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Name:

Registration No.:

Course Code: 855

Program: MA/MEd

Semester: Autumn 2026

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

Course: Computer in Education (855) • Level: MA/MEd

Semester: Autumn 2026

Assignment No. 2 (Units 5–9)

Total Marks: 100 • Pass Marks: 40

SOLVED ASSIGNMENT GUIDE

(For Study & Reference)

Note: This guide is prepared for study and reference purposes. Students are advised to read the relevant units of the course book, understand the concepts, and then write the assignment in their own words. Total marks of the assignment are 100; each question carries the marks shown with it.

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Question 1: Self-Learning Through Computers (20 Marks)

What is self-learning through computers? Enlist and discuss the ways in which computers help self-learning.

Introduction

Self-learning — learning that a person plans, carries out and evaluates largely by himself, at his own initiative and pace — is one of the most important outcomes a good education can produce, because formal schooling ends while learning must continue for life. Among all the tools that have ever supported self-learning, the computer is the most powerful: it combines in one machine the library, the tutor, the laboratory, the exercise book, the examiner and the postman. For a distance-education system such as Allama Iqbal Open University, whose students by definition study away from a classroom, self-learning through computers is not an optional enrichment but a central method. This answer first explains what self-learning through computers means, and then enlists and discusses the many ways in which computers help a person learn on his own.

What Is Self-Learning Through Computers?

Self-learning through computers means using computer-based resources and programmes as the main medium and manager of one's own learning: the learner chooses or is given objectives, studies material presented by the computer (tutorials, e-books, recorded lectures, websites), practises with its exercises, tests himself with its quizzes, receives its feedback, and uses it to find information, produce work and communicate with teachers and fellow learners — all without the continuous presence of a teacher. Its defining features are learner control (the learner decides what, when, where and how fast to study), interactivity (the material responds to the learner instead of merely being read), and immediate feedback. It must be distinguished from simply being left alone: effective self-learning material is carefully designed so that objectives, explanations, examples, questions and answers are all built in, and the computer delivers this design faithfully to each learner. In distance education the printed study material pioneered this approach; the computer carries the same idea much further, because it can also judge responses, branch to remedial help and connect the isolated learner to the whole world.

Ways in Which Computers Help Self-Learning

1. Tutorials and Structured Courseware

Tutorial programmes present new subject-matter step by step, in small units, with questions after each step and remedial branches for learners who answer wrongly. A self-learner can thus work through a complete topic — a chapter of mathematics, a unit of this very course — exactly as if a patient tutor were beside him, stopping, repeating and testing as needed.

Because the sequence and explanations are prepared by experts in advance, the quality of instruction does not depend on the learner's locality or on the availability of a local teacher.

2. Drill, Practice and Self-Testing

Computers provide unlimited practice material — vocabulary drills, arithmetic exercises, grammar questions, past-paper style quizzes — with instant marking and explanations. The self-learner can discover precisely what he does and does not know before facing a real examination, repeat weak areas until they are mastered, and watch his scores improve, which builds confidence. Objective self-testing of this kind is tedious for a human teacher to supply in quantity, but costs the computer nothing.

3. Access to Information: E-Books, Libraries and the Internet

A computer with internet access is a library without walls: encyclopaedias, digital libraries, journals, dictionaries, open courseware of world universities, recorded lectures and educational videos are available to a learner in a village as fully as to one in a capital city. Search tools let the learner pursue a question the moment it arises, follow references, and compare sources. For self-learning this removes the oldest barrier — the absence of books and information — though it also demands the skill of judging the reliability of what is found.

4. Multimedia, Simulation and Virtual Laboratories

Self-learners often fail at abstract or process-based topics because a book can only describe them. Computer multimedia shows them: animations of scientific processes, simulations in which the learner changes variables and observes results, virtual laboratories for experiments that are dangerous, costly or unavailable locally, and language programmes that let the learner

hear and repeat native speech. Learning by doing and seeing, at one's own desk, converts passive reading into experience.

5. Writing, Producing and Problem-Solving Tools

Self-learning is not only receiving; it is producing. Word processors help the learner draft, revise and present his own assignments and notes; spreadsheets let him analyse data and test 'what if' questions; presentation software, programming environments and design tools let him create projects through which deep learning occurs. The computer thus supports the constructive side of self-study, in which the learner organises knowledge in his own words and artefacts — the surest sign that learning has happened.

6. Communication and Collaborative Learning

The connected computer ends the isolation that was once the weakness of self-learning. Through e-mail, discussion forums, group chats, video calls and shared documents, the self-learner can ask a tutor a question, discuss a problem with fellow students in other cities, join a study group, and submit assignments electronically. He learns alone in location but not alone in community — the model on which modern open universities increasingly run their support systems.

7. Learning Management, Pace and Motivation

Finally, computers help the self-learner manage his learning itself. Learning management systems and study apps record what has been completed, set out what comes next, remind the learner of deadlines and show progress charts that sustain motivation. The learner can study at the hour that suits his job and family, revisit a recorded lecture before an examination, and

slow down or accelerate as his understanding dictates. Flexibility of time, place and pace is, for adult learners, often the difference between continuing education and abandoning it.

Table 1: How computers help self-learning — summary

Way	What the computer provides	Benefit to the self-learner
Tutorials / courseware	Structured lessons with built-in questions and branches	Learns new topics without a present teacher
Drill and self-testing	Endless exercises, instant marking	Identifies and removes weaknesses
Information access	E-books, libraries, internet, lectures	No barrier of distance or scarcity of books
Multimedia and simulation	Animation, sound, virtual experiments	Abstract ideas become visible and practical
Production tools	Word processing, spreadsheets, projects	Learns by creating, not only receiving
Communication	E-mail, forums, video, shared work	Tutor and peer support despite isolation
Learning management	Plans, records, reminders, flexibility	Controls own pace, time and progress

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Conditions and Cautions

Honesty requires noting that computers help self-learning only when certain conditions hold. The learner needs basic computer literacy, reading ability, self-discipline and a study plan; without them the same machine becomes a source of distraction and entertainment. Material must be well designed — a scanned textbook on a screen is not self-learning courseware. Access remains unequal: cost of devices, connectivity and electricity divide learners, and institutions promoting computer-based self-learning must address this divide through computer laboratories, offline material and support services. Guidance also still matters: the self-learner needs occasional human advice on what to study and how, which is why successful distance systems combine computer resources with tutor support rather than pretending the machine alone is sufficient.

Conclusion

In conclusion, self-learning through computers means the learner directing his own study through computer-delivered tutorials, practice, information, simulation, production tools, communication and learning management. Computers help this learning in at least seven major ways, and together they dissolve the traditional limits of self-study — no teacher present, no library nearby, no one to mark practice work, no fellow students to ask. For distance learners above all, the computer has turned self-learning from a second-best substitute for the classroom into a rich, interactive and respectable way of learning in its own right, provided the learner brings discipline and the institution provides well-designed material and support.

Question 2: Computer-Managed Learning (CML) and Its Rationale (20 Marks)

What is computer-managed learning (CML)? Develop a rationale for the use of CML in our educational institutions.

Introduction

Anyone who has managed a school, college or university programme knows that teaching is surrounded by a mountain of management: diagnosing what each student knows, prescribing suitable material, testing, marking, recording results, reporting to parents and administrators, and keeping track of hundreds of individual learners moving at different speeds. Computer-managed learning (CML) — also called computer-managed instruction (CMI) — is the use of the computer to perform and coordinate exactly this management work. It is the natural partner of

computer-assisted instruction: where CAI delivers the teaching itself, CML organises, steers and records the whole learning process. This answer explains what CML is and how it works, and then develops a rationale — a reasoned case — for adopting it in our educational institutions.

What Is Computer-Managed Learning?

CML is a system in which the computer manages the learning of each student on the basis of stored information about the curriculum and about the learner. Its working cycle has five main functions. First, diagnosis: the learner takes a computer-administered test (or his entry data are recorded) so the system knows his present level. Second, prescription: comparing his results with the course's objectives, the system prescribes what he should study next — a unit of the textbook, a CAI lesson, a video, a laboratory task or a worksheet. Third, delivery support: the system directs him to the prescribed resources, which may be computer-based or entirely conventional; CML does not require that the learning itself happen on a screen. Fourth, assessment: after study, the learner takes a progress test, which the computer marks instantly. Fifth, record-keeping and reporting: every result is stored in the learner's record, mastery is certified when the required standard is reached, the next prescription is issued, and reports are generated for the learner, the teacher and the institution. The learner thus moves through the course along an individual path, at his own pace, while the computer keeps the map and the diary.

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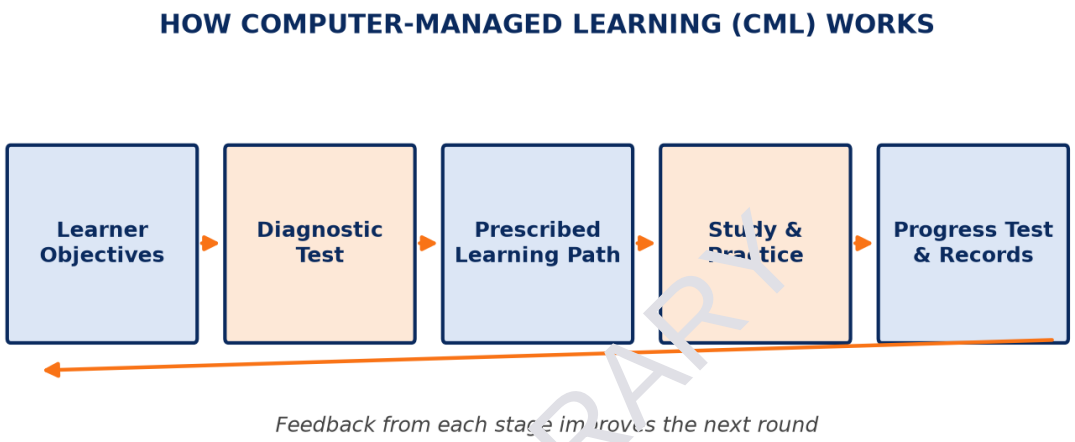


Figure 1: The CML cycle — diagnosis, prescription, study, assessment and records, repeated for each objective

Two features distinguish CML clearly. It is individual-based: the unit of management is not the class average but each learner's progress against each objective. And it is teacher-supporting, not teacher-replacing. The computer absorbs the clerical and diagnostic routine, while decisions about teaching, counselling and intervention remain with the teacher, who now receives timely, accurate information on which to base them. Historically, large CML systems were developed for military and industrial training and for mastery-learning programmes; today their descendants are the learning management systems (LMS) — such as Moodle and the online portals of open universities — through which courses, assignments, marks and announcements are managed for millions of learners, including AIOU's own students.

Rationale for Using CML in Our Educational Institutions

1. Our Classes Are Large and Our Learners Diverse

The first argument is the condition of our classrooms. A teacher with fifty or more students of widely differing ability cannot realistically diagnose each one's needs, set individual work and

track individual mastery by hand; in practice the class is taught as an average and many learners silently fall behind or mark time. CML makes individualisation administratively possible: diagnosis, prescription and progress records for every learner are maintained by the machine, so mastery learning and individual pacing cease to be slogans and become workable routines even in large institutions.

2. Teachers Are Overburdened with Clerical Work

Surveys of teachers' time repeatedly show a large share consumed by marking objective work, maintaining registers, compiling results and preparing reports — time taken from preparation, individual help and their own development. CML transfers this routine burden to the computer: tests are marked on the spot, records update themselves, and reports that once took days are produced in minutes. The rationale is not to economise on teachers but to return teachers to teaching, using scarce professional time where human judgement actually matters.

3. Distance Education Cannot Function Without It

For open and distance institutions the case is stronger still. When thousands of students are scattered across the country, submitting assignments to hundreds of tutors, an institution cannot run on paper registers: enrolment, assignment dispatch, tutor allocation, marks, results and student queries must be computer-managed if students are to receive timely service. AIOU's own growth, and the experience of open universities worldwide, show that CML-type systems are not an optional modernisation for distance education but its administrative backbone.

4. Better Information Means Better Decisions

CML creates, as a by-product of daily work, a reliable database of learning: which objectives students find difficult, which materials succeed, where a class or a whole programme is weak. Managers and curriculum developers can act on evidence instead of impressions — revising a troublesome unit, arranging remedial teaching, or identifying students at risk of failure early enough to help them. In institutions where examination analysis is currently manual and late, this flow of timely information alone justifies a CML system.

5. Objective, Prompt and Fair Assessment Handling

Computer-administered testing with item banks offers further benefits: tests can be generated afresh for each learner from a large bank (reducing copying), marking is instant and perfectly consistent, and learners receive immediate feedback while the material is fresh. Records held centrally are less easily lost or altered than paper files, and transcripts and result cards can be produced accurately. For institutions troubled by delays and errors in results, this reliability builds public trust.

6. Cost-Effectiveness in the Long Run

CML requires initial investment in hardware, software and training, and this must be faced honestly. The rationale is long-term: once running, the system serves successive cohorts at little extra cost, reduces paper, postage and clerical hours, prevents costly errors and repetition, and allows an institution to serve more learners with the same teaching staff. Phased adoption — beginning with admissions, records and assignment management, where returns are quickest — makes the investment manageable for our institutions.

Possible Objections and Their Answers

Three objections are commonly raised. That CML is too expensive for our schools: true for an instant, complete installation, but the functions can be adopted gradually, starting with a single computer for records and testing, and shared or open-source systems have greatly lowered software costs. That teachers will resist it: they resist systems imposed without training or consultation; where teachers are trained, involved and visibly relieved of drudgery, acceptance follows. That management by computer will make education mechanical: this confuses managing with teaching — CML manages information so that teachers can teach more personally; the danger lies not in the system but in forgetting that distinction.

Conclusion

To conclude, computer-managed learning is the computer's organisation of diagnosis, prescription, assessment and record-keeping for each individual learner, supporting rather than replacing the teacher. The rationale for its use in our institutions is compelling: oversized and diverse classes that defeat manual individualisation, teachers buried in clerical work, distance-education systems that cannot operate on paper, decisions that need evidence, assessments that need speed and fairness, and long-run economy. Adopted in phases, with training and clear purpose, CML offers our educational institutions a realistic route to managing learning as carefully as we have always claimed to value it.

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Question 3: In-Service Training of Teachers for the Use of Computers (20 Marks)

Elaborate on possible means to train teachers in-service for the use of computers.

Introduction

Every plan to bring computers into education eventually meets the same decisive factor: the teacher. Hardware can be purchased in a month, but a serving teacher — appointed years ago, trained without computers, busy with a full timetable and often anxious about new technology — will use computers in the classroom only if he is trained, supported and convinced. In-service training (training given to teachers while they are in service) is therefore the bridge between computer policy and classroom practice. This answer elaborates the possible means by which in-service teachers can be trained for the use of computers: the forms such training can take, the content it should carry, and the conditions that decide whether it changes classroom behaviour or merely adds a certificate to a file.

What In-Service Computer Training Must Teach

Before the means, the content deserves a word, because training fails when it teaches the wrong thing. A teacher needs three layers of competence. The first is basic computer literacy: operating the machine, managing files, word processing, spreadsheets, presentations, e-mail and the internet. The second is pedagogical integration: how computers serve teaching and learning in his own subject — selecting and evaluating educational software, using CAI and multimedia sensibly, managing a class in a computer laboratory, using the computer for testing

and records (CML), and blending computer activities with ordinary lessons. The third is professional use: preparing handouts and question papers, analysing results, communicating with parents and administration, and continuing his own learning online. Training that stops at the first layer produces teachers who can operate a computer but not teach with one — the commonest failure of such programmes.

Means of In-Service Training

1. Workshops and Short Courses

The most familiar means is the face-to-face workshop or short course, held at a training institute, a district resource centre or the school itself, ranging from a few days to several weeks. Its strengths are hands-on practice at real machines, immediate help from the trainer, and learning alongside colleagues. Good workshops for serving teachers are practical rather than lectured, use the teachers' own subjects and classrooms as examples, and end with each participant producing something usable — a lesson plan, a presentation, a test — rather than merely listening. Their weakness is cost and the difficulty of releasing teachers from duty, so workshops work best as intensive starting points followed by other means of support.

2. Distance and Online Training

Distance education is a particularly suitable means for serving teachers, who cannot leave their posts for long: printed and online modules, recorded video demonstrations, and structured self-study allow a teacher to train at home in the evenings and vacations. Allama Iqbal Open University itself is the outstanding national instrument for this purpose, offering courses and programmes to teachers across the country without removing them from their schools. Online

courses and webinars add live interaction and discussion forums to the distance model. The known weakness of distance training — isolation and dropout — is met by combining it with local study centres, tutor support and some face-to-face practical sessions, a blended pattern that experience shows works best of all.

3. School-Based and Cluster Training

Training can also come to the teacher. In school-based training, a trainer or a trained colleague works with the staff of one school in its own laboratory and classrooms, addressing its actual timetable, equipment and students; in cluster training, teachers of several neighbouring schools meet at one centre school. This means has two great advantages: the training is automatically relevant, because it uses the machines and problems the teachers really have, and colleagues trained together can afterwards support one another. It is also cheaper per teacher than sending individuals away, and follow-up is natural because the trainer can return.

4. Cascade (Master Trainer) Model

To reach very large numbers, systems commonly use the cascade model: a small group of master trainers is trained intensively at the centre; they train district-level trainers; and those trainers train teachers in their localities. The cascade is economical and fast, which is why government programmes favour it. Its known danger is dilution — quality and enthusiasm weakening at each step down the chain — so successful cascades protect quality with standardised materials, direct observation of lower-level training, and refresher courses that reconnect teachers with the centre.

5. Peer Learning, Mentoring and Professional Communities

Much of the most effective in-service learning is informal: a computer-confident teacher in the same staffroom demonstrates, helps and encourages colleagues day by day. Institutions can deliberately cultivate this means by designating computer coordinators or mentor teachers, arranging demonstration lessons and peer observation, holding staffroom sharing sessions, and encouraging online teacher communities where materials and solutions are exchanged. Peer support has a unique advantage: it is available at the moment of need, in the middle of an ordinary school week, long after a formal course has ended.

6. Self-Learning with Structured Materials

Finally, teachers can be trained through self-learning: carefully designed self-instructional modules, tutorial software, video lessons and practice exercises that a teacher works through at his own pace, with self-tests and assignments checked by a tutor or institution. This means suits motivated teachers, costs little per head, and models exactly the self-learning through computers that teachers are expected to arrange for their students. It works best when completion is recognised — counted toward promotion, certification or allowances — so that effort is rewarded.

Table 1: Means of in-service computer training compared

Means	Main strength	Main limitation
Workshops / short courses	Intensive hands-on practice with a trainer	Costly; releases teachers from duty only briefly
Distance / online training	Reaches teachers everywhere without leaving post	Needs motivation; practical work needs local support
School-based / cluster training	Uses the school's own equipment and problems; builds a team	Depends on quality of the visiting or local trainer
Cascade model	Reaches very large numbers economically	Quality can dilute at each level

Peer learning and mentoring	Support available daily, at the moment of need	Needs at least some skilled teachers to start
Structured self-learning	Cheap, flexible, self-paced	Dropout risk without recognition and follow-up

Conditions That Make Training Succeed

Whatever means are chosen, research and experience point to the same conditions of success. Training must be followed by access: a trained teacher who returns to a school with no working computer, or one locked in the head's office, will lose the skill within months — practice opportunities, laboratory timetabling and technical support are part of the training investment. Training must be continuous, not a single event: refresher courses, advanced modules and help-lines keep pace with changing technology. Incentives matter: certificates should carry weight in promotion and posting, and trained teachers should be given recognised roles, such as computer coordinator, that honour their new competence. Training should be in the teachers' language and curriculum context wherever possible. Above all, head teachers must be included and convinced, because a supportive head turns training into a school programme, while an indifferent one quietly suffocates it.

Conclusion

To conclude, in-service teachers can be trained for computer use through a rich variety of means — workshops and short courses, distance and online programmes such as those of AIOU, school-based and cluster training, the cascade model, peer mentoring and professional communities, and structured self-learning. No single means is sufficient: the strongest systems blend them, teach pedagogy as well as operation, and guarantee follow-up access, support and

recognition. Computers in education stand or fall by teachers, and investing in teachers in service is therefore not an accessory to a computer programme but its very centre.

Question 4: Short Notes: E-Mail, Computer Conferencing, and the Internet and World Wide Web (20 Marks)

Write short notes on the following: (1) Electronic mail (E-Mail) (2) Computer Conferencing (3) The internet and the World Wide Web.

Introduction

Three related developments turned the standalone computer into a communicating machine and reshaped education in the process: electronic mail, which lets individuals exchange messages and documents across the world in seconds; computer conferencing, which lets groups discuss together regardless of distance; and the internet with its World Wide Web, the global network and information system on which both of the others now largely travel. This answer gives a short note on each, explaining what it is, how it works, and what it means for teaching, learning and distance education.

Note 1: Electronic Mail (E-Mail)

Electronic mail is the exchange of messages, and with them files of every kind, between computer users over a network. Each user has a unique address of the form name@domain (for example, a student at an open university) and a mailbox held on a mail server. The sender writes a message in a mail programme or webmail page and sends it; servers pass it across the internet within seconds or minutes; the receiver opens his mailbox when convenient and reads,

replies to, forwards, prints or files the message. This 'store and forward', non-simultaneous character is e-mail's quiet strength: sender and receiver need never be online together, across any time zones. Attachments allow documents, pictures, assignments and software itself to ride with the message.

E-mail's advantages explain why it became the first universally adopted internet service: it is fast compared with post, extremely cheap, written and therefore recordable, and it can reach one person or a whole mailing list of hundreds with the same effort. In education its uses are now basic infrastructure. Students submit assignments and receive marked work and tutor comments by e-mail; tutors answer queries between study sessions; institutions send admissions information, date-sheets and results alerts; teachers exchange materials with colleagues; and research scholars correspond across continents. For distance education in particular, e-mail replaced the slow postal turnaround that once delayed feedback by weeks. Its limitations should also be noted: it requires connectivity and basic literacy with the machine; mailboxes attract unsolicited 'spam' and, worse, fraudulent and virus-carrying messages, so users must be taught caution; and a written message lacks tone of voice, so care in wording matters. Used with these cautions, e-mail remains the workhorse of educational communication.

Note 2: Computer Conferencing

Computer conferencing is a system in which a group of people, each at his own computer in his own place, participate in a common discussion held on a central computer. A participant logs in, reads the contributions others have posted to the conference (organised by topic into threads),

and adds his own comments, questions and replies whenever he chooses. Unlike a telephone or video call, the conference is asynchronous — it does not require everyone to be present at the same moment — and unlike ordinary e-mail it is many-to-many: every contribution is visible to the whole group, and the complete discussion is preserved as a growing, searchable record. A moderator usually opens topics, keeps discussion on track and summarises. (Its close relatives include bulletin boards, discussion forums and, in real time form, chat and video conferencing.)

The educational significance of computer conferencing is considerable, above all for distance learners, whose historic weakness was isolation. In a course conference, students discuss study material with each other and with their tutor, ask questions that benefit everyone, work on group tasks, and experience something of the seminar life of a campus they may never visit. Open universities pioneered large-scale conferencing for exactly this purpose, finding that active conferences improve motivation, deepen understanding through peer explanation, and reduce dropout. Conferencing also serves teachers' professional development, academic collaboration and committee work across institutions. Its requirements are moderation, clear ground rules of courtesy ('netiquette'), and enough participation to keep discussion alive; a neglected conference quickly falls silent. Well run, it converts a scattered list of individual learners into a learning community.

Note 3: The Internet and the World Wide Web

The internet is the worldwide network of networks: millions of computers, in universities, businesses, homes and pockets, linked by agreed rules (protocols, chiefly TCP/IP) so that any of them can exchange data with any other. It began as a research and defence network in the

United States in the late 1960s and grew, once opened to the public in the 1990s, into a general infrastructure carrying e-mail, file transfer, discussion, commerce, entertainment and education. No single body owns it; it is governed by shared standards and cooperation, which is part of the secret of its growth.

The World Wide Web (WWW) is the internet's most famous service — and the two terms must not be confused. The Web, created by Tim Berners-Lee in 1991, is a system of interlinked documents and resources held on web servers and identified by addresses (URLs). Pages, written in HTML, contain text, pictures, sound and video, and — decisively — hyperlinks, which let a reader jump from one page to any linked page anywhere in the world with a click. The user views the Web through a browser programme. For education the Web is transformative: it places libraries, encyclopaedias, journals, museums, lectures, simulations and whole free courses within reach of any connected learner; it lets institutions publish information, run admissions and deliver courses online; and it lets students publish their own work to a real audience. Its risks are the mirror of its openness: information on the Web is unedited, so quality, accuracy and suitability vary wildly, and learners must be taught critical evaluation of sources; access remains unequal; and distraction and misuse are constant temptations. The educated user treats the Web as a vast library without a librarian — immensely valuable, provided he has learned to judge what he finds.

Table 1: The three services compared

Feature	E-Mail	Computer Conferencing	Internet / WWW
Basic pattern	One-to-one or one-to-many messages	Many-to-many group discussion	Global network; Web = linked pages and resources
Timing	Asynchronous (store	Usually asynchronous	Browsing at any time;

	and forward)		servers always available
Record kept	In personal mailboxes	Shared, threaded conference record	Pages persist at their addresses
Typical educational use	Assignment submission, tutor feedback	Seminars, group discussion, peer support	Research, e-libraries, online courses, information

Conclusion

In conclusion, e-mail gives education fast, cheap, written person-to-person communication; computer conferencing gives dispersed learners and teachers a shared seminar room that never closes and keeps its own minutes; and the internet with the World Wide Web supplies the global infrastructure and the immense linked library on which both increasingly depend. Together these three turned the computer from a solitary machine into the communications backbone of modern open and distance learning — the very system through which most AIOU students reading this assignment now receive much of their support.

Question 5: A Programme of Professional Development for Teachers Who Use Computers (20 Marks)

Sketch a program of professional development for teachers who use computers in the teaching-learning process.

Introduction

Training gives a teacher a skill; professional development makes him grow, year after year, in the confident and creative use of that skill. The distinction matters for computers, because technology changes faster than any single course can cover, and because using computers well in teaching is a professional practice — involving judgement about pedagogy, learners and

materials — not merely a technical trick. This answer sketches a complete programme of professional development for teachers who use computers in the teaching-learning process: its aims, its guiding principles, its components arranged as a yearly cycle, its support structures and incentives, and the way its success should be evaluated.

Aims and Guiding Principles

The programme aims at four outcomes: (1) competence — every teacher able to operate computers and standard software confidently; (2) integration — every teacher able to plan and conduct lessons in which computer use genuinely serves his subject's objectives; (3) professionalism — teachers using computers for assessment, records, communication and their own learning as a normal part of their work; and (4) leadership — a growing cadre of expert teachers in each school who train and support others. Five principles govern the design. Development must be continuous, not a one-time course. It must be school-embedded, connected to the teacher's own classroom, subjects and students. It must be practical and produce usable classroom materials. It must be collaborative, because teachers learn a great deal from one another. And it must be recognised and rewarded, because unacknowledged extra effort quietly dies.

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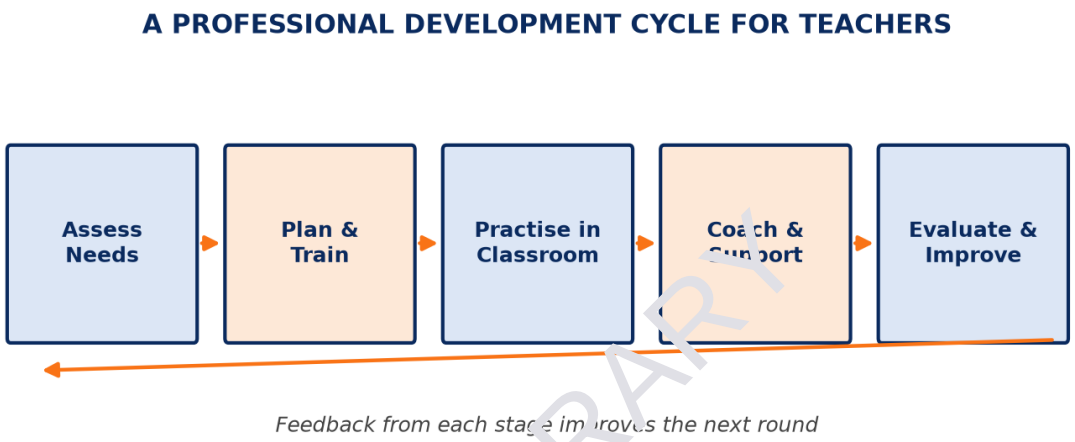


Figure 1: The professional development cycle — needs, training, classroom practice, support and evaluation, repeated yearly

Stage 1: Assessing Needs

The programme begins each year with a brief needs assessment in every school: a self-assessment checklist and a short practical audit establish each teacher's present level (beginner, competent user, or advanced/integrating user), the subjects and classes he teaches, and the equipment actually available to him. Teachers are then placed on differentiated pathways rather than forced through identical training — the commonest waste in development programmes is teaching the confident what they know and overwhelming the beginner. The school's development plan, agreed with the head teacher, sets targets for the year: for example, all staff at basic competence, half the staff integrating computers into at least one unit per term, and two teachers prepared as school-level resource persons.

Stage 2: Core Training Modules

Training is delivered in short, spaced modules — after-school sessions, weekend workshops and vacation courses, blended with online and distance material so that teaching is not disturbed —

organised in three ascending levels. Level 1 (Foundations) covers computer operation, file management, word processing, presentations, internet and e-mail, and safety and ethics online. Level 2 (Classroom Integration), subject-specific wherever possible, covers selecting and evaluating educational software and websites, CAI and simulation use, multimedia lesson design, managing computer-laboratory sessions, preparing digital worksheets and tests, and using computer-managed records. Level 3 (Advanced and Leadership) covers creating original digital materials, online course and discussion management, data analysis of student results, mentoring colleagues, and action research on one's own computer-supported teaching. Each module ends with a classroom product — a taught lesson, a prepared test, a set of materials — which is observed or reviewed, so that certification certifies practice, not attendance.

Stage 3: Classroom Practice with Coaching and Support

Between modules, development continues where it counts: in classrooms. Each teacher tries the new techniques with his own students, supported by three structures. A school computer coordinator (a Level-3 teacher with a small timetable allowance) provides day-to-day help, maintains the laboratory schedule and troubleshoots. Peer observation pairs teachers to watch each other's computer-supported lessons and discuss them frankly. And a cluster coach or district resource person visits periodically to observe, model lessons and run problem-solving sessions. A staffroom and online help channel (a teachers' group on the school or district network) answers quick questions. This stage is the heart of the programme: skills learned in workshops become habits only through supported practice.

Stage 4: Professional Community and Continuing Learning

To keep growth alive beyond formal sessions, the programme builds a professional community. Monthly school or cluster meetings showcase one teacher's successful computer-supported lesson, with discussion of what made it work. An online community of practice (forum or group) circulates materials, solved problems and announcements of free courses and webinars. Teachers are encouraged and helped to take recognised online and distance courses — including AIOU programmes — for credit, to attend an annual district technology-in-education exhibition or conference, and to undertake small action-research projects, presenting findings to colleagues. A small school library of reference material and a curated list of quality educational websites support self-directed study, honouring the principle that teachers should experience the self-learning they are asked to foster in students.

Stage 5: Recognition, Incentives and Career Linkage

The programme will stand only if the system visibly values it. Completion of each level brings a certificate recorded in the teacher's service record and counted in promotion criteria and in selection for coveted postings and roles. Advanced teachers receive formal roles — computer coordinator, cluster trainer, materials developer — with appropriate allowance or timetable relief. Annual awards at school and district level honour outstanding technology-integrated teaching, and the best teacher-made digital materials are published on the district portal with their authors named. These incentives cost little beside the hardware budget and repay themselves in motivation and retention of skills.

Table 1: The programme at a glance — a one-year cycle

Period	Main activities	Responsibility
Term 1, weeks 1–3	Needs assessment; individual pathways; school development plan	Head teacher + coordinator
Term 1	Level-wise training modules (blended); classroom products prepared	District trainers / AIOU & online providers
Terms 1–3	Supported classroom practice; peer observation; coaching visits	Coordinator, peers, cluster coach
Monthly	Sharing meetings; online community activity	School / cluster
Term 2	Refresher and subject-specific modules; action research begins	District trainers
Term 3	Showcase lessons, evaluation; certificates and awards; next year's plan	Head teacher + district

Evaluating the Programme

Finally, the programme evaluates itself at four levels, in the manner of standard training-evaluation models: Did teachers find the training relevant and usable? Did they actually learn the skills (shown by practical assessment and classroom products)? Did their classroom behaviour change (shown by observation and laboratory usage records)? And did students benefit (shown by engagement, work quality and achievement in computer-supported units)? Findings feed directly into the next year's needs assessment, closing the cycle shown in Figure 1. A programme that is not evaluated in this way drifts into ritual; one that is, improves steadily and can demonstrate its worth to the authorities who fund it.

Conclusion

In conclusion, the sketched programme treats professional development as a continuous, school-embedded cycle: assess needs and differentiate pathways; train in ascending, practical modules; support real classroom practice through coordinators, peers and coaches; sustain

growth through a professional community and further study; recognise achievement in certificates, roles and promotion; and evaluate honestly, feeding the results into the next cycle. Teachers developed in this way cease to be reluctant operators of machines and become what the computer in education most needs: confident professionals who choose, adapt and even create technology in the service of their students' learning.

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