

The CITSCAPES Developmental Tool

This tool is intended to enable institutions to position themselves against a developmental model focused on student C&IT literacy in the context of other relevant developments.

The MIT Model

The model underlying the positioning tool derives from the *Management in the 90s* research project at the Massachusetts Institute of Technology. Scott Morton (1991) and his team proposed a transformational model indicating the effect of IT on change in companies, in which the character of IT implementation is related to an increasing range of potential benefits. The model involves five stages grouped into three phases:

The **Evolutionary** Phase represents the movement from unco-ordinated ad hoc developments towards an organised structure, although IT remains supportive of, rather than embedded within, core business activities. It consists of two stages:

- i. *Localised*: ad hoc activities or local initiatives happen in a context of little or no central policy or support.
- ii. *Co-ordinated*: these initiative are brought together into an organised structure, or replaced by a centrally imposed structure, which maintains the same types of activity.

The second phase is the **Transformative**, in which thorough rethink of IT activities is undertaken. It consists of one stage:

- iii. *Transforming*: change agents (i.e. those who have the power to bring about change across the organisation) begin to reshape IT activities, and to draw them closer to core business activities, which are themselves caused to change.

The final phase is the **Revolutionary**, in which IT activities move into the centre of core activities and themselves become a force for change. It consists of two stages:

- iv. *Embedded*: IT activities have become embedded within core business activities, which are now radically different from before.
- v. *Innovative*: IT activities now become a source of ongoing change to the core activities themselves and the nature of the business and the company.

This model can with appropriate modification, be applied to the involvement of IT in higher education. It was drawn to the attention of the education sector by NCET (now BECTa) and incorporated in a booklet *Managing IT in Schools* (Poole & Capstick, 1995), and then in a “Developmental Matrix” on the BECTa website (BECTa, 1999). The matrix allows managers of schools and FE colleges to mark their progress along dimensions based on the MIT model. The version for HE and FE colleges (Passey, 1999) gives the stages for “Student IT Skills” as:

- i. *Localised*: “Some staff exploit students basic IT skills but with little attempt to integrate IT into learning and assessment process.”
- ii. *Co-ordinated*: “Curriculum areas provide contexts for the development of IT skills and their assessment. Generic skills may be developed through IT courses.”
- iii. *Transforming*: “Staff acknowledge high level of student IT skills and devise appropriate learning situations which reflect those skills.”
- iv. *Embedded*: “Student use of IT is appropriate in the context of their learning experience and its application is regularly re-evaluated.”
- v. *Innovative*: “Flexible course delivery using IT appropriately.”

From NCET the idea was also taken up at Cheltenham and Gloucester College of Higher Education (Oates & Watson, 1996), under the IT leadership of Les Watson, who took the

model to Glasgow Caledonian University on his move there. The Glasgow Caledonian *C&IT Strategy and Policy* defines the stages regarding “Student C&IT Skills” in terms almost identical to the BECTa matrix. The phases are placed alongside similar developments in other aspects of the learning environment, such as learning and teaching, student access to C&IT, C&IT training for staff, and development of the e-university, as well as issues of support, funding and resource distribution. In this case the matrix is presented as a way of indicating the university’s progress along a desired developmental path.

Focusing the Model on Student C&IT Literacy

This formulation forms a good starting point for a focus on student C&IT Literacy issues. It emphasises that implications of C&IT for educational institutions are dynamic; that the current situation is a moment in a process of change; and that change in student C&IT provision occurs alongside other changes in the organisation and in the learning environment. We have, however, developed the matrix further, in order to offer more detail with a specific focus on development of student C&IT provision, and to capture the sense of revolutionary transformation at the heart of the organisation which Scott Morton’s model identifies.

The MIT/BECTa matrix has been modified as follows:

- i. A more detailed focus on student C&IT provision is offered;
- ii. The “width” of the matrix is reduced to offer two tracks parallel to that focusing on student C&IT literacy: learning activities and support facilities
- iii. The first, *Localised*, stage is replaced by two stages, *Individualised* and *Localised*, since it seemed that a stage in which developments are driven purely by individual enthusiasts is different from one in which individual initiatives have been adopted into the organisational structure, even at a local (e.g. departmental) level.

The model is shown as a graph in Figure 1 below

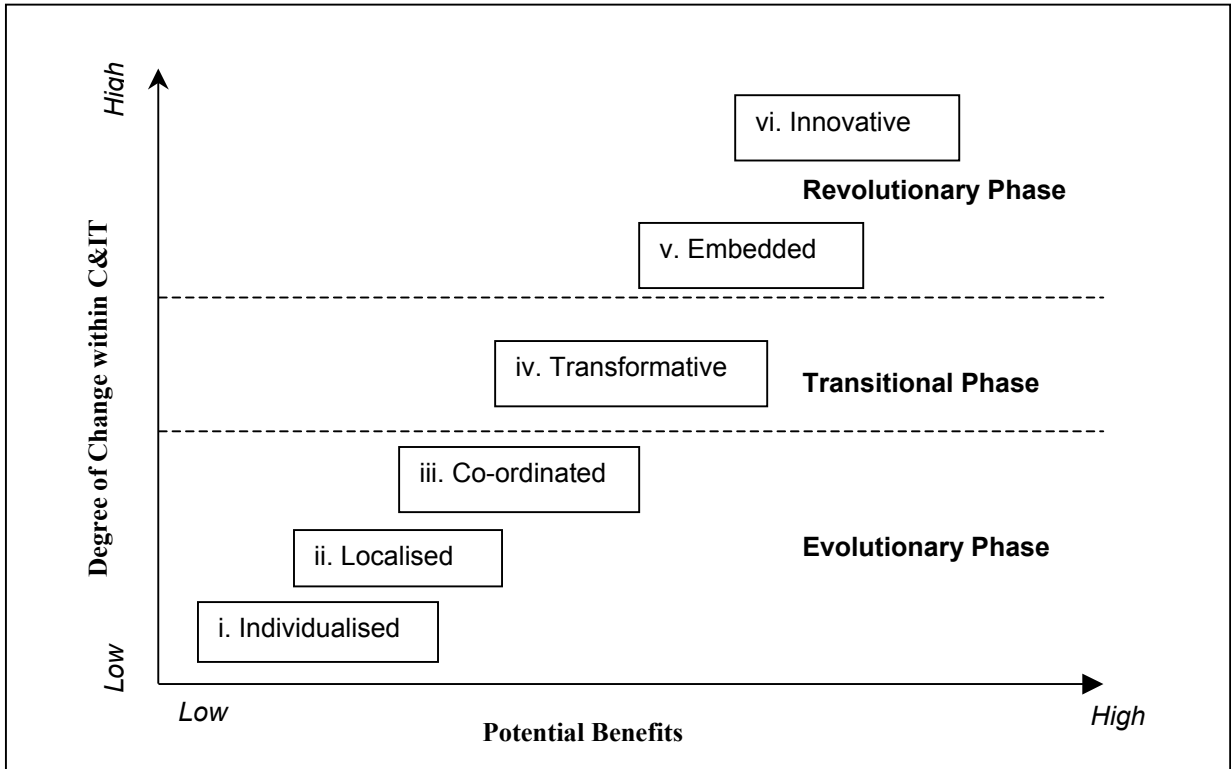


Figure 1. MIT Transformational model, as amended.

The stages themselves are described in Figure 2 below.

Phases ↑	Stages ↑	Area →	Learning Activities	Student C&IT Literacy	Support Facilities
Revolutionary Phase	vi. Innovative		Assumption of IT literacy helps drive rethinking of learning processes. Courses designed in context of IT-rich learning environment. Range of delivery & interaction modes assumed.	C&IT literacy programmes or requirements include more critical/reflective elements. C&IT and Information literacy provision merges. Assumption of C&IT literacy helps drive rethinking of learning processes and support facilities.	Assumption of C&IT literacy helps drive rethinking of support facilities. Merger of Library and C&IT services, restructuring of combined service. Implementation of VLE/MLE for whole institution.
	v. Embedded		Adoption of C&IT into learning activities of virtually all courses. C&IT enthusiasts attain senior academic posts.	Adoption of C&IT literacy into all courses or application to all students. C&IT literacy may be built into regulations. C&IT literacy taken for granted in course development or delivery.	Provision of access to digital facilities to all students and staff. Consideration of VLE/MLE for whole institution.
Transitional Phase	iv. Transforming		Adoption of C&IT into learning activities of most courses. Use of C&IT by students puts pressure on non-C&IT using staff. C&IT enthusiasts gain respect and promotion. Pilot courses based on rich C&IT involvement approved.	Adoption of C&IT literacy element into majority of courses or application to majority of students. C&IT literacy helps stimulate demand for facilities and for C&IT-based learning activities.	Provision of access to digital facilities to majority of students and staff. Demand for facilities increases sharply, usually outstrips supply.
Evolutionary Phase	iii. Co-ordinated		Isolated activities supported or encouraged. Central programmes set up to foster experiment or fund departmental initiatives.	Isolated activities supported or encouraged; co-ordinating structures developed, with standardised provision or expectation.	Standardisation of facilities by support services. Support limited to approved smaller range of hardware & software.
	ii. Localised		C&IT used by some departments to enhance existing activities. Led by enthusiasts. Funded by departmental resource or from grants sources outwith the institution.	C&IT literacy delivery taken up by some departments, locally resourced.	Provision of limited facilities led by individual "experts" in service areas or on demand of particular departments. Dramatic increase in variety of hardware & software (e.g. several email systems)
	i. Individualised		C&IT used by individual staff enthusiasts to enhance existing activities, and by individual students to enhance performance.	C&IT literacy offered by individual staff or gained by students outwith the HEI as a personal goal.	Small-scale provision of facilities by enthusiasts or on demand of individual students; regarded as one-off or experimental.

Figure 2. 6-stage model for C&IT Literacy, learning activities and support facilities.

Detailed descriptions of the developmental stages for student C&IT literacy are:

Evolutionary Phase

At this stage C&IT activities support the learning/teaching process. During the Individualised stage they are developed purely by individuals; during the Localised stage individual initiatives are taken up by localised parts of the organisation, but remain fragmentary and unco-ordinated;

whilst during the Co-ordinated phase they are drawn into a more or less organised structure of activity at the level of large organisational segments, or of the whole organisation.

- i. *Individualised* stage: during this stage some individuals incorporate IT into their teaching and/or encourage students to make use of IT in learning. This might include activities such as: using *Powerpoint* to present information during a lecture (instead of using hand-written acetate sheets or the blackboard); getting students to use a computer-based simulation in Business Studies (instead of a paper-based simulation exercise); requiring students to prepare essays or lab reports using a word processor; using a CAL package to learn a particular topic. Some students will see the value of IT skills, and take their own steps to get IT literate, perhaps attending a class outwith the university, or getting informal peer tuition from an IT literate friend.
- ii. *Localised* stage: at a second stage, some activities might be adopted by a whole department. In order to support this type of activity, provision of IT literacy is addressed. Some enthusiasts will require students to acquire sufficient IT competence themselves. Others will teach just the skills required to use the particular facilities which the IT activity requires – this may only amount the operations required to run a particular piece of software. Others will offer more generic provision on the grounds that a more rounded IT experience will students more confident in their IT use. Such activity will be limited however, since it requires resourcing: a self-help booklet may be all that can be afforded, or a single computer lab session which inevitable calls for a limited experience. In the luckiest situations departmental resources will be addressed to IT skills training, or some external funding attracted. Service departments, such as the IT or Computing Service may also introduce teaching of IT skills, provide self-teach booklets or access to online tutorials for particular applications.
- iii. *Co-ordinated* stage: during this stage isolated activities are supported or encouraged centrally, and then co-ordinating structures are developed to achieve dispersal of IT-related practice across the institution. In terms of student IT literacy, a number of options are possible: adoption of a successful practice in one area for implementation throughout the whole institution, setting up of an IT literacy programme to cover the whole institution, issuing of guidelines which will ensure relative uniformity of practice throughout the institution, extension of an existing skills programme to include IT, joining of a consortium to share structures and materials with one or more other institution. These arrangements may be built into university regulations and procedures: achieving IT literacy may become a requirement without which graduation is not permitted.

Transitional Phase:

- iv. *Transforming* stage: by this point the new development is beginning to have an impact on core practice. Computer-based activities are built in to the curriculum as a normal part rather than as a bolt-on extra. Syllabuses are adjusted so that the assumption of IT literacy by a certain point can be taken into account: for instance an exercise which formerly had to wait until the second year, so that a member of staff in the department could find time to teach students how to use spreadsheets, can now be brought forward into the second semester of the first year, as the students will have had their IT induction course in the first semester. Expectations of what students can do are raised, once the assumption of IT literacy is made. IT literacy requirements now apply to most courses or students, and the pressure of an increasingly IT-literate student body will be felt by non-IT-using staff.

Revolutionary Phase:

- v. *Embedded* stage: IT literacy development will now have been adopted into virtually all courses, or be a requirement for all students; and a requirement of IT literacy may be built

into university strategy documents, and perhaps into university regulations; the assumption of IT literacy by a certain stage (e.g. the end of the first year or of the first semester) or of the building up of generic IT skills in a graduated way (e.g. by achieving a series of defined thresholds which subject departments must build into their teaching by certain points in the degree course, possibly by associating threshold with particular levels) is now embedded into normal practice, and has had effects upon the way learning and teaching is carried out: some courses have moved onto an IT-supported resource-based learning model;

- vi. *Innovative* stage: by this phase the assumption of IT literacy is helping to drive the reconceptualisation of the learning process. Discussion fora have become normal adjuncts to course activity; the internet is used to mount class notices, lecture texts, reading lists, links to useful sites, as well as being a source of information accessed through intelligent use of search engines and bibliographic databases. Email is the normal medium of communication outwith the face-to-face situation. IT and library services have merged so that library services are based on delivery of digitised material: in this way rare volumes in the university's collection be freely used by students without fear of damage to the originals. Books online can be searched and annotated in a student's own version. Agencies such as the Information Service and Teaching and Learning Service will have identified a virtual learning environment (VLE) or managed learning environment (MLE) package which it will support centrally and which is used widely across the institution. The VLE allows students structured and focused access to digital facilities and tools, whilst the MLE additionally links such activity to the university's core information management activity. The types of activities which are normal now include IT-driven tasks: reviews of internet sources; projects jointly completed by email with students in partner universities throughout the world; studies of complex simulations, and so on. Expectations of students' IT literacy continue to rise, so that the thresholds required are regularly adjusted to include new IT tools. But also by this stage staff and students have developed an attitude of reflective criticality towards IT, regarding it as they would any other learning tool.

The value of this approach is that it draws attention to the relationship between evolution of student IT literacy provision and the development of the whole learning environment. It is difficult to imagine the innovative phase being achieved solely through the impact of an IT literacy programme. And yet we know from experience that gracefully co-ordinated movement forward across a wide front just does not normally happen; the reality of innovation is piecemeal, even fragmentary, and friction, fear, suspicion and resistance are endemic, somewhere in the organisation. Strategic statements may be on the one hand wishful thinking or public relations hype without roots in real activity, or on the other hand mere listings of ongoing projects without any real developmental or future-oriented perspective. In both these cases the realities of change are masked, in the one case by the description of the future, in the other by the description of the present.

Can the IT literacy situation provide then a window through which we can view other developments in relation to it, as from a window of a train we can view others on parallel lines heading for the same station? What other developments would we view through the IT literacy window? There are essentially two: learning activities and support facilities.

Learning activities are the activities through which the learning process is constructed. These consist partly of the events which are brought together in a more or less planned way by staff to make up a "course" or "module": lectures, tutorials, other interaction with staff, preparation of essays, lab reports, and other written assignments, presentations, contributions to discussion groups, practical work, exams and other assessment events, field trips, and so on. Learning activities also consist of the activities additionally performed by students in order to comply

with the expectations of staff, or to succeed in the course, or to attain other learning goals which students additionally attach to the course activity: making notes, reading, seeking information, writing up field trips and experiments, discussing things with other students, reviewing what they have achieved, revising for examinations, etc. It is clear that learning activities may be to a greater or lesser degree IT-rich.

Support facilities consist of those facilities that enable students to carry out learning activities. These would include:

- i. facilities to locate information: either books, or other sources including online sources; such facilities would also include space and furniture, IT equipment and software, and advisory or support staff.
- ii. facilities to examine, organise and analyse information: this might include special equipment or particular software, although it could be fairly generic things like a calculator, a spreadsheet program or space and furniture (a room with a large table, seats and a white board where a group of students can work through a problem);
- iii. facilities to present findings and the results of reflections upon information: *Powerpoint* software, OHP, whiteboard, photocopier, access to a discussion list;
- iv. facilities to communicate with others involved in the learning process, such as staff and other students: places to meet (common room, café, group study rooms), ways of communicating (internal mail, email, telephone system, appointments or regular meetings with staff).

We should remember that support facilities do not only include those provided at the university, but those which may be available to the student either at his/her residence or in the community.

Can we then put these areas of development alongside student IT literacy, to form a “suitable fit” path through the stages we already established with regard to IT literacy. We would expect in the “perfect” situation that these three areas would move in parallel. But in practice, even if this appears to be the case, it is only an illusion, since change takes place in an incremental, fragmentary and often tension-filled manner. The illusion of smooth change is a result of either the rewriting of history or the coarseness of lens through which change events are viewed. Change viewed *ex post facto* becomes unproblematically co-ordinated, as retrospective accounts seek to place individual actions either within a grand plan (which, even if it did exist, did not usually equate with what actually happened) or within an inevitable process of historical development (either a technological determinism which sees IT developments as forcing changes in education, or a rationalistic determinism which assumes that educators and students cannot but realise that using IT is the only way to continually enhance education as we know it). Contemporaneous accounts of change may also be filtered through the public relations and publicity apparatus of universities needful of presenting themselves effectively on the market place, for students, for staff or for research grants. And we should not forget that accounts of change are also products of individuals immersed in the ongoing struggles which characterise the political life of the organisation, in which disaster as much as success needs to be presented as success.

It may be that indication at the level of the three elements identified above is sufficient to capture the tense reality of change. Alternatively it may be necessary to identify particular aspects of each element as key steps. For instance, we have suggested the merger of Library and IT services as a feature of the innovative stage of support facilities development; would a failure to take this step, with other key steps achieved, indicate a source of tension?

Using the Tool

Using the tool is a matter of evaluating your institution's progress along the three categories. If you can identify where the institution is on each scale, it is then a question of asking how the positions reached on each of the scales could affect the institution's ability to achieve its goals affectively with respect to the other two scales. How would change in one scale then affect the others? It may be that in carrying out this exercise, the definitions of the points along the scales may be rewritten in a way that is more appropriate for the character and needs of the institution. This activity may then feed into the policy-making process at the institution, and itself contribute to both suggesting the direction of change and of making change happen.

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