Methods of Teaching Information Technology Based on a Conceptual Approach

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Annotation:
The XXI century is the age of information technology. This article discusses the methodology of teaching information technology based on a conceptual approach.

Teachers remain central to the learning process
A shift in the role of a teacher utilizing ICTs to that of a facilitator does not obviate the need for teachers to serve as leaders in the classroom; traditional teacher leadership skills and practices are still important (especially those related to lesson planning, preparation, and follow-up).

Lesson planning is crucial when using ICTs
Teacher lesson planning is vital when using ICTs; where little planning has occurred, research shows that student work is often unfocused and can result in lower attainment.

Pedagogy
Introducing technology alone will not change the teaching and learning process
The existence of ICTs does not transform teacher practices in and of itself. However, ICTs can enable teachers to transform their teacher practices, given a set of enabling conditions. Teachers’ pedagogical practices and reasoning influence their uses of ICT, and the nature of teacher ICT use impacts student achievement.

ICTs seen as tools to help teachers create more 'learner-centric' learning environments
In OECD countries, research consensus holds that the most effective uses of ICT are those in which the teacher, aided by ICTs, can challenge pupils’ understanding and thinking, either through whole-class discussions and individual/small group work using ICTs. ICTs are seen as important tools to enable and support the move from traditional 'teacher-centric' teaching styles to more 'learner-centric' methods.

ICTs can be used to support change and to support/extend existing teaching practices
Pedagogical practices of teachers using ICT can range from only small enhancements of teaching practices using what are essentially traditional methods, to more fundamental changes in their approach to teaching. ICTs can be used to reinforce existing pedagogical practices as well as to change the way teachers and students interact.
Using ICTs as tools for information presentation is of mixed effectiveness
The use of ICTs as presentation tools (through overhead and LCD projectors, television, electronic whiteboards, guided "web-tours", where students simultaneously view the same resources on computer screens) is seen to be of mixed effectiveness. While it may promote class understanding of and discussion about difficult concepts (especially through the display of simulations), such uses of ICTs can re-enforce traditional pedagogical practices and divert focus from the content of what is being discussed or displayed to the tool being utilized.

Teacher technical abilities and knowledge of ICTs
Preparing teachers to benefit from ICT use is about more than just technical skills
Teacher technical mastery of ICT skills is a not a sufficient precondition for successful integration of ICTs in teaching.

'One-off training' is not sufficient
Teachers require extensive, on-going exposure to ICTs to be able to evaluate and select the most appropriate resources. However, the development of appropriate pedagogical practices is seen as more important that technical mastery of ICTs.

Few teachers have broad 'expertise' in using ICTs in their teaching
Even in the most advanced school in OECD countries, very few teachers typically have a comprehensive knowledge of the wide range of ICT tools and resources.

In OECD countries, the use of ICTs to promote 'computer literacy' is seen as less important than in using ICTs as teaching and learning tools
In OECD experience, the use of technology in everyday teaching and learning activities appears to be more important than specific instruction in "computer classes". While the development of technology skills is seen to have a role in the teaching and learning process, it is more important as an enabler of other teaching and learning practices, and not too important in and of itself. Schools that report the highest levels of student ICT-related skills and experience are often not those with heavy computer course requirements, but rather ones that made use of ICTs on a routine basis throughout the teacher professional development and the teaching and learning process.

Students are more sophisticated in their use of technology than teachers
In OECD countries, there appears to be a great disconnect between student knowledge and usage of ICTs the knowledge and abilities of teachers to use ICTs. This suggests that teacher inexperience and skill deficiencies may often be an important factor inhibiting the effectiveness of ICT use in education by students.

Teacher usage of ICTs
Teachers most commonly use ICTs for administrative tasks
Teachers most often use ICTs for 'routine tasks' (record keeping, lesson plan development, information presentation, basic information searches on the Internet).

More knowledgeable teachers rely less on "computer-assisted instruction"
Teachers more knowledgeable in ICTs use utilize computer-assisted instruction less than other teachers who use ICTs, but utilize ICTs more overall.

How teachers use ICTs is dependent on their general teaching styles
Types of usage of ICTs correlate with teacher pedagogical philosophies. Teachers who use ICTs the most -- and the most effectively -- are less likely to use traditional 'transmission-method' pedagogies. Teachers who use more types of software tend to practice more "constructivist" pedagogies.
Teaching with ICTs takes more time
Introducing and using ICTs to support teaching and learning is time-consuming for teachers, both as they attempt to shift pedagogical practices and strategies and when such strategies are used regularly. Simply put: Teaching with ICTs takes more time (estimates vary on how much extra time is required to cover the same material; 10% is a common estimate).

Teacher confidence and motivation
Few teachers are confident users of ICTs
Few teachers are confident in using a wide range of ICT resources, and limited confidence affects the way the lesson is conducted.

Fear prevents many teachers from using ICTs
In OECD countries, many teachers still fear using ICTs, and thus are reluctant to use them in their teaching.

ICTs motivate (some) teachers, at least at the start
At least initially, exposure to ICTs can be an important motivation tool to promote and enable teacher professional development.

Incentives must be developed to promote effective teacher participation in continuing professional development
Teachers require additional motivation and incentives to participate actively in professional development activities. A variety of incentives can be used, including certification, professional advancement, pay increases, paid time off to participate in professional development, formal and informal recognition at the school and community levels and among peers, reduced isolation, and enhanced productivity.

Access to ICTs is the most significant factor in whether teachers use them
The most significant factor for continuing the development of teachers’ ICT-related skills is for them to have regular access to functioning and relevant ICT equipment.

Subject knowledge
Teachers' subject knowledge influences how ICTs are used
The way ICT is used in lessons is influenced by teacher knowledge about their subjects, and how ICT resources can be utilized and related to it.

Teacher content mastery and understanding of student comprehension make ICT use more effective
The evidence shows that when teachers use their knowledge of both the subject and the way pupils understood the subject, their use of ICT has a more direct effect on student achievement.

Exposure to new/additional information via ICTs is not enough
The effect on attainment is greatest when pupils are challenged to think and to question their own understanding, rather than on exposure to new and additional information.

ICTs can aid teacher self-learning in subject matter
By providing access to updated and additional learning resources, ICTs can enable teacher self-learning in his/her subject area.

Teacher professional development
On-going teacher training and support is critical to the successful utilization of ICTs in education
Teacher training and professional development is seen as the key driver for the successful usage of ICTs in education.

Teacher professional development is a process, not an event
Traditional one-time teacher training workshops have not been seen as effective in helping teachers to feel comfortable using ICTs, let alone in integrating it successfully into their teaching. Discrete, ‘one-off’ training events are seen as less effective than on-going professional development activities.
Introducing ICTs expands the needs for on-going professional development of teachers

Effective ICT use in education increases teachers’ training and professional development needs. However, ICTs can be important tools to help meet such increased needs, by helping to provide access to more and better educational content, aid in routine administrative tasks, provide models and simulations of effective teaching practices, and enable learner support networks, both in face to face and distance learning environments, and in real time or asynchronously.

Successful teacher professional development models can be divided into three phases

Successful on-going professional development models can be divided into three phases: pre-service, focusing on initial preparation on pedagogy, subject mastery, management skills and use of various teaching tools (including ICTs); in-service, including structured face-to-face and distance learning opportunities building upon pre-service training and directly relevant to teacher needs; and on-going formal and informal pedagogical and technical support, enabled by ICTs, for teachers, targeting daily needs and challenges.

Effective teacher professional development should model effective teaching practices

Effective teacher professional development should approximate the classroom environment as much as possible. "Hands-on" instruction on ICT use is necessary where ICT is deemed to be a vital component of the teaching and learning process. In addition, professional development activities should model effective practices and behaviors and encourage and support collaboration between teachers. On-going professional development at the school level, using available ICT facilities, is seen as a key driver for success, especially when focused on the resources and skills directly relevant to teachers’ everyday needs and practices.

Training in assessment methods is important

Professional development should include methods for evaluating and modifying pedagogical practices and expose teachers to a variety of assessment methods.

Effective professional development requires substantial planning

A needs assessment should precede the creation of and participation in teacher professional development activities, regular monitoring and evaluation should occur of these activities, and feedback loops should be established, if professional development is to be effective and targeted to the needs of teachers.

On-going, regular support for teachers is crucial

On-going and regular support is essential to support teacher professional development and can be facilitated through the use of ICTs (in the form of websites, discussion groups, e-mail communities, radio or television broadcasts).

Enabling factors

A variety of changes must be implemented to optimize teacher use of ICTs

Shifting pedagogies, redesigning the curriculum and assessment, and providing more autonomy to the schools help to optimize the use of ICT. With sufficient enabling factors in place, teachers can utilize ICTs in as 'constructivist' a manner as their pedagogical philosophies would permit.

Functioning technical infrastructure is (obviously) crucial

Teachers must have adequate access to functioning computers, and be provided with sufficient technical support if they are to use ICTs effectively.

Introducing ICTs takes time

Adequate time must be allowed for teachers to develop new skills, explore their integration into their existing teaching practices and curriculum, and undertake necessary additional lesson planning if ICTs are to be used effectively.
Support from school administration and the community can be important
Support of school administrators and, in some cases, the surrounding community, for teacher use of ICTs is seen as critical if ICTs are to be used at all, let alone effectively. For this reason, targeted outreach to both groups is often necessary if investments in ICTs to support education are to be optimized.

Communities of practice can be important tools to support teacher professional development
The existence of formal and informal communities of practice and peer networks can be important tools to support ICT in education initiatives and activities. Such support mechanisms can be facilitated through the use of ICTs.

Lessons learned from introducing ICTs in education need to be shared
As the introduction of ICTs to aid education is often part of a larger change or reform process, it is vital that successful uses of ICTs are promoted and disseminated.

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