e-Ink liberates online learning

Birgit Loch and Christine McDonald

Department of Mathematics and Computing
lochb, mcdonald @ usq.edu.au
\[ \int_0^\infty \frac{\pi}{\sqrt{x^3}} \, dx \]
Type $e^{x^2}$

$e^{x^2} = (e^x)^2$
e-Ink?

- What is it?
- How can you use it (hardware, software)?
- Where is it useful?
Why consider e-Ink?

- Teaching Mathematics to Distance students
  - Frustrating
  - Time consuming
Why consider e-Ink?

○ The past
  ● One-way communication electronically (visually), instructor → student
  ● Two-way verbally – suitable for maths?
    ○ Telephone tutorials
  ● Two-way in type – suitable for maths?
  ● Audiographics in centres
  ● One-way webcam and chat

○ The future
  ● e-Ink can liberate online learning!
What did we try?

- Online tutorial
  - Chose two first year courses, offered in S3
  - S3 most difficult semester, no lectures, shorter, public holidays
  - Not directly involved in teaching of these courses
  - No assessment of tutorial work
  - Offered to all students, on voluntary basis
  - Sent questionnaire
  - For one hour, 7pm Wednesday
How did we do it?

- Data Analysis
  - Asked to send questions by Monday
  - Distributed to all on Tuesday
  - Used as focus of tute
  - Usually from text/study book
  - Last minute questions accepted
How did we do it?

- Discrete Maths
  - No questions submitted beforehand
  - Questions asked from study book/text book/lecture slides
- e-ink was not formally introduced, just used
Who was involved?

- The two of us
- Volunteering students
  - Data Analysis (300 total)
    - 38 positive replies, chose 10
    - Regulars: 5
    - Maths skills not great! Some maths phobics.
  - Discrete Maths (50 total)
    - 13 positive replies, chose all
    - Regulars: 3
    - Maths skills ok. Computer savvy IT students.
Where in the world?

- We were
  - At uni (both in same office, one with laptop (wireless), other on desktop)
  - At home (Toowoomba, Hervey Bay)
- They were in
  - Adelaide, Melbourne, Thailand (village), Singapore, Toowoomba
  - Brisbane, Maryborough, Sydney
Chat Speak

- Question marks if unsure
- Name used if one person addressed, or referred to message
- Typos not corrected
- Very informal language, incomplete sentences, no formal punctuation
Chat Speak/Dynamics

- Abbreviations/acronyms, brb!!!!!, cya, lol, ok, btw, heh, oops, nite, cu
- Smilies 😊 :-o
- Socializing at beginning
- Quick succession of messages
- Overlapping topics
- Typing is faster than writing
Birgit says:
why does this work? because the y axis is where x = 0. so for
x=0 we get y=m*0+c=c. so (0,c) is the point
Birgit says:
still following me?
Student G says:
trying... hang on with the "why does this work"
Student G says:
ahh ok, yes got you now
Student D writes:
\[ x^2 + y^2 = 1 \land y \leq x \]
Chat Speak/Dynamics – Example

Student K says:
that explains it very clearly
Student C says:
yes thanks christine
Student S says:
GOT IT
Christine says:
i hope that is not confusing because in fact z scores allow
you to compare things that are measured in different units
Student K says:
like athletes competing in different events?
Christine says:
yes, which had the most outstanding performance?! 
Student S says:
the one with the highest z score?
Results from survey

- Data Analysis:
  - Didn’t like using e-ink, appreciated value for graphs and formulae
  - No more than 8 students in one session
  - “great, as some formulas you simply can’t type”
  - “yes, sometimes a verbal explanation of a graph can be very misleading when participants don’t understand terminology”
Results from survey

- **Discrete Maths:**
  - Useful for Venn diagrams, logic sets and relations
  - Talked to others outside tute occasionally, and used hand writing
  - “We were encouraged to answer the questions from other students so this took out the boredom factor”
  - “ensures that at least once a week I’m thinking and looking at maths”
What we thought

- Very rewarding
- Thanked by students after every session
- Time consuming
- Built a learning community, and we were part of it
e-ink use

- Observations:
  - Necessity forces use
  - Tutors used it more than students
  - Students appreciated visual contribution to explanation
e-ink use – Examples
Future directions

- Offer at designated consultation times
- Complement phone conversation
- Peer assisted sessions
- FAQs on website, or whole chat session
- E-ink can be easily included in emails

A big Thankyou to Jamie Shield (Wide Bay) for pointing out the e-Ink tool to us!!!