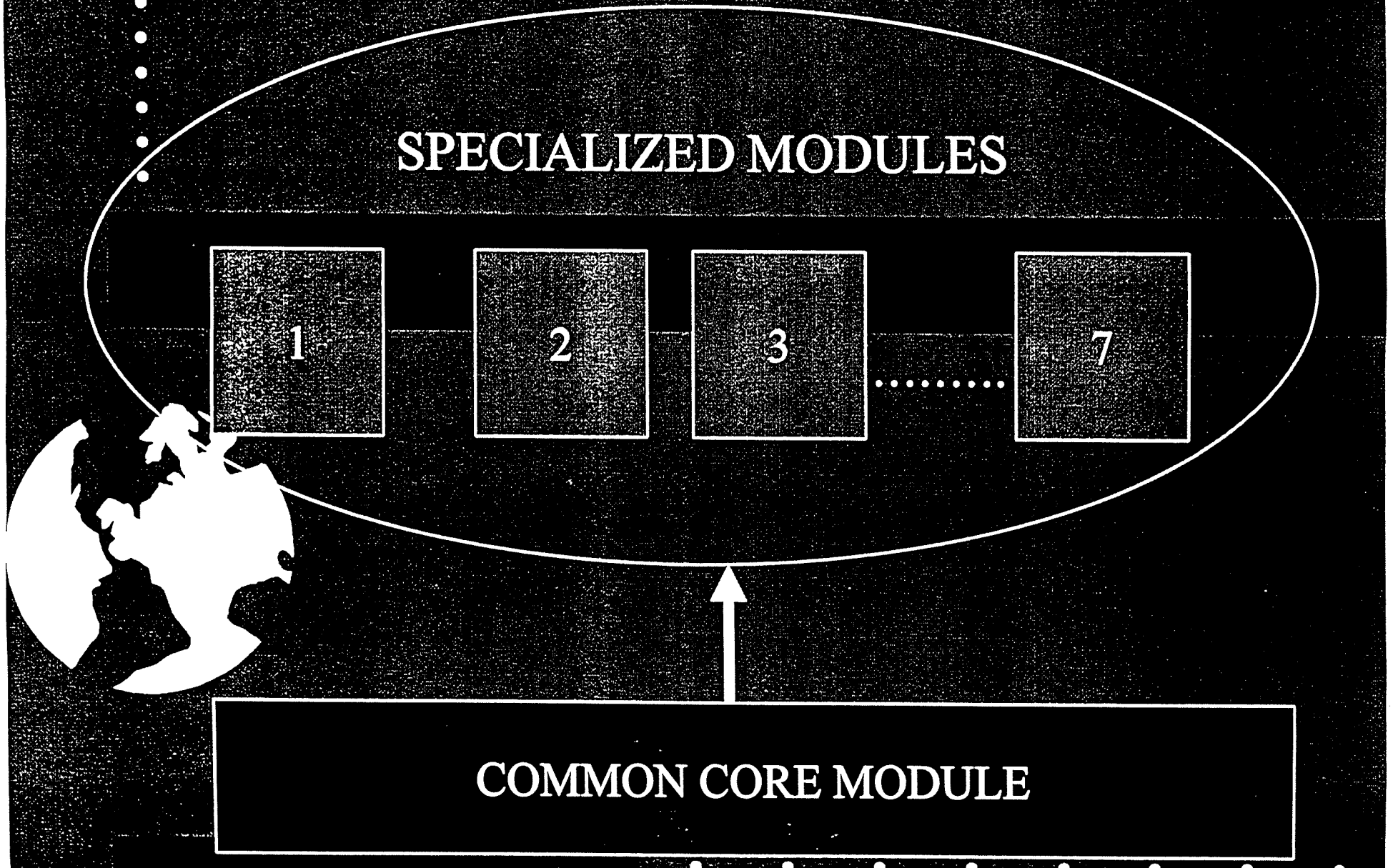
(**Statutes of IITE,** ***Article II, par.2 (d)***)

TARGET GROUPS



- Policy-makers in educational sphere.
- Heads of national and regional educational systems.
- Teachers, and other educational personnel.

Structure of the IITE Educational Programme



COMMON CORE MODULE

(BASIC)

- Present goals of education and the ICTs role in their attainment
- ICTs in education: state-of-the-art, problems and international experience
- ICTs and New Literacy for Information Society
- UNESCO recommendations on national and regional strategies of ICT implementation in education
- Methodological aspects of ICTs in education
- ICTs in teaching, practical training and achievement evaluation
- Basic ICT knowledge and skills
- Integrated information environment of an educational establishment.

SPECIALIZED MODULES

professional competence

1. Informatics in primary education.
2. ICTs in education for people with special needs.
3. ICTs in distance education.
4. Telecommunications in education and education resources in the Internet.
5. Multimedia in education.
6. CAD systems, computer design.
7. Audio-video, TV, radio, etc. technologies in education.

BASIC ICT KNOWLEDGE AND SKILLS

1. Elementary ICT curriculum for teacher training.
2. Informatics in primary education.
3. Computer Driving License for teachers.

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Working Document

Introduction

In the framework of the UNESCO intersectoral project "The Status of Teachers and Teacher Education in the Information Society", the UNESCO Institute for Information Technologies in Education (IITE) is to create a set of training and self-training modules for different categories of educational personnel. The modules will comprise competencies in using information and communication technologies (ICTs) in the process of learning, including learning of teachers themselves. Emphasis will be placed, on the one hand, on imparting competencies in the use of new technologies (e.g. computers, the Internet) to teachers and other educational personnel and, on the other hand, on more effective use of new technologies (e.g. television, radio, computers and the Internet) in the training and retraining of teachers and teachers educators on a large scale.

Special consideration should be given to dissemination and sharing of successful strategies and "best practices", exemplary training materials as well as expertise; and facilitating access to training databases of educational software on teacher education.

UNESCO understands a crucial role of teachers in the development of educational system particularly in the information society where information and communication technologies will play a very important role. ICTs provide both new opportunities and challenges for teachers. As it was said at the Second International UNESCO Congress "Education and Informatics" (Moscow, 1996. See Annex 1), the ICTs play a catalyst role in shifting teachers from an information dispenser to a guide, mentor, knowledge navigator, consultant and co-learner with a student.

Several months ago the World Education Forum was held in Dakar, Senegal (26-28 April 2000). IITE thoroughly analyzed the following documents: "The Dakar Framework for Action. Education For All: Meeting Our Collective Commitments" and "A UNESCO Strategy for Education For All". IITE strongly supports the endeavor to combine forces and efforts in order to ensure that quality basic education for all will become a reality and the leading role of UNESCO in the follow-up to Dakar. IITE strives to contribute to attaining goals spelt out in "The Dakar Framework...", between which there are:

- Training and re-training of teachers in the information society;
- Distance education, as an excellent means for reaching the unreached and the improvement of staff development;
- ICTs in education for people with special needs.

Though at the turn of the century literacy for all – children, youth and adults -- is still an unaccomplished goal and an ever moving target, all of us should concentrate on the next steps to information society. New society demands and the new world around us (new technologies and new models of actions) call for New Literacy for Information Society (NLIS). As a substitute to old meaning of basic literacy (reading, writing, arithmetic and mode of thinking) new ones may be presented such as finding information by searching in written sources, observing, collecting, recording, etc.; communicating in hypermedia and involving all types of information and all media; designing objects and actions; creatiing of hypermedia essays involving all types of information and all media.

This new meaning of literacy and the a next step - information culture - need new generation of teachers. Majority of the old ones are trained in traditional manner. So the development of introductory and retraining programmes for these bearers of the school institutes will be the main challenge. ICT curriculum for teacher training has to assist in a reconstruction of schooling and learning rather than an introduction of hardware and software. It should be not only a programme to make teachers familiar with ICTs though it presents its starting point but to create long-term commitment and a programme of lifelong learning for teachers. A programme for educational leaders and decision-makers who will be responsible for the reconstruction of schooling process should be a part of this ICT curriculum.

In any case, we can get the understanding of new trends by receiving answers to four basic questions:

- what does this understanding enhance or amplify;

- what does it obsolesce or push out;
- what does it retrieve from the past realm of previously obsolesced;
- what does it reverse of or flip into when it reaches potential limits.

Previous model of education could be described as an army or a machine image of school. It means rationalization of time and motion, strict control and standardization of results. Present model of education describes school as an organism or a culture. Future model can describe school as an image of brain or a flux of transformation.

"Informatics in Primary Education. Recommendations", design of the Elementary ICT Curriculum for Teacher Training and Computer Driving License will be presented at the seminar. On this basis, the IITE educational programme will be discussed (see Annex 2). The participants are invited to discuss possible structure, content and ways of its development.

Informatics in Primary Education. Recommendations

The Recommendations on Informatics in Primary Education were developed by the Working Group representing the UNESCO Institute for Information Technologies in Education, the International Federation for Information Processing, and the Institute of New Technologies for Education (Moscow). The Working Group included Alexei Semenov, Co-chair and Joint Editor (Russia), Anton J. Knierzinger, Co-chair (Austria), Katerina Martcheva (Bulgaria), Sindre Roesvik (Norway), Erling Schmidt (Denmark).

The Document was prepared according to the resolution of the UNESCO Congress on Education and Informatics (Moscow, 1996), and presented at and supported by the IITE International Governing Board Meeting (Moscow, 1998), and the Meeting of the Experts from the CIS countries and Central and Eastern Europe (Kiev, 1999).

The document summarizes the international experience and vision on using the information and communication technologies, as well as acquiring corresponding skills in information processing within the school education starting from very first stages (age of 5 and younger). A characteristic feature of the Recommendations is that they are essentially work-in-progress, and a co-operative product of the networked educational community.

The authors attempted to make the Recommendations valid for various (potentially all) countries, that might differ in regard to general education, technological development, and needs and perspectives of the national economy. That's why the Recommendations include even non-computer options.

The authors also tried to make the Recommendations valid for different categories of users: decision-makers of all ranks, regional and school administrators, teachers, technology coordinators, curricula developers, researchers in education, donators, and technology producing companies. The Document is addressed to all those who are already using ICTs in education, or going to make decision about such usage.

Both short and long-term aspects of the Recommendations reflect rapid changes of technology and slow changes of school in relation to the needs of society and the individual, general goals of education, local tradition of education and world economy.

The Document presents:

- the goals to be achieved with ICTs,
- models of introducing ICTs into school practice,
- success stories related to the educational usage of ICTs in different countries.

The major issues are:

- general development of learners;
- new models of learning in all subjects;
- fundamental concepts and structures of the information processing;
- operational skills in ICTs.

The general development of learners includes New Literacy and New Competence. The new models of learning (of all subjects) assume student's motivation; real life connection; integration of subjects; group co-operation (including global networking); teacher support. Important features of the models are described as discovery, project-based learning, etc.

The fundamental concepts of the information processing encompass structures, languages, processes and discrete models.

New educational models as well as sufficient technological skills are based on actions and objects of the information processing. Objects include texts; numeric data (of measurements, etc.); graphic objects; sounds; moving pictures; actuators (bulbs, motors). The actions include creation, editing, organizing (linking), communicating and presenting.

The most efficient models of introducing ICTs into schools and roles played by the participants of this process are investigated. Teacher's roles are described as a skilful master of doing, adviser, and collaborator. The

model of joint work of a teacher and an information technology coordinator is considered: first - to master technology, then - to apply it for solving problems relevant to students and included into curriculum. Students at times successfully play roles of the ICTs gurus. Administrators and coordinators of information technology at schools are special categories of participants of the school change.

As for operational skills in ICTs - today we have computers with the picture quality approaching the limits of a human eye, which can address pupil in a human voice and store enough of recorded sound, recognize basic things you are saying to them. These computers can easily access almost any information, which is coming into the Net; videoconferencing for schools is real; inside school we can use radio and infrared networking. This means that teacher should first and above all teach children to manage and efficiently use all those tools, options, sources and services in order to make learning even more interesting, inspiring and productive.

The last section of the Recommendations has a special validity. It contains descriptions of the experience of teachers from different countries and provides examples of their activity that helps to create new paradigm of the teaching-learning process and to form a vision of how new information and communication technologies can be effectively used in primary education. The Success Stories is an important contribution made by the Community; they present real examples of effective usage of information and communication technologies in learning. One of the major goals of these Recommendations is to invite more educators to participate in creating our common vision. Different kinds of partnership would be appreciated. The Web site http://www.IITE.ru/primedu will incorporate suggestions from readers (in particular, success stories).

Elementary ICT Curriculum for Teacher Training

ICT Curriculum for all levels of Teacher Training elaborated by the IFIP working group 3.3 will be considered below.

First of all, it is necessary to answer a question about the training objective to be achieved. What do we mean by current and future practice with information and communication technologies in education, basic technology competence? What kind of a teacher competence as an objective do we understand? Is it enough to use some criteria of the basic skills from the concept of the European Computer Driving Licence (ECDL):

1. To promote and encourage computer literacy for all.

2. To raise the level of knowledge about the Information Technology (IT) and the level of competence in using personal computers and common computer applications for all citizens within Europe and internationally.
3. To ensure all computer users understand best practices and the advantages of using a personal computer.
4. To increase the productivity of all employees who need to use computers in their work.
5. To enable better returns from investments in the information technology.
6. To provide a basic qualification that will allow all people, regardless of their background, to be a part of the Information Society.

What should be suggested as ICT advanced skills, media skills, etc.? Should all the teachers have the same ICT curriculum? What should be done for shifting teacher from instructor to organiser and guide? In any case all professional categories should be taken into account (See Annex 3).

IITE Educational Programme: Considering the Agenda

The following questions will be discussed at the seminar:

1. Is there any established notion of the New Literacy for Information Society (NLIS)?
2. Is there any stable and standard content of the Elementary ICT Teacher Training curricula? How is it related with NLIS?
3. What are the requirements for the ICT professional competence basic knowledge and skills, how are they incorporated in the ICT Teacher Training curricula?
4. What are the examples of the most successful experience of implementing IT competence modules in practice of the teacher's development and in-service training?
5. Can we propose a set of requirements and a procedure for the international certification of the teacher's ICT competence?
6. How the ICT competence can influence the teacher's role in the society?
7. How can a teacher manage with the responsibility which he or she shares in the negative aspects of information civilization?

Annex 1

EXTRACTS
FROM PROCEEDINGS OF THE SECOND INTERNATIONAL UNESCO CONGRESS EDUCATION AND INFORMATICS

Moscow 1999

MAIN WORKING DOCUMENT

THEME 2:
TEACHERS

13.The new information and communication technologies provide both new opportunities' and challenges for teachers. The NITs can be used to serve as a catalyst to help change the role of teachers from information dispenser to that of guide, mentor, knowledge navigator, consultant and even co-learner with the student. They can also be used to support traditional teaching modes and practices. A critical variable in the effective use of the NITs is the knowledge and skill of the teacher in the application and integration of the technologies into instruction. Pre-service teacher education programmes are needed that not only prepare teachers to use the current generation of technologies but also to accommodate and even develop new technologies in the future. To accomplish this goal requires that the teacher preparation institutions provide adequate student and faculty access to the technologies. In order that they can model the use and integrate technologies into the pre-service curriculum, the faculty must also be provided with training and support. A critical need also exists to enhance the technology skills of existing teachers. In-service professional development programmes are needed to provide technology training opportunities and technical support. Improved programme documentation, teacher-oriented computer-based programmes and the new distance learning technologies may assist in this effort. Without effective teacher training, investments in technology will bear little fruit.

Among the teacher-related issues and questions to be addressed in the Congress are:

(a)Current Practice with New Technologies. What makes for successful teaching using new technologies? How is this success gauged? What characterises a successful teacher's use of NITs? Does particular software use seem to promote success? Are the characteristics for successful teaching with new technologies the same in all sectors of education - primary, secondary, higher, vocational and informal adult teaching? Is the use of film, television and radio in teaching strategies less valued when computers are introduced? If it is, should it be? How do we best teach information skills to students? information overload results from the unlimited access to information that new technologies can bring the learner. How do we teach selection, indexing, alternative presentations and evaluation of information? Since access to information is at the root of much of what is being discussed, how can efforts in this area be coordinated and how can standards be arrived at?

[b}Teacher Training: Pre- and In-service. How are teachers best being prepared (pre-service) and supported (in-service) to use new technologies in their teaching roles? How are they best supported technically? Can ongoing professional support, for example by Telematics, be incorporated into overall policy and funding for teacher education? How will a remote trainer, providing training through Telematics be able to match the policy, provision and support available locally?

(c)New Roles for Teachers. The role of the teacher is said to be shifting from that of an instructor to that of an organiser and guide. Do new technologies hinder or support this shift? Is this movement the same in all sectors of education and training? To what extent does culture shape this expectation of change in the teachers' roles? What are the stresses that the teacher must confront with regard to these new roles?

RECOMMENDATIONS OF THE 2nd UNESCO INTERNATIONAL CONGRESS

THEME 2:

TEACHERS

National and international agencies should support the dissemination, by appropriate means, of successful strategies and best practices of teachers' and trainers' use of ICTs. Teachers and their professional associations should be encouraged to involve themselves in the process of change to revalidate their roles and to master ICTs. The development of ICTs must not be left to the commercial and industrial world alone but be developed in co-operation with it.

Research data should be collected (and frequently updated) on the changes in the role of the teacher from an instructor to a guide and mentor. UNESCO should encourage the inclusion into online data bases of research data collected in developing countries. UNESCO should make links to these data bases from its sites in the World Wide Web.

UNESCO should collaborate with other agencies to set up models of in-service training and professional development for teachers and trainers which make effective use of the approaches, facilities and opportunities provided by the use of technology, including telecommunications. In particular, UNESCO should encourage the organization of workshops and seminars in developing countries, such as the ones using the UNESCO/International Federation for Information Processing (IFIP) document on *"Informatics for Secondary Education"*.

UNESCO should explore the possibility of linking regional telematic centres world-wide to cover topics such as the use of multi-media, training of trainers, management techniques, instructional design, pedagogical innovation, etc. and should endeavour to incorporate into such an initiative priority pilot projects, e.g. telematic development centres in Africa.

PROPOSALS FOR POSSIBLE UNESCO PROJECTS

UNESCO GLOBAL PROJECT:

"A GLOBAL NETWORK FOR TELE-TRAINING FOR TEACHERS"

The proposal indicates plans for a Global Teachers Network Service Organization (GTNSO) which would provide a platform for the design, development and distribution of courses relating to technology in education for teachers throughout the world. The courses, as well as other communication and information services, would be made available via the Internet.

With rapid advances in technology, it is difficult for the existing systems of teachers training and in-service to stay up-to-date in terms of the implications of innovations in teaching and practice. Awareness and experience with the use of new technologies in teaching and learning are not yet found in all teacher education systems.

These new communication and information technologies provide opportunities for a worldwide community of experts to be brought together with teachers through a global project that facilitates the provision of quality courses and resources for teachers through a common service organization. This proposal defining such an organization is based on UNESCO's unique international network of scientific experts and national contacts such as Ministries of Education. A special benefit of such a service organization is that it can not only service existing institutes of teacher education and in-service but also the teacher's emerging needs for lifelong training.

A special feature of this proposal, in addition to the unique human, professional network on which the Network Service Organization can be built, is the provision of "authoring

templates" for course materials. Course providers in countries throughout the world can provide course content, in their language of choice, and the content can be fitted into various templates for hyper linked, multimedia distributed access. Currently these templates make use of World Wide Web technologies.
Another strength of the proposal is the collection and availability of examples of models of good practice, involving new technologies and new didactics in the classroom. These models will come from a wide range of cultural settings, and will be eventually expressed in a range of languages as well as media, so that teachers can see, hear, or read about classroom applications of new technologies and student work developed from those applications.

The proposal is connected with a number of projects already attempting to use network technologies to bring networked services to teachers. At the same time the Project should benefit from the results of all R&D projects on national and transnational levels in which UNESCO is directly or indirectly involved (for example, the Russian DESCOP -Distance Education in New Information Medium, and others).

These are the arguments for presenting this proposal to the UNESCO Congress participants and to the Director-General of UNESCO. We hope that the Member States will support the proposal and include the Project into the final document.

FINAL REPORT OF UNESCO "EDUCATION AND INFORMATICS"

THEME 2: TEACHERS

The second theme was introduced in the plenary session by Mr. Qian Kunming, Deputy Director, Distance Education Centre of Central Radio and TV University (People's Republic of China) and Mr. Alexei L. Semenov, President of Moscow Institute for Teacher Development, Vice-Chairman of Moscow Department of Education (Russian Federation).

Mr. Kunming's paper, *New Information Technology and Teachers,* gave an overview, based on statistical data, of teacher training programmes at the national level which make use of ICTs, a phenomenon which has gained momentum over the last years. Faced with the challenges of the 'information society' and of the 'information highway', the traditional teacher-centred educational model had to be changed and new policies be developed. He illustrated his arguments by taking his university, Radio. and TV University of China, as a concrete example. The success of the teacher training programme based on ICTs, introduced by the University (1.5 million college graduates in 8 years, only), prompted the Chinese government to extend the use of the:
new technologies in the training of primary and secondary school teachers. A national network of satellite TV education was established, which broadcasts two sets of educational programmes through a Chinese communication satellite. Special emphasis was laid on the courses produced by China TV Teachers College, covering a wide range of subjects (156 in total), 12,000 hours of visual teaching programmes, which are very popular among teachers. The growing role of distance education has turned the latter into an independent educational model. The wide use of the new information and communication technologies has radically changed the traditional teacher-student relationship. Notwithstanding the rapid development of ICTs, the latter can never replace the direct interpersonal exchange in the educational process. The speaker concluded by stressing the key role of the human factor (i.e. the teacher), the only one capable of inculcating moral values in students.

Mr. Semenov placed his presentation, *Informatics in Russian Secondary Education,* in the general framework of the in-depth educational reform going in Russia at all levels and covering all aspects, teacher training included. His conclusions are based on first-hand experience in the introduction and application of new information and

communication technologies in secondary schools all over the country. The experiment conducted in secondary schools once again underlined the key role that teachers play in the reform of the educational process and that particular attention should be therefore paid to their pre- and in-service training. The assimilation by teachers of the necessary skills in mastering the new technologies was conceived as a modular, multi-stage process, designed to overcome possible psychological barriers. This process was backed by the development of federal and regional guidelines regarding the application of information technologies followed by all secondary schools. According to the curriculum, information technologies were included in the general domain of technology studies, involving the development of software environments (e.g. general applications, construction kits, combination of logo and hyper-encyclopedias on CD-ROMs). The success of the programme was ensured to a great extent by the good co-operation relations established between teachers-specialists in new technologies and non-specialists in the teaching of various subjects. Given the vast amount of information disseminated, teachers and students came to regard the Internet as a form of alternative and informal education, a source for student investigation and data collection projects, teleconferences in the framework of the regular curriculum. The speaker concluded that the Russian teachers involved in the project were ready to share their experience with colleagues from other countries and develop co-operation in the field.

The discussions in Commission I began with an evaluation of the results of what is referred to as the "first wave" in the application of computers in education. Proposals were then made for the "second wave" of computer network applications. Access to infrastructure and economies of scale at national or regional level was stressed. In order to minimize the problem of teachers facing difficulties in the access and use of computers, developers/project initiators should work through with teachers all problems related to the use of computers in the classroom. It was emphasized that there are no grounds for concern over the fact that the increased use of ICTs might lead to lack of communication with the students or for a need to protect the latter from harmful information. Governments and educational institutions should not carry out large-scale teacher-training programmes. It is better to concentrate efforts on small projects which are both cost-effective and relevant to immediate concerns. Mention was made of the lack of a large commercial market of computer software and commercial networks for educational purposes. The setting up of cost-free networks for teachers and students is a must in the face of the new challenges. Computer networks permit teachers to have wider access to information and resources and to choose relevant software for their teaching programme. Several speakers pointed out that the development of educational software should not be left to the commercial and industrial world alone. Teachers and their professional associations should be encouraged to become pioneers, innovators and initiators of the wide application of new technologies in education. An interesting presentation was made of a project on how information superhighways can be used for the purpose of introducing pedagogical innovations. Attention was drawn to the fact that the use of ICTs should focus on the pedagogical, and not technological, aspect. The teachers' role as coordinators and 'navigators' was emphasized. They should stimulate reproductive, problem-based and quality learning by using ICTs as one of the tools among others. Integrated curricula, active students and passive teachers, critical thinking and individualization are the key approaches which should be applied in computer-based teacher training programmes.

Commission II launched its debates by questioning whether the new information and communication technologies do actually benefit education. A case study conducted in Bulgaria suggested that they could, on condition that they help introduce a discovery approach to learning and that teachers are well prepared and enjoy their new roles. It was demonstrated that the application of computers can actually empower students, minimizing their traditional role of passive recipients, an autocratic teaching style being no longer possible. Another case study referred to the use of the Internet in the schools of Montana (USA), a state which, in certain respects, can be compared to some developing countries because of its isolation and relatively poor economy. The Network

Montana project was developed on a cost-effective basis by planning for the whole state, enlisting the co-operation of industrial partners and making use of the communication channels developed for larger Internet users. A concrete example was the earth sciences curriculum delivered via the Internet, which makes extensive use of real data and image analysis software available on the Internet. It was noted that such experiments cannot be conducted in developing countries, on the one hand, because of the lack of corresponding infrastructure, and the considerable financial expenditure involved, on the other hand. The proposal was made that UNESCO should help these countries in evaluating these technologies and advising on their use.-

Among the issues discussed in Commission III was the importance of 'strategic planning' for educational technology projects using new information and communication technologies, which has the following main stages: staff development, curriculum development, equipment development, courseware development and laboratory/practicum development. It was argued that the move to multimedia, like the move to effectively adopt any new teaching and learning methodology, can only be successful and viable if it is undertaken as part of a coherent long-term plan designed to provide solutions in a system-wide manner. One of the projects presented involved several US schools in a model of computer use, called Computer Supported Collaborative, Learning. Aimed at changing the role of the teacher and the student and based on pedagogical goals of constructivism and 'intentional learning', the project has created a knowledge building community, using telecommunications, within and without the school, plus group support system software to achieve these goals.

The status of teachers and teacher education in the information society

0124

Regular budget	
• Activities:	$1,350,000
• Decentralization:	55.6%
Extrabudgetary:	$1,300,000

01240

The General Conference

Authorizes the Director-General:

(a) to implement an intersectoral project entitled "The status of teachers and teacher education in the information society", in order to assist Member States in renewing teaching methods and the training of teachers at all levels, and, using open and distance education approaches, adapting them to the emerging information society, and to promote the status of teachers, including higher education teaching personnel, in cooperation with ILO and the associations of the teaching professions;

(b) to allocate for this purpose an amount of $1,350,000 for programme costs, $1,391,200 for staff costs and $391,000 for indirect programme costs.

Background. The crucial role of teachers in the development of education systems has been reaffirmed in many international conferences, in particular by the 45th session of the International Conference on Education devoted to "Strengthening the role of teachers in a changing world: issues, prospects and priorities" (Geneva, 1996). Following the Declaration and Plan of action adopted on that occasion, UNESCO has reinforced its partnership with the associations of the teaching profession, in particular Education International, and carried out joint actions at global and regional levels, including the proclamation of 5 October as International Teachers' Day. UNESCO Chairs in selected fields of education, including teacher education, and a computerized learning network of African teachers were established. The application of the joint ILO/UNESCO Recommendation on the Status of Teachers has been promoted through regional workshops on the Recommendation, in particular in the Asia and Pacific and Africa regions.

Strategy. During the 2000–2001 biennium UNESCO's action in support of the teaching profession and the role of CEART will be expanded and reinforced. A fresh impetus will be given to upgrading the skills and qualifications of teachers at all levels of education. The project – implemented jointly by the Education Sector, including the UNESCO Institute for Information Technologies in Education (Moscow) and the Communication, Informatics and Information Sector – will follow a twofold strategy. First, action will aim at enhancing the contribution of tertiary institutions towards adapting teacher education and teaching methods at all levels to the changes occurring in the teaching/learning process in the context of the emerging information society through appropriate educational research, and to promoting the use of new training methods such as open and distance education to train larger numbers of teachers. Efforts will be made to increase the number of UNESCO Chairs in teacher and distance education and to facilitate cooperation among them and with teacher education institutions. Advocacy and the defence of the status and rights of teachers will be continued in cooperation with ILO and the associations of the teaching profession in the implementation of the 1966 and 1997 Recommendations. Secondly, priority will be given to assisting Member States, particularly developing countries, to formulate and implement policies and programmes aimed at addressing the challenges facing the teaching profession in the wake of the world information society. Emphasis will be placed, on the one hand, on imparting competences in the use of new technologies (e.g. computers, the Internet) to teachers and other educational personnel and, on the other hand, on the more effective use of new technologies (e.g. television, radio, computers and the Internet) in the training and retraining of teachers and teacher educators on a large scale. Special attention will be given to regional and subregional networking of teacher-training institutions; the

UNESCO Institute for Information Technologies in Education

0144

Financial allocation: $1,200,000
Voluntary contributions: $3,000,000

01440

The General Conference,
Acknowledging the report of the UNESCO Institute for Information Technologies in Education (IITE) for the 1998–1999 biennium,

Considering the application of new information and communication technologies (ICTs) a major challenge for the reform and renewal of education systems during the twenty-first century,

1. *Invites* the Governing Board of IITE to pay particular attention to the following priorities of IITE:
   (a) to act as an international clearing house for the application of ICTs in education through the establishment of a network of national focal points for the exchange of information and experience;
   (b) to contribute to the formulation of national policies and guidelines concerning the application of ICTs in education;
   (c) to organize subregional workshops and other training activities including the preparation and testing of training modules;
2. *Authorizes* the Director-General to support the Institute by providing a financial allocation of $1,200,000 under Major Programme I;
3. *Expresses its gratitude* to the Government of the Russian Federation, which gives a substantial financial contribution and provides its premises free of charge;
4. *Appeals* to Member States, international organizations, donor agencies, foundations and the private sector to grant or renew their support to enable IITE to implement and expand the programme activities foreseen for the 2000–2001 biennium.

01441

Background. Following resolution 6 adopted by the General Conference at its 29th session and the Agreement signed between UNESCO and the Government of the Russian Federation, the UNESCO Institute for Information Technologies in Education (IITE) became operational in 1998. At its first session (Moscow, July 1998), the Governing Board, appointed by the Director-General, approved an initial work programme for the Institute and took several decisions concerning the staffing and the operations of the Institute.

01442

Strategy. The Institute will establish, in cooperation with National Commissions and UNESCO field offices, an international network of national focal points with a view to starting a systematic collection and analysis of relevant policy papers, action plans and policy guidelines. Particular emphasis will be placed on teacher education and development of curricula and other learning materials on the use of ICTs in education. Gradually enhancing its potential in applied research and training, the Institute will offer advisory services and technical assistance to Member States, at their request, in organizing pre- and in-service training of educational personnel, in preparing and implementing national pilot projects, and in fostering regional programmes, in particular in developing countries and countries in transition.

Annex 3

ICT curriculum structure for elementary teacher training

ICT knowledge and skills for all categories	Professional category	Professional competence
1. Basics of computer confidence 2. Main principles of information processing 3. Text processing 4. Spreadsheets 5. ICT in personal communication 6. Internet navigation and information resources 7. ICT in education media construction	Education administrators and policy makers	⇒ ICT in educational environment development
	School administrators	⇒ ICT in school curriculum
	ICT technology coordinators	⇒ Hardware and software support of educational media
	Primary school teachers	⇒ New Literacy basic skills
	Mother tongue and literature teachers	⇒ Creative writing and critical thinking
	Foreign language teachers	⇒ ICT in foreign language immersion
	Humanities teachers	⇒ Cultural information resources
	Natural science teachers	⇒ ICT in science experiment
	Technology teachers	⇒ CAD/CAM, automatic control systems
	Art teachers	⇒ Visual arts in ICT

Annex 1

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Moscow 1999

MAIN WORKING DOCUMENT

THEME 2:
TEACHERS

13.The new information and communication technologies provide both new opportunities' and challenges for teachers. The NITs can be used to serve as a catalyst to help change the role of teachers from information dispenser to that of guide, mentor, knowledge navigator, consultant and even co-learner with the student. They can also be used to support traditional teaching modes and practices. A critical variable in the effective use of the NITs is the knowledge and skill of the teacher in the application and integration of the technologies into instruction. Pre-service teacher education programmes are needed that not only prepare teachers to use the current generation of technologies but also to accommodate and even develop new technologies in the future. To accomplish this goal requires that the teacher preparation institutions provide adequate student and faculty access to the technologies. In order that they can model the use and integrate technologies into the pre-service curriculum, the faculty must also be provided with training and support. A critical need also exists to enhance the technology skills of existing teachers. In-service professional development programmes are needed to provide technology training opportunities and technical support. Improved programme documentation, teacher-oriented computer-based programmes and the new distance learning technologies may assist in this effort. Without effective teacher training, investments in technology will bear little fruit.

Among the teacher-related issues and questions to be addressed in the Congress are:

(a)Current Practice with New Technologies. What makes for successful teaching using new technologies? How is this success gauged? What characterises a successful teacher's use of NITs? Does particular software use seem to promote success? Are the characteristics for successful teaching with new technologies the same in all sectors of education - primary, secondary, higher, vocational and informal adult teaching? Is the use of film, television and radio in teaching strategies less valued when computers are introduced? If it is, should it be? How do we best teach information skills to students? information overload results from the unlimited access to information that new technologies can bring the learner. How do we teach selection, indexing, alternative presentations and evaluation of information? Since access to information is at the root of much of what is being discussed, how can efforts in this area be coordinated and how can standards be arrived at?

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Research data should be collected (and frequently updated) on the changes in the role of the teacher from an instructor to a guide and mentor. UNESCO should encourage the inclusion into online data bases of research data collected in developing countries. UNESCO should make links to these data bases from its sites in the World Wide Web.

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PROPOSALS FOR POSSIBLE UNESCO PROJECTS

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FINAL REPORT OF UNESCO «EDUCATION AND INFORMATICS»

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Mr. Semenov placed his presentation, *Informatics in Russian Secondary Education,* in the general framework of the in-depth educational reform going in Russia at all levels and covering all aspects, teacher training included. His conclusions are based on first-hand experience in the introduction and application of new information and

communication technologies in secondary schools all over the country. The experiment conducted in secondary schools once again underlined the key role that teachers play in the reform of the educational process and that particular attention should be therefore paid to their pre- and in-service training. The assimilation by teachers of the necessary skills in mastering the new technologies was conceived as a modular, multi-stage process, designed to overcome possible psychological barriers. This process was backed by the development of federal and regional guidelines regarding the application of information technologies followed by all secondary schools. According to the curriculum, information technologies were included in the general domain of technology studies, involving the development of software environments (e.g. general applications, construction kits, combination of logo and hyper-encyclopedias on CD-ROMs). The success of the programme was ensured to a great extent by the good co-operation relations established between teachers-specialists in new technologies and non-specialists in the teaching of various subjects. Given the vast amount of information disseminated, teachers and students came to regard the Internet as a form of alternative and informal education, a source for student investigation and data collection projects, teleconferences in the framework of the regular curriculum. The speaker concluded that the Russian teachers involved in the project were ready to share their experience with colleagues from other countries and develop co-operation in the field.

The discussions in Commission I began with an evaluation of the results of what is referred to as the "first wave" in the application of computers in education. Proposals were then made for the "second wave" of computer network applications. Access to infrastructure and economies of scale at national or regional level was stressed. In order to minimize the problem of teachers facing difficulties in the access and use of computers, developers/project initiators should work through with teachers all problems related to the use of computers in the classroom. It was emphasized that there are no grounds for concern over the fact that the increased use of ICTs might lead to lack of communication with the students or for a need to protect the latter from harmful information. Governments and educational institutions should not carry out large-scale teacher-training programmes. It is better to concentrate efforts on small projects which are both cost-effective and relevant to immediate concerns. Mention was made of the lack of a large commercial market of computer software and commercial networks for educational purposes. The setting up of cost-free networks for teachers and students is a must in the face of the new challenges. Computer networks permit teachers to have wider access to information and resources and to choose relevant software for their teaching programme. Several speakers pointed out that the development of educational software should not be left to the commercial and industrial world alone. Teachers and their professional associations should be encouraged to become pioneers, innovators and initiators of the wide application of new technologies in education. An interesting presentation was made of a project on how information superhighways can be used for the purpose of introducing pedagogical innovations. Attention was drawn to the fact that the use of ICTs should focus on the pedagogical, and not technological, aspect. The teachers' role as coordinators and 'navigators' was emphasized. They should stimulate reproductive, problem-based and quality learning by using ICTs as one of the tools among others. Integrated curricula, active students and passive teachers, critical thinking and individualization are the key approaches which should be applied in computer-based teacher training programmes.

Commission II launched its debates by questioning whether the new information and communication technologies do actually benefit education. A case study conducted in Bulgaria suggested that they could, on condition that they help introduce a discovery approach to learning and that teachers are well prepared and enjoy their new roles. It was demonstrated that the application of computers can actually empower students, minimizing their traditional role of passive recipients, an autocratic teaching style being no longer possible. Another case study referred to the use of the Internet in the schools of Montana (USA), a state which, in certain respects, can be compared to some developing countries because of its isolation and relatively poor economy. The Network

Montana project was developed on a cost-effective basis by planning for the whole state, enlisting the co-operation of industrial partners and making use of the communication channels developed for larger Internet users. A concrete example was the earth sciences curriculum delivered via the Internet, which makes extensive use of real data and image analysis software available on the Internet. It was noted that such experiments cannot be conducted in developing countries, on the one hand, because of the lack of corresponding infrastructure, and the considerable financial expenditure involved, on the other hand. The proposal was made that UNESCO should help these countries in evaluating these technologies and advising on their use.-

Among the issues discussed in Commission III was the importance of 'strategic planning' for educational technology projects using new information and communication technologies, which has the following main stages: staff development, curriculum development, equipment development, courseware development and laboratory/practicum development. It was argued that the move to multimedia, like the move to effectively adopt any new teaching and learning methodology, can only be successful and viable if it is undertaken as part of a coherent long-term plan designed to provide solutions in a system-wide manner. One of the projects presented involved several US schools in a model of computer use, called Computer Supported Collaborative, Learning. Aimed at changing the role of the teacher and the student and based on pedagogical goals of constructivism and 'intentional learning', the project has created a knowledge building community, using telecommunications, within and without the school, plus group support system software to achieve these goals.

Annex 3

ICT curriculum structure for elementary teacher training

ICT knowledge and skills for all categories	Professional category	Professional competence
1. Basics of computer confidence 2. Main principles of information processing 3. Text processing 4. Spreadsheets 5. ICT in personal communication 6. Internet navigation and information resources 7. ICT in education media construction	Education administrators and policy makers	⇒ ICT in educational environment development
	School administrators	⇒ ICT in school curriculum
	ICT technology coordinators	⇒ Hardware and software support of educational media
	Primary school teachers	⇒ New Literacy basic skills
	Mother tongue and literature teachers	⇒ Creative writing and critical thinking
	Foreign language teachers	⇒ ICT in foreign language immersion
	Humanities teachers	⇒ Cultural information resources
	Natural science teachers	⇒ ICT in science experiment
	Technology teachers	⇒ CAD/CAM, automatic control systems
	Art teachers	⇒ Visual arts in ICT

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Working Document

Introduction

In the framework of the UNESCO intersectoral project "The Status of Teachers and Teacher Education in the Information Society", the UNESCO Institute for Information Technologies in Education (IITE) is to create a set of training and self-training modules for different categories of educational personnel. The modules will comprise competencies in using information and communication technologies (ICTs) in the process of learning, including learning of teachers themselves. Emphasis will be placed, on the one hand, on imparting competencies in the use of new technologies (e.g. computers, the Internet) to teachers and other educational personnel and, on the other hand, on more effective use of new technologies (e.g. television, radio, computers and the Internet) in the training and retraining of teachers and teachers educators on a large scale.

Special consideration should be given to dissemination and sharing of successful strategies and "best practices", exemplary training materials as well as expertise; and facilitating access to training databases of educational software on teacher education.

UNESCO understands a crucial role of teachers in the development of educational system particularly in the information society where information and communication technologies will play a very important role. ICTs provide both new opportunities and challenges for teachers. As it was said at the Second International UNESCO Congress "Education and Informatics" (Moscow, 1996. See Annex 1), the ICTs play a catalyst role in shifting teachers from an information dispenser to a guide, mentor, knowledge navigator, consultant and co-learner with a student.

Several months ago the World Education Forum was held in Dakar, Senegal (26-28 April 2000). IITE thoroughly analyzed the following documents: "The Dakar Framework for Action. Education For All: Meeting Our Collective Commitments" and "A UNESCO Strategy for Education For All". IITE strongly supports the endeavor to combine forces and efforts in order to ensure that quality basic education for all will become a reality and the leading role of UNESCO in the follow-up to Dakar. IITE strives to contribute to attaining goals spelt out in "The Dakar Framework...", between which there are:

- Training and re-training of teachers in the information society;
- Distance education, as an excellent means for reaching the unreached and the improvement of staff development;
- ICTs in education for people with special needs.

Though at the turn of the century literacy for all – children, youth and adults -- is still an unaccomplished goal and an ever moving target, all of us should concentrate on the next steps to information society. New society demands and the new world around us (new technologies and new models of actions) call for New Literacy for Information Society (NLIS). As a substitute to old meaning of basic literacy (reading, writing, arithmetic and mode of thinking) new ones may be presented such as finding information by searching in written sources, observing, collecting, recording, etc.; communicating in hypermedia and involving all types of information and all media; designing objects and actions; creatiing of hypermedia essays involving all types of information and all media.

This new meaning of literacy and the a next step - information culture - need new generation of teachers. Majority of the old ones are trained in traditional manner. So the development of introductory and retraining programmes for these bearers of the school institutes will be the main challenge. ICT curriculum for teacher training has to assist in a reconstruction of schooling and learning rather than an introduction of hardware and software. It should be not only a programme to make teachers familiar with ICTs though it presents its starting point but to create long-term commitment and a programme of lifelong learning for teachers. A programme for educational leaders and decision-makers who will be responsible for the reconstruction of schooling process should be a part of this ICT curriculum.

In any case, we can get the understanding of new trends by receiving answers to four basic questions:

- what does this understanding enhance or amplify;
- what does it obsolesce or push out;

- what does it retrieve from the past realm of previously obsolesced;
- what does it reverse of or flip into when it reaches potential limits.

Previous model of education could be described as an army or a machine image of school. It means rationalization of time and motion, strict control and standardization of results. Present model of education describes school as an organism or a culture. Future model can describe school as an image of brain or a flux of transformation.

"Informatics in Primary Education. Recommendations", design of the Elementary ICT Curriculum for Teacher Training and Computer Driving License will be presented at the seminar. On this basis, the IITE educational programme will be discussed (see Annex 2). The participants are invited to discuss possible structure, content and ways of its development.

Informatics in Primary Education. Recommendations

The Recommendations on Informatics in Primary Education were developed by the Working Group representing the UNESCO Institute for Information Technologies in Education, the International Federation for Information Processing, and the Institute of New Technologies for Education (Moscow). The Working Group included Alexei Semenov, Co-chair and Joint Editor (Russia), Anton J. Knierzinger, Co-chair (Austria), Katerina Martcheva (Bulgaria), Sindre Roesvik (Norway), Erling Schmidt (Denmark).

The Document was prepared according to the resolution of the UNESCO Congress on Education and Informatics (Moscow, 1996), and presented at and supported by the IITE International Governing Board Meeting (Moscow, 1998), and the Meeting of the Experts from the CIS countries and Central and Eastern Europe (Kiev, 1999).

The document summarizes the international experience and vision on using the information and communication technologies, as well as acquiring corresponding skills in information processing within the school education starting from very first stages (age of 5 and younger). A characteristic feature of the Recommendations is that they are essentially work-in-progress, and a co-operative product of the networked educational community.

The authors attempted to make the Recommendations valid for various (potentially all) countries, that might differ in regard to general education, technological development, and needs and perspectives of the

national economy. That's why the Recommendations include even non-computer options.

The authors also tried to make the Recommendations valid for different categories of users: decision-makers of all ranks, regional and school administrators, teachers, technology coordinators, curricula developers, researchers in education, donators, and technology producing companies. The Document is addressed to all those who are already using ICTs in education, or going to make decision about such usage.

Both short and long-term aspects of the Recommendations reflect rapid changes of technology and slow changes of school in relation to the needs of society and the individual, general goals of education, local tradition of education and world economy.

The Document presents:

- the goals to be achieved with ICTs,
- models of introducing ICTs into school practice,
- success stories related to the educational usage of ICTs in different countries.

The major issues are:

- general development of learners;
- new models of learning in all subjects;
- fundamental concepts and structures of the information processing;
- operational skills in ICTs.

The general development of learners includes New Literacy and New Competence. The new models of learning (of all subjects) assume student's motivation; real life connection; integration of subjects; group co-operation (including global networking); teacher support. Important features of the models are described as discovery, project-based learning, etc.

The fundamental concepts of the information processing encompass structures, languages, processes and discrete models.

New educational models as well as sufficient technological skills are based on actions and objects of the information processing. Objects include texts; numeric data (of measurements, etc.); graphic objects; sounds; moving pictures; actuators (bulbs, motors). The actions include creation, editing, organizing (linking), communicating and presenting.

The most efficient models of introducing ICTs into schools and roles played by the participants of this process are investigated. Teacher's roles are described as a skilful master of doing, adviser, and collaborator. The model of joint work of a teacher and an information technology coordinator is considered: first - to master technology, then - to apply it for solving problems relevant to students and included into curriculum. Students at times successfully play roles of the ICTs gurus.

Administrators and coordinators of information technology at schools are special categories of participants of the school change.

As for operational skills in ICTs - today we have computers with the picture quality approaching the limits of a human eye, which can address pupil in a human voice and store enough of recorded sound, recognize basic things you are saying to them. These computers can easily access almost any information, which is coming into the Net; videoconferencing for schools is real; inside school we can use radio and infrared networking. This means that teacher should first and above all teach children to manage and efficiently use all those tools, options, sources and services in order to make learning even more interesting, inspiring and productive.

The last section of the Recommendations has a special validity. It contains descriptions of the experience of teachers from different countries and provides examples of their activity that helps to create new paradigm of the teaching-learning process and to form a vision of how new information and communication technologies can be effectively used in primary education. The Success Stories is an important contribution made by the Community; they present real examples of effective usage of information and communication technologies in learning. One of the major goals of these Recommendations is to invite more educators to participate in creating our common vision. Different kinds of partnership would be appreciated. The Web site http://www.IITE.ru/primedu will incorporate suggestions from readers (in particular, success stories).

Elementary ICT Curriculum for Teacher Training

ICT Curriculum for all levels of Teacher Training elaborated by the IFIP working group 3.3 will be considered below.

First of all, it is necessary to answer a question about the training objective to be achieved. What do we mean by current and future practice with information and communication technologies in education, basic technology competence? What kind of a teacher competence as an objective do we understand? Is it enough to use some criteria of the basic skills from the concept of the European Computer Driving Licence (ECDL):

1. To promote and encourage computer literacy for all.
2. To raise the level of knowledge about the Information Technology (IT) and the level of competence in using personal computers and common computer applications for all citizens within Europe and internationally.
3. To ensure all computer users understand best practices and the advantages of using a personal computer.

4. To increase the productivity of all employees who need to use computers in their work.
5. To enable better returns from investments in the information technology.
6. To provide a basic qualification that will allow all people, regardless of their background, to be a part of the Information Society.

What should be suggested as ICT advanced skills, media skills, etc.? Should all the teachers have the same ICT curriculum? What should be done for shifting teacher from instructor to organiser and guide? In any case all professional categories should be taken into account (See Annex 3).

IITE Educational Programme: Considering the Agenda

The following questions will be discussed at the seminar:

1. Is there any established notion of the New Literacy for Information Society (NLIS)?
2. Is there any stable and standard content of the Elementary ICT Teacher Training curricula? How is it related with NLIS?
3. What are the requirements for the ICT professional competence basic knowledge and skills, how are they incorporated in the ICT Teacher Training curricula?
4. What are the examples of the most successful experience of implementing IT competence modules in practice of the teacher's development and in-service training?
5. Can we propose a set of requirements and a procedure for the international certification of the teacher's ICT competence?
6. How the ICT competence can influence the teacher's role in the society?
7. How can a teacher manage with the responsibility which he or she shares in the negative aspects of information civilization?