mLearning: Doing the unthinkable and reaching the unreachable

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Introduction

The general environment and target market for mLearning would probably look like this:

An environment with sufficient fixed and wireless telecom infrastructure for eLearning and mLearning in order to support learners that

- *are highly ICT literate,*
- *use the latest mobile and handheld devices and*
- *are either in full-time employment and/or*
- *prefer studying at their own pace, place and time*.

Introduction

eLearning and mLearning in rural Africa?

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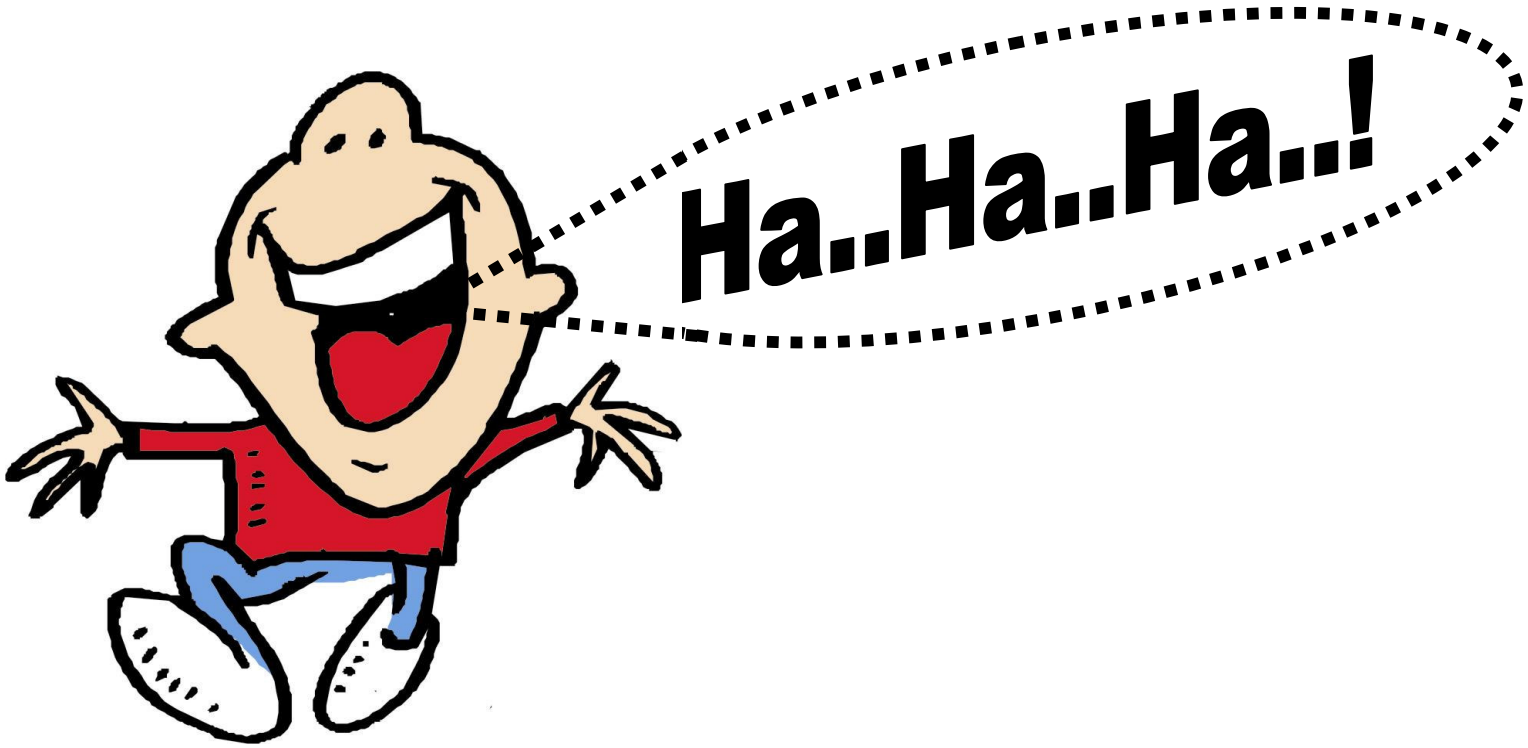

Introduction

eLearning and mLearning in rural Africa?

You want to do what? You want to use high tech to support learners in rural Africa?

You must be joking!

- They are not ICT literate
- They don't have access to the Internet – not even to basic e-mail
- The telecom infrastructure in rural areas is almost non-existent
- The nearest post office is 60-100km away.

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No, I am not joking! Let me show you…

Examples - Part 1

The use of bulk SMS for administrative support

SMS for admin support

- For example: The University of Pretoria started using mobile phone support during 2002 in three paper-based distance education programmes because more than 99% of the “rural students” had mobile phones (still the case – currently 98%).
- The profile of these students:
  - Majority live in rural areas
  - 100% are full-time employees (teaching)
  - 77.4% are English second language speakers
  - 83.8% are between the age of 31 – 50
  - 66.4% are women
  - **0.4% have access to e-mail**
  - **99.4% have a mobile phone**

Brown (2004)

M-learning in rural Africa

M-learning in rural Africa

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M-learning in rural Africa

SMS for admin support

What does the mobile phone support entail?

- Bulk SMS (pre-planned) to all students or students of a specific programme for general administrative support as well as motivational support
- Customised group SMS to specific groups of students extracted from the data-base for specific administrative support
- Customised small group or individual SMS to specific students extracted from the data-base on an individual basis for specific admin support
- *Project team: Johan Hendrikz, Anita van der Bank, Jeanne-Marie Viljoen, Tom Brown*

SMS examples

Dear Student. Your study material was posted to you today. Enquire in time, quote your tracking number: PE123456789ZA, at your post office. UP

Purpose:

- Students do not visit their rural post offices very often and this leads to many returned packages
- If students know about a dispatch, they make an effort to fetch packages timely

Success:

- Significant drop in returned packages and accompanying costs

SMS examples

If you have not submitted Assignment 2, due to late dispatch of study material, you may submit before 19 Sept. Do this urgently to help you pass your exam. UP

Purpose:

- Extension of assignment submission date due to a late dispatch of study material
- Encouragement to complete the assignment

Success:

- Normal assignment submission statistics

SMS examples

ACE Edu Management contact session block 1 from 7-9 July for modules EDM 401 EDO 401 ONLY, changed to Town Hall Main Street KOKSTAD. New letter posted. UP

Purpose:

- Urgent notification of a venue change for a specific contact session

Success:

- All the students arrived at the correct venue (as far as we know)

SMS examples

Dear Student. We have not received your registration for the Oct exam. Please fax registration form or letter not later than Thursday 31 July. UP

Purpose:

- Encouragement for exam registration
- Notification of the deadline for exam registration

Success:

- Increase in the number of exam registrations compared to previous exams

SMS examples

April exam proved that students attending contact sessions are more successful. Please attend July contact session. Register per fax before or on Friday 6 July. UP

Purpose:

- Encouragement for contact session registration
- Notification of the deadline for contact session registration

Success:

- 58% of the learners registered before the closing date vs the normal rate of below 40%.

SMS for admin support

From a logistical and financial point of view, the successes are also significant:

- Using print and the postal service to distribute the necessary information to students would have been more than *20 times* the cost of the bulk SMSs.
- While the SMSs provide immediate and JIT (just-in-time) information, the posted information would have taken between 3 to 18 days (depending on the remoteness of the student) to reach all the students.

The use of SMS for academic learning support

SMS for academic support

- The University of Pretoria started using SMS for academic learning support in November 2004 in one module of one of the three paper-based distance education programmes in the Faculty of Education, namely:
  * ACE: Special Needs Education:

    Module LPO402
- The pilot project comprises four categories of ***asynchronous* academic interventions**.
- *Project team: Jeanne-Marie Viljoen, Carl du Preez, Johan Hendrikz, Anita van der Bank, Tom Brown*

SMS for academic support

The four categories are:

- **Academic instructional message** (regular bulk type SMS messages)
- **IVR (interactive voice response) system for FAQs** (students phone in to a “FAQ number” and receive answers from the programmed system)
- **SMS quizzes (**MCQ’s are send to students and a simple answer choice is replied via SMS. Answers and feedback are provided on each quiz)
- **SMS question-answer system** (students ask questions via SMS regarding a given pre-selected topic and then they are answered automatically by the system via a comprehensive programmed matching system [text database])

Category 1 example: Instruction

LPO 402 student: study section on Assets p43-44 in Tutorial Letters 1 booklet before answering 1.4 of Assign 1. This is also important for your Project & Assign 2. UP

Purpose:

- Study tip for a difficult assignment question that normally gets answered incorrectly by students
- Preparation for contact sessions
- Hint for the project and follow-up assignment

Envisaged outcome/success:

- Increase in the quality of assignment answers
- Increase in the quality of contact session interaction

Category 2 example: IVR

LPO 402 student: phone 0825557777 to hear more about the most import concept in this module, the asset-based approach. UP

Voice message when reaching 0825557777:

Hello LPO 402 student. We will now discuss some frequently asked questions on the asset-based approach that will enhance your understanding of this important concept. Press 1 to hear what the asset-based approach is. Press 2 to hear what makes it so unique. Press 3 to hear why you should use it.

Category 3 example: Quizzes

First question: *Asset-based initiatives* are clarified on
a) p14 of learning guide
b) p14 of *Assets* textbook
c) p5 of tutorial letter 1
Reply by pressing a, b, or c & send. UP

Correct! The asset-based approach is eco-systemic. Eco-systemic approaches emphasize:
a) interrelatedness
b) individuality
c) neither
Press and send answer

Category 3 example: Quizzes

Correct! The asset-based approach is eco-systemic. Eco-systemic approaches emphasize:
a) interrelatedness
b) individuality
c) neither
Press and send answer

A needs-based approach emphasizes individuality and a asset-based approach emphasizes interrelatedness.
Press C & send

Category 3 example: Quizzes

Correct! You are on your way to reaching the 2nd and 3rd outcomes of this unit. Now read p 15-18 in learning guide. Good luck! Bye.

Purpose:

- Review important content
- Tutoring the reach of desired learning outcomes
- Remedial support on identified learning shortcomings

Envisaged outcome/success:

- Improve the quality of assignment answers and the achievement of the desired learning outcomes
- Other successes is not yet determined - needs further research

Category 4 example: SMS Q&A

Dear student: See section C no 2 page 20 in Assignment Workbook. For any assistance SMS your questions about these guidelines for educators via reply SMS.

Purpose:

- Provide students the opportunity to clarify issues and ask questions without the high cost of a lengthy telephone call
- Provide asynchronous learning support
- Lessen the impact on the call centre or the faculty's telephone tutoring

Envisaged outcome/success:

- Enhance achieving the desired learning outcomes
- Other not yet determined - needs further research

Current activities in Africa

There are two types of mobile learning environments in Africa:

- In rural areas where little or no telecom infrastructure exists and eLearning environments are almost non-existent.
- In cities and on campuses where the telecom infrastructure for eLearning and mLearning is in place.

mLearning activities in Africa: In rural areas

Current activities in Africa

The use of mobile phones and SMS:

Administrative learning support:

- Bulk SMS for administrative information
- Access to examination and test marks via mobile service number or mPortal
- Access to financial statements and registration data via mobile service number or mPortal

Academic learning support:

- Communication and interaction (bulk SMS / IVR)
- Assessment (MCQs / Quizzes)
- Feedback on assignments and tasks
- Motivational and instructional messages

mLearning activities in Africa: In cities and on campuses

Current activities in Africa

Integration of mLearning with established eLearning environments:

- mPortals and SMS-gateways (SMS-portal integrated with the LMS/LCMS [e.g. WebCT])
- Mobile tutoring
- Mobile blogging
- mAssessment (eAssessment on mobile devices)
- Collaborative learning, discussion groups

Wireless environments:

- Pilot wireless classrooms
- Hot spots and wireless LANs on campus
- Wireless VoIP

Current activities in Africa

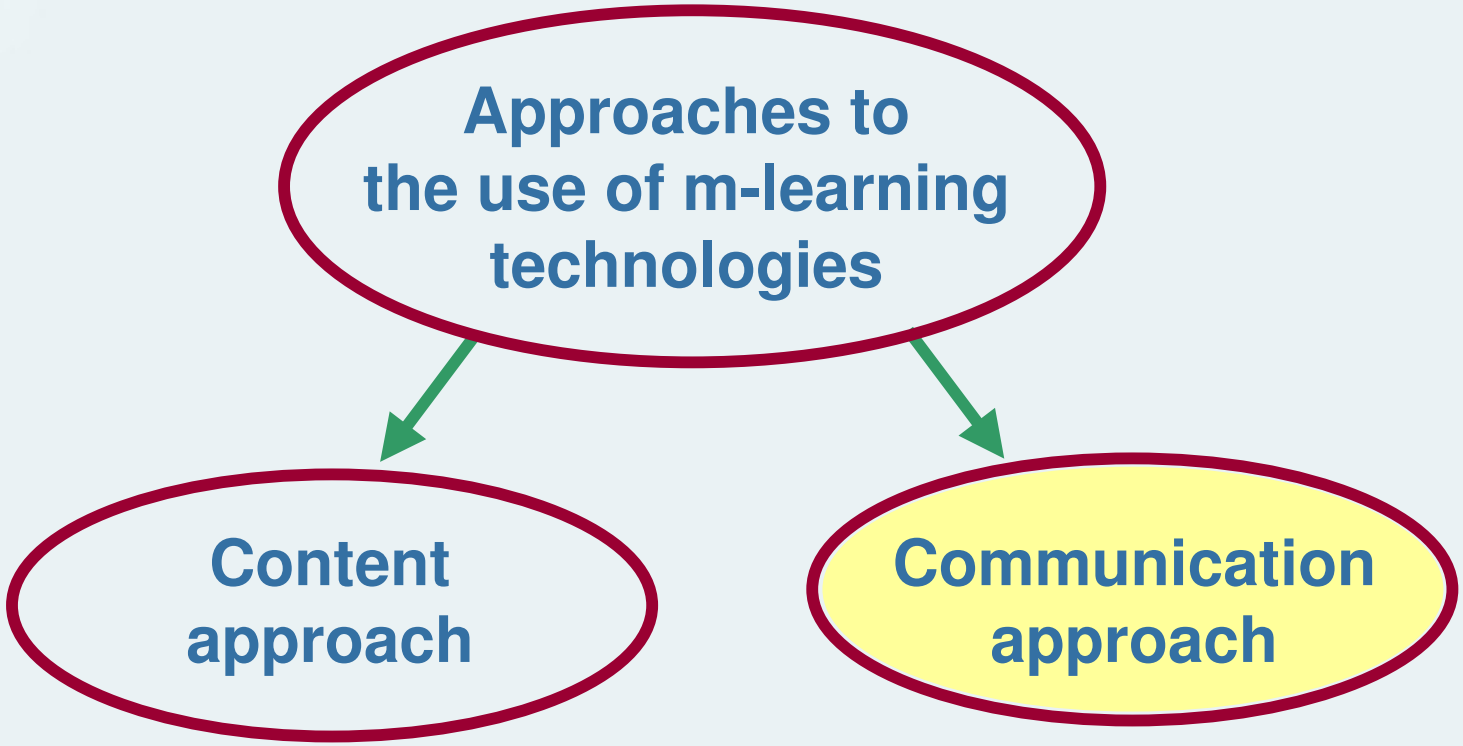
Using PDAs, Smartphones and Pocket PCs:

- Classroom “tools” (note taking, scheduling, etc)
- Beaming (via bluetooth) in classrooms (sharing notes, handing in assignments, etc)
- Assessment: assessing performance and providing automated results and feedback
- Coursework, scheduling and assignments in wireless environments
- JIT (just-in-time) and OTS (on-the-spot) information for field workers and field studies
- Human Language Technologies (HLT) [speech-to-text; voice recognition]
- Collaborative activities via multi-user applications

mLearning in rural Africa

- mLearning has already started to play a very important role in Africa.
- mLearning has brought eLearning to the rural communities of Africa – to learners that we never imagined as eLearning learners just a few years ago.
- mLearning is the gateway to eLearning for most learners in Africa as the rapidly growing wireless infrastructure increasingly fulfils their access needs.
- Africa is leapfrogging from an unwired, non-existent eLearning infrastructure to a wireless eLearning infrastructure. Numerous statistics in this regard are already significant proof of this process.

Approaches to m-learning

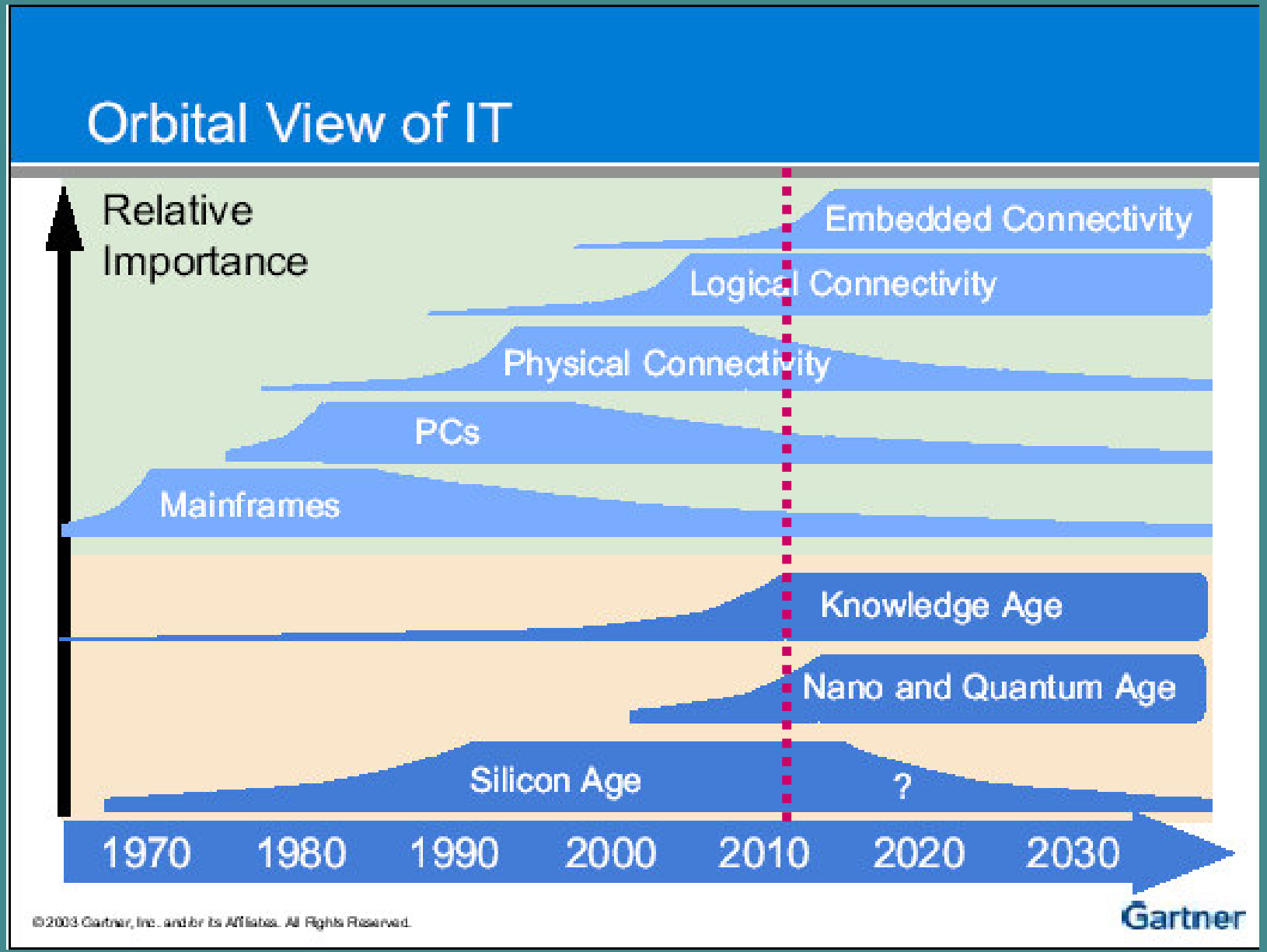


What will future learning paradigms look like?

Rise of the knowledge economy

- According to Gartner (2003) the new knowledge economy is merely in its emerging stages. The knowledge economy will only reach maturity from 2010 onwards.

Rise of the knowledge economy



Rise of the knowledge economy

- According to Gartner (2003) the new knowledge economy is merely in its emerging stages. The knowledge economy will only reach maturity from 2010 onwards.
- A doubling of the world's knowledge (Bontis, 2002):

  1930 → every 30 years

  1970 → every 7 years

  2010 → every 11 hours

Rise of the knowledge economy

- According to Gartner (2003) the new knowledge economy is merely in its emerging stages. The knowledge economy will only reach maturity from 2010 onwards.
- A doubling of the world's knowledge (Bontis, 2002):

  1930 → every 30 years

  1970 → every 7 years

  2010 → every 11 hours
- We already experience enormous challenges in coping with the current overflow of available information. It is difficult to imagine what it will be like when the knowledge economy is in its prime...

Future learning paradigms

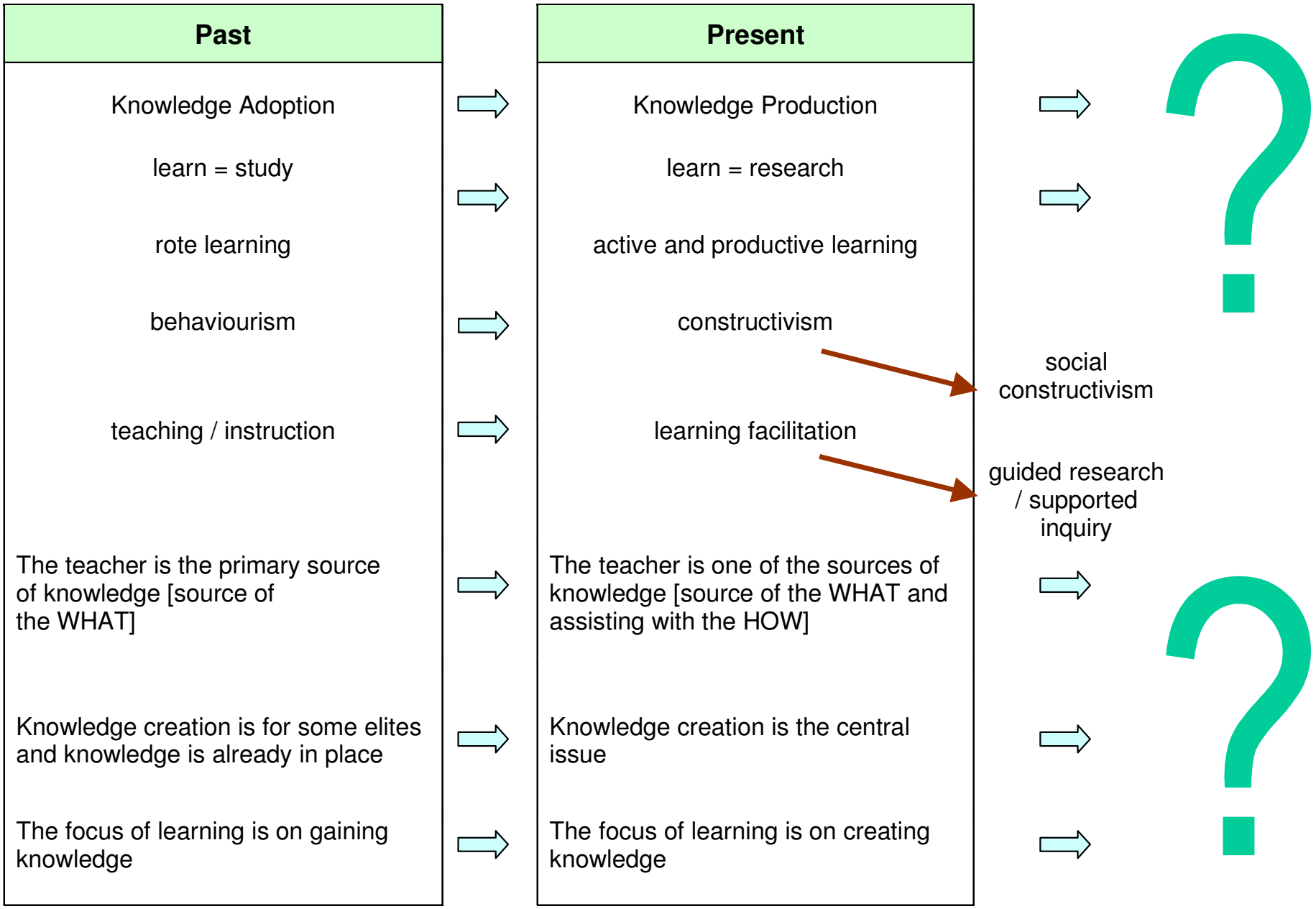
Paradigm shifts?

knowledge adoption	→	knowledge production	→	
information gathering	→	information generation	→	
constructivism	→	social constructivism	→	
teaching	→	learning facilitation	→	

Exploring and anticipating learning paradigms beyond constructivism

Past
Knowledge Adoption
learn = study
rote learning
behaviourism
teaching / instruction
The teacher is the primary source of knowledge [source of the WHAT]
Knowledge creation is for some elites and knowledge is already in place
The focus of learning is on gaining knowledge

Exploring and anticipating learning paradigms beyond constructivism



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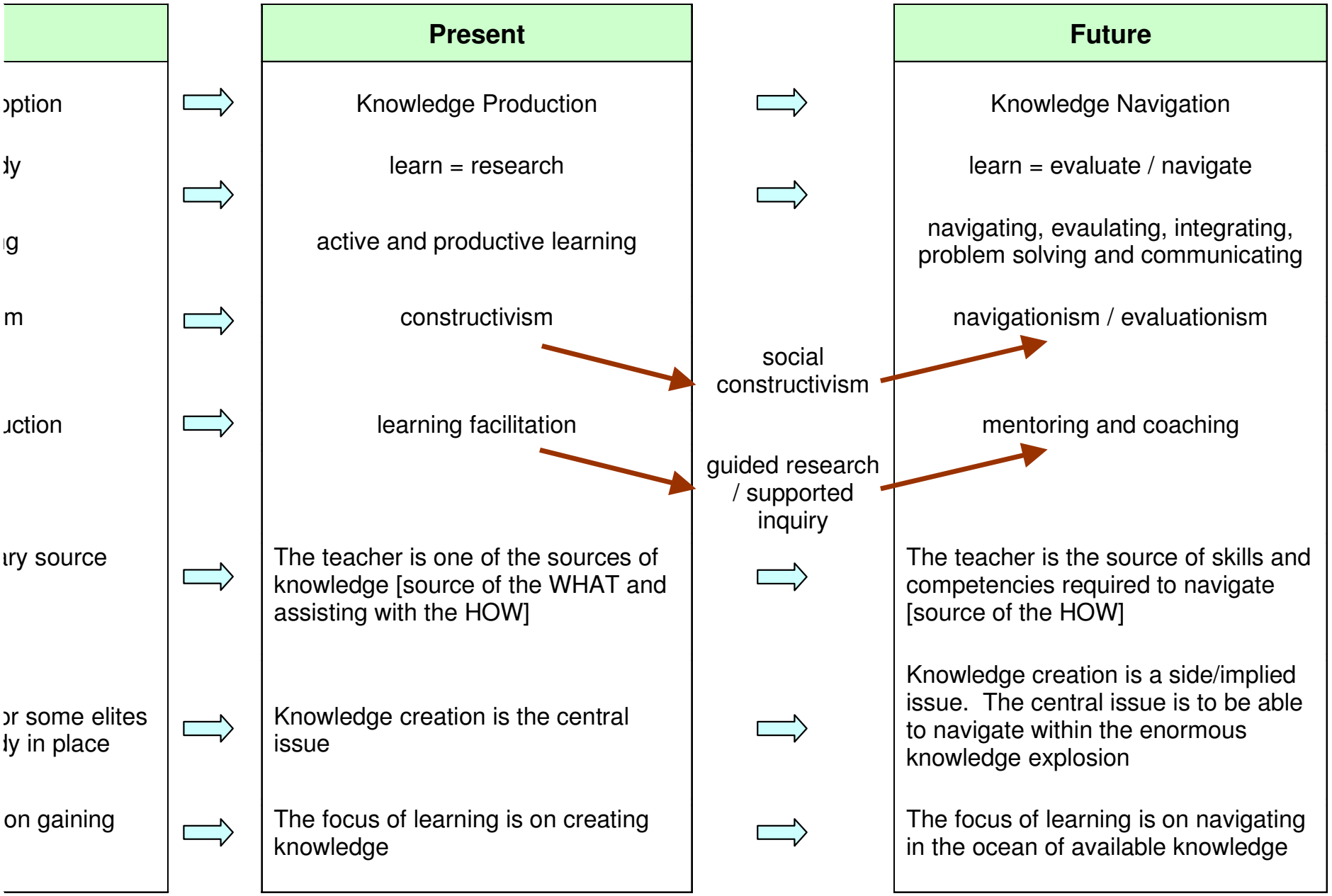

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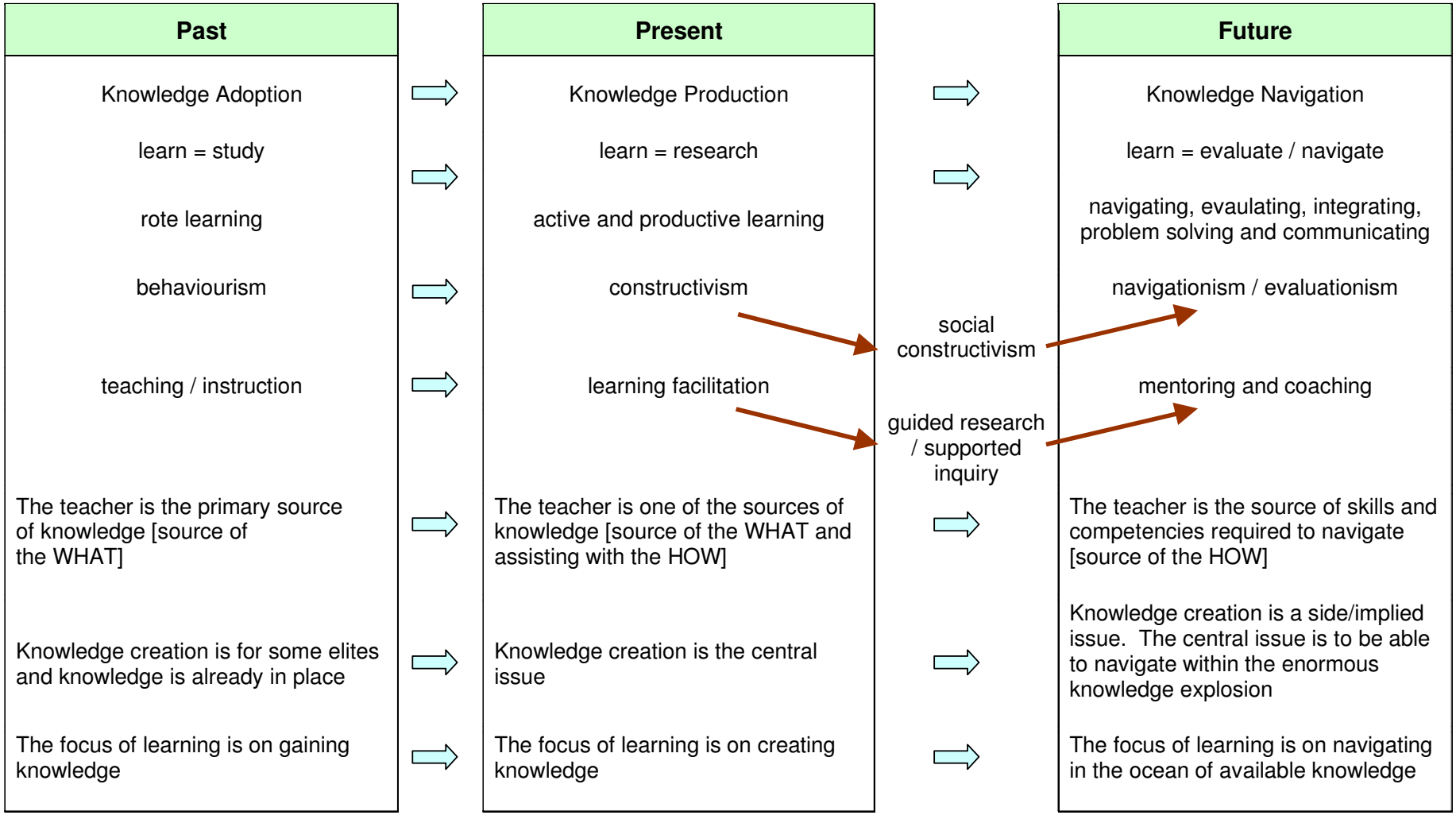

Paradigm shifts in education		
Past →	**Present** →	**Future**
• knowledge adoption		
• behaviourism • objectivism		
• instruction		
• information gathering		
• knowledge provision		

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• instruction	• learning facilitation	
• information gathering	• information generation	
• knowledge provision	• knowledge management	

Paradigm shifts in education		
Past →	**Present** →	**Future**
• knowledge adoption	• knowledge production	• knowledge navigation
• behaviourism • objectivism	• cognitivism • constructivism	• navigationism
• instruction	• learning facilitation	• coaching and mentoring
• information gathering	• information generation	• information navigation
• knowledge provision	• knowledge management	• knowledge facilitation

Role Changes in education			
Role Player	**Past**	**Present**	**Future**
	Knowledge Adoption Era →	**Knowledge Production Era** →	**Knowledge Navigation Era**
Learner	• knowledge adoption		
Teacher	• instruction		
Instructional Designer	• design of instruction • reduction of content		
Information Specialist	• information gathering and provision • knowledge provision		

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	Knowledge Adoption Era →	**Knowledge Production Era** →	**Knowledge Navigation Era**
Learner	• knowledge adoption	• knowledge production	
Teacher	• instruction	• learning facilitation	
Instructional Designer	• design of instruction • reduction of content	• design of learning facilitation and learning activities • re-/configuration of knowledge	
Information Specialist	• information gathering and provision • knowledge provision	• information configuration • knowledge management	

Role Changes in education			
Role Player	**Past**	**Present**	**Future**
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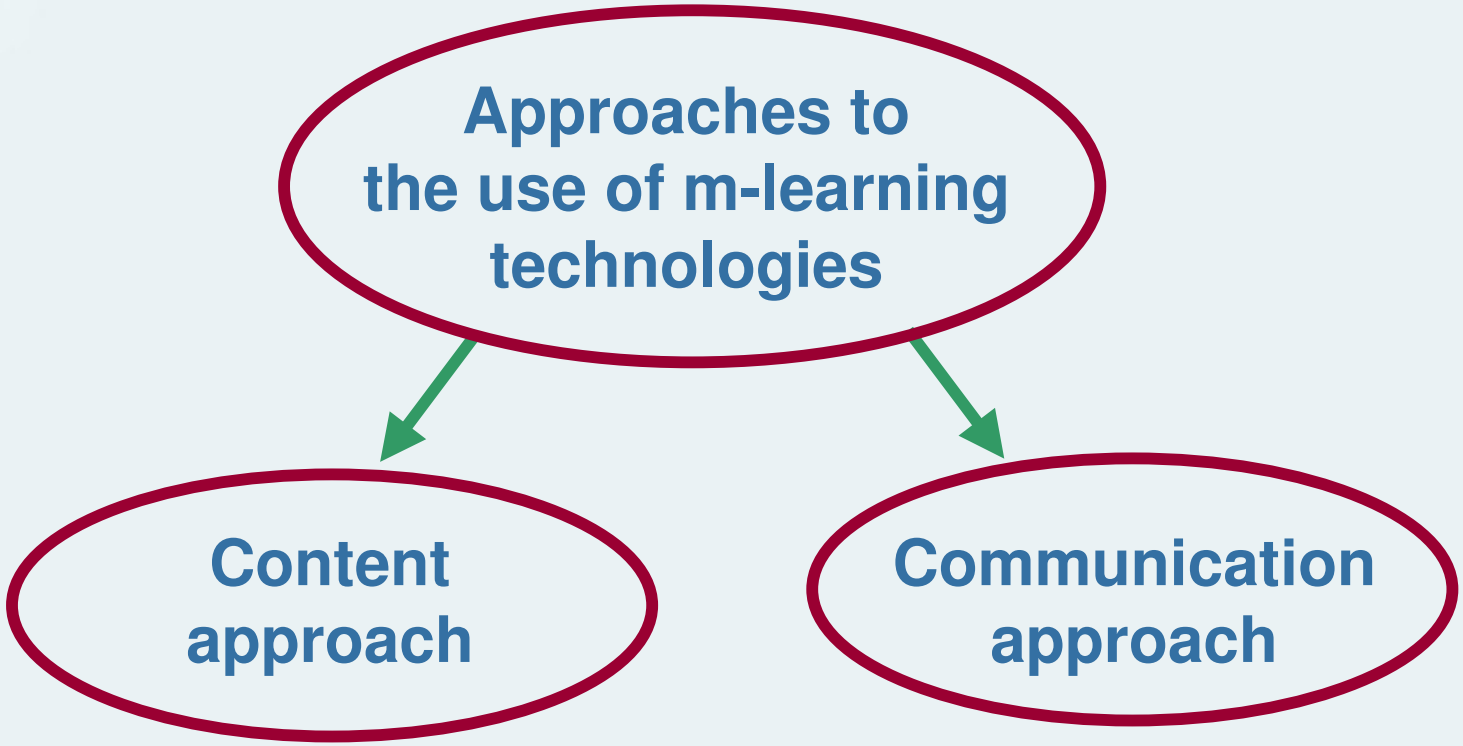
Learner	• knowledge adoption	• knowledge production	• knowledge navigation
Teacher	• instruction	• learning facilitation	• coaching and mentoring
Instructional Designer	• design of instruction • reduction of content	• design of learning facilitation and learning activities • re-/configuration of knowledge	• design of coaching and navigation activities • configuration of navigation tools
Information Specialist	• information gathering and provision • knowledge provision	• information configuration • knowledge management	• information facilitation • knowledge facilitation

Future learning paradigms

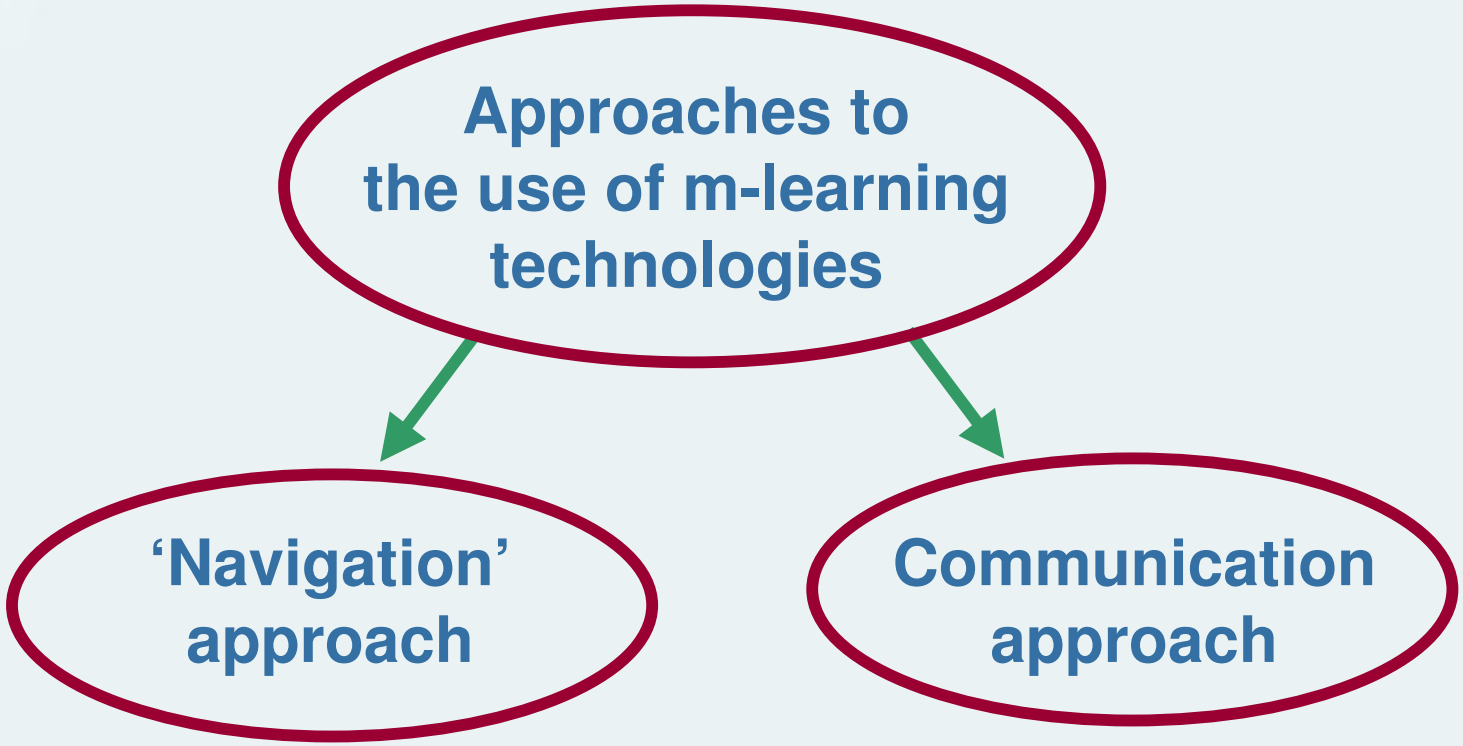
"*I believe that the real literacy of tomorrow will have more to do with being able to be your own private, personal reference librarian, one that knows how to navigate through the incredible, confusing, complex information spaces and feel comfortable and located in doing that. So navigation will be a new form of literacy if not the main form of literacy for the 21st century.*"

Brown (1999)

Current approaches to m-learning



Future approaches to m-learning



Our challenges

A navigationism paradigm

- We should move away from providing content per se to learners. We should focus on how to enable learners to find, identify, manipulate and evaluate existing knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others.
- Teachers and educators should become the source of HOW to navigate in the ocean of available information and knowledge. We should become coaches within the knowledge economy.

Brown (2005)

Challenges

Doing the unthinkable and reaching the unreachable…

Challenges

Doing the unthinkable and reaching the unreachable…

We should do the unthinkable and take the bold leap towards navigationism!

And we should continue to reach the unreachable through mobile learning!

Thank you

References

Bontis, N. (2002). The rising star of the Chief Knowledge Officer. *Ivey Business Journal,* March/April 2002: 20 – 25.

Brown, J.S. (1999). *Learning, Working & Playing in the Digital Age*. Paper delivered at the 1999 Conference on Higher Education of the American Association for Higher Education, March 1999, Washington, USA.

Brown, T.H. (2004) The role of m-learning in the future of e-learning in Africa? In *Distance Education and Technology: Issues and Practice*. Hong Kong.

Brown, T.H. (2005) Beyond constructivism: Exploring future learning paradigms. *Education Today*, issue 2 of 2005, Aries Publishing Company, Thames, New Zealand.

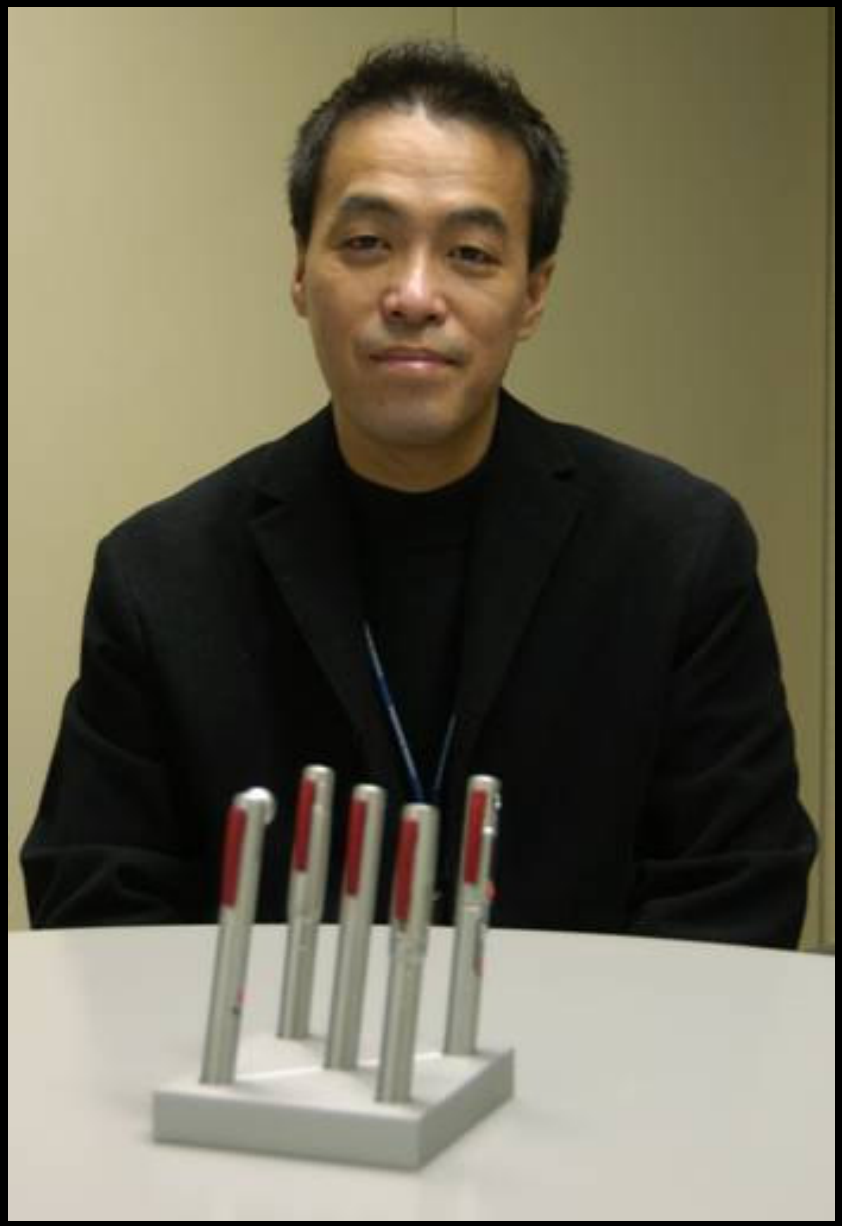
Gartner (2003). *Emerging Technology Scenario.* Paper delivered by Gartner analyst Nick Jones at the Gartner Symposium and ITxpo, 4 – 6 August 2003, Cape Town, South Africa.

What will m-learning environments look like in 2010?

2010 envisaged

- Wireless is “big” and mobile devices are “small”
- Ambient technology and intelligence
- Always-on wireless connections and ubiquitous computing
- Wearable mobile technologies
- Bio-informatics and bio-technology a commercial reality
- Personalised learning with dynamic adaptation of learning resources to individual preferences
- From courseware to performanceware
- mLMSs and mLCMSs
- Platforms supporting multi-user interaction on software, applications and devices

2010 envisaged



2010 envisaged

2010 envisaged

2010 envisaged

2010 envisaged

2010 envisaged

2010 envisaged

1GHz

20GB hard drive

256MB DDR RAM

800 x 480 W-VGA 5" display

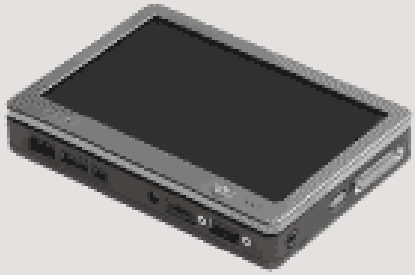
8mb video RAM

Bluetooth

802.11b wireless

4-pin FireWire (1394)

USB 1.1



The future role of mobile devices

In general:

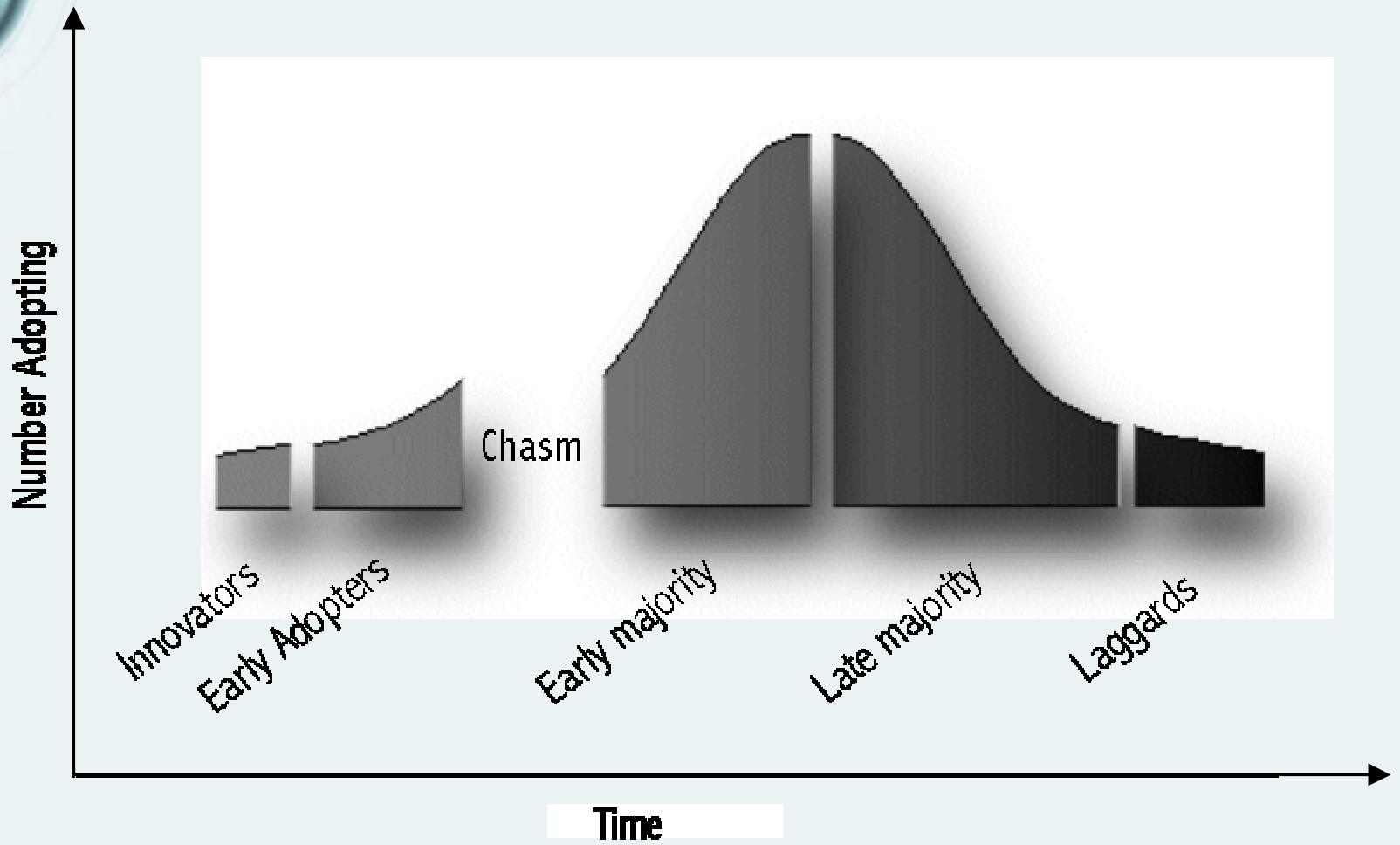
- Access to information and knowledge
- Ambient connectivity to people and resources
- Communication and interaction
- Navigation tools to deal with the abundance of information and knowledge in the knowledge era

In education:

- NOT the delivery of content per se
- Communication, collaborative learning and learning (navigationism) support
- Tools to improve effectiveness and efficiency
- Navigation tools to optimise learning activities

Some additional slides just in case…

The adoption curve



The technology adoption lifecycle (Moore, 1991)

Latest and future developments

- Moblogging (mobile blogging)
- Instant messaging (IM)
- Wireless Google
- Collapse-to-Zoom and Popouts
- Ambient technology and intelligence
- Personalised learning with dynamic adaptation of learning resources to individual preferences
- Text to speech & speech recognition for mobile devices
- Multi-user applications and resources
- Multi-technology interaction
- Podcasting (broadcasting of audio to iPods)

Current activities in Africa

The use of PDAs – two examples at UP:

- mLearning project in the Faculty of Health Sciences. Using PDAs in clinical assessment sessions of medical students: assessing performance and providing automated results and feedback. (*Ina Treadwell*) Project software funded by HaPerT software in Vienna, Austria.
- mLearning project in the Faculty of Engineering. Students in a 4th year course have been issued with PDAs to use within a pilot wireless eLearning environment. PDAs are used for queries, content delivery, interactive distributed simulations, notices, database access, collaboration, etc. (*Etienne Barnard*) Project funded by Hewlett Packard.

Current activities in Africa

The use of PDAs in clinical assessment sessions of health science students:

Research is being done on:

- Impact of PDA use on assessment quality
- Impact of PDA use on student performance
- Impact on efficiency and effectiveness

  (impact on administrative load, time, paper work, human errors, calculation errors, record keeping, duplication, costs, etc)

Success:

- Project still in progress. No official results yet. Feedback already very positive regarding efficiency, effectiveness and cost savings.

Current activities in Africa

The use of PDAs in wireless environments:

Research is being done on:

- HLT (Human Language Technologies):
  - speech recognition and speech-to-text
  - voice user interfaces
- Ability to stimulate collaboration with PDAs
- Mobile sharing of software and resources
- Multi-user applications and resources (multiplayer games are very popular)
- Wireless VoIP

Success:

- Project still in progress. No official results yet.

Target markets for mLearning

We can differentiate between two ideal target markets for mLearning:

- learners that are either without (fixed line/wired) infrastructure and access to the Internet, or
- learners that require mobility, flexibility and access anywhere, anytime.

In other words:

- 3rd world rural or remote area learners who have basic mobile phones, and
- 1st world learners with state of the art mobile devices.

Brown (2004)

mLearning in Africa

Premises for mLearning in Africa - lessons learnt from the pilot study:

- mLearning is a supportive mode of education and not a primary mode of education.
- The most appropriate mobile device for learners in rural Africa is a mobile phone.
- Possibilities and latest developments in mobile technologies must be tested against practicality, usability and cost-effectiveness.
- The use of multimedia on mobile phones must be tested against the envisaged learning outcomes.
- The major focus of mLearning should be more on communication and interaction than on content.

HAVE A HIGH TECH HOLIDAY!

hand-held
compact

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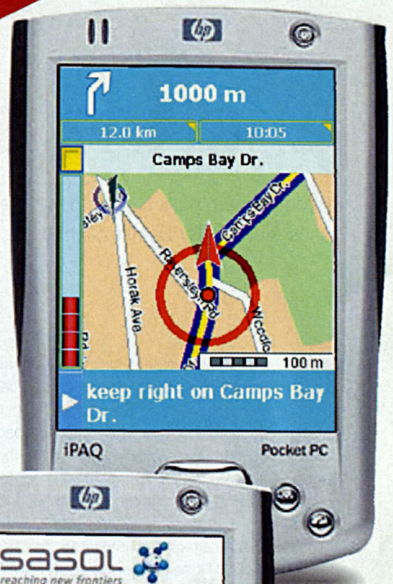
- maps of the whole South African region
- navigation by satellite to your destination
- gives voice directions as you travel



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- electronic log
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- birdcalls
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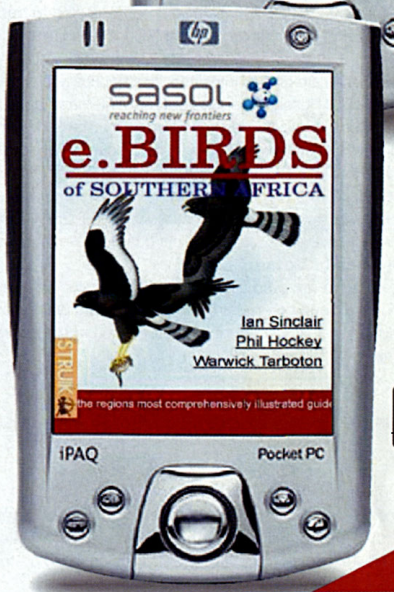

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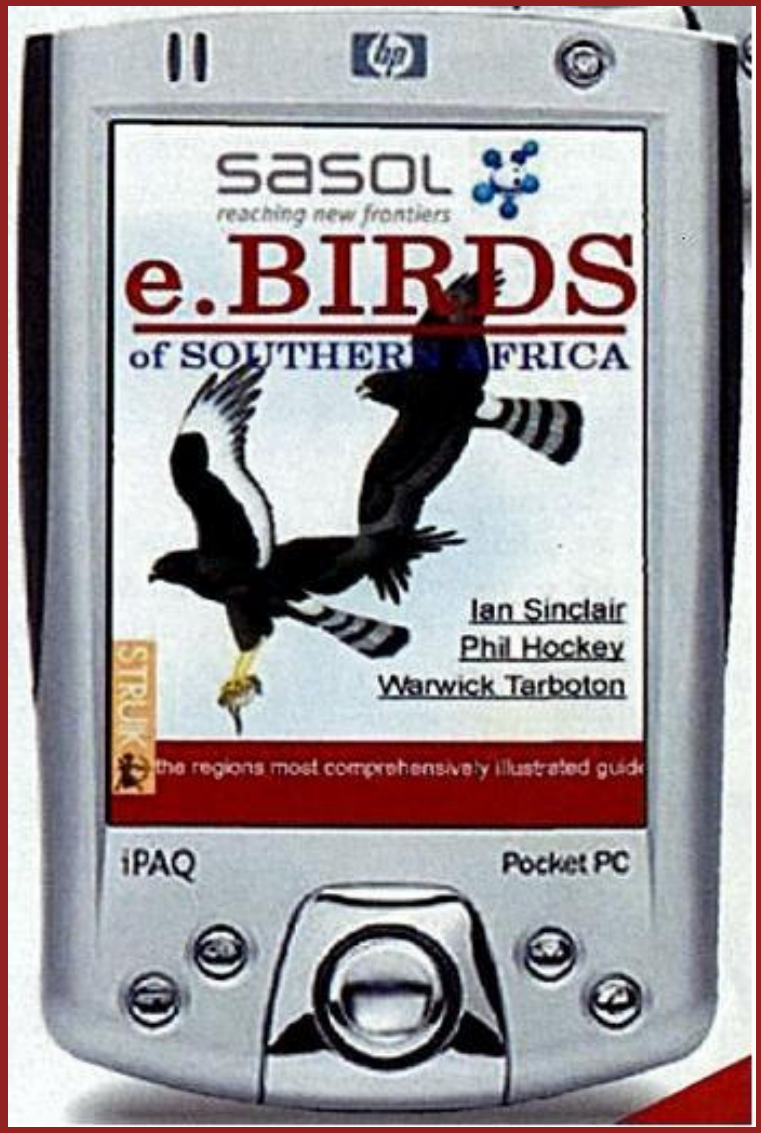

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Video specifications:

- **QCIF & SQCIF**
- **50-110 Kb/s**
- **3G & 2.75 supported phones**

Videos like these are now broadcast to 3G mobile phones. We are publishing our live video lessons and two courses' full VOD library weekly.

In a few days we will have it available to our students through Israel's two major cellular providers.

For the this experiment, the access will be free and open, but in future, it will be restricted to registered students.

13 June 2005
Boaz Mermelshtien
Instructional Designer
Israel Open University