

Math on Mxit: Using Mxit as a Medium for Mathematics Education

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Abstract: It is common cause that the average mathematics mark among high school learners in South Africa has declined. Traditional “math clubs” and “math extra lessons” often do not work because of a number of reasons including 1) it being “uncool” to be seen going to math club 2) the stigma of going to extra lessons 3) lack of suitable tutors 4) suitable tutors are employed full time and are not available in the afternoon 5) learners are not available to return to school in the evenings for meetings 6) other scheduling conflicts between learner and tutor (assuming a tutor could be found) and 7) costs of extra lessons. This paper examines a math club or math help system which is being run via Mxit – the popular instant messaging system running on cell phones and extremely popular with teenagers. Learners use Mxit and contact the tutor during specified time periods. The tutor, in his or her office using a traditional computer and keyboard, can handle queries from many learners. The learners remain anonymous and are not aware of the other learners using the system.

Keywords: mathematics, Mxit, cell phone, instant messaging

1. Introduction

Mathematics education is crucial to the future of South Africa. Competence in mathematics is a key requirement for economic development of South Africa, indeed for all of Southern Africa. By many performance indicators, South Africa is doing poorly in mathematics [1]. For previously disadvantaged individuals, South Africa's failure to improve mathematics education is a significant obstacle to African advancement. One of the key components of this problem is that there are not enough competent educators to teach mathematics [2]. Another key problem is that traditional out-of-school interventions (extra lessons, math clubs, etc) are normally only available in urban areas and cost the learner (or family) additional money [8].

Instant Messaging is a communication mechanism similar to email but the messages are sent and delivered immediately between the users. It can be used on both traditional computers and on cell phones. Instant Messaging systems have been used to enhance education in a distance learning environment [3]. This paper reports on a project where instant messaging was used over cell phones in a traditional secondary education environment where learners needed additional help with mathematics homework after school hours when most teachers were not available.

2. MXit

MXit is a cell phone instant messaging application which is propriety software of MXit Lifestyle (Pty) Ltd. based in Stellenbosch, South Africa [4]. It enables people to easily communicate with each other with textually typed messages which are similar to SMS on cell phones.

One of the primary differences, however, between SMS and MXit is the cost factor. Messages sent via MXit cost approximately one or two cents whereas SMSs could cost upwards to fifty cents depending on contract type. This cost factor makes MXit very popular with the teenage population in South Africa. Current demographics on MXit usage show that there are currently about 3 million MXit users in South Africa and nearly 45% are between the ages of 12 and 18 [5]. Naspers recently purchased a 30% stake in MXit [6] and there are plans to expand its global market share. MXit's plans are to have 50 million users internationally by the end of 2008 [7].

It is extremely quick and easy for teenagers (or anybody, for that matter) to get connected with MXit on their phones. They merely download some MXit software via WAP which runs on most modern cell phones, register with MXit, and they are communicating with their friends within minutes.

The MXit software keeps track of the participants via their cell phone numbers. The MXit software distributes cell phone numbers between participants. Obviously, these cell phone numbers are also stored on the central MXit servers. And, it would be possible, for the central MXit servers to also log and record all conversations. MXit has recently had some "bad press" with a number of cases of adults luring teenagers into dangerous situations. In addition, school teachers have been concerned that learners are "addicted" to

4. Examples of Conversations

After the initial novelty of *Math on MXit* was overcome by the learners, the quality of the conversations between the learners and the tutors was very good. (In the conversations listed in this paper, in view of the fact that people often keep the same alias across websites, even the aliases or nicknames have been changed.)

Since *Math on MXit* was targeted to high schools, the range of questions covered the entire high school syllabus including both mathematics and mathematics literacy. Some questions were short and sweet:

(14:30:32) speedy: hw do u work out the area of a circle
(14:30:46) dr.math: Hi, do you have the radius of the circle?
(14:32:06) dr.math: If you have the radius of the circle, then the area is pi times radius squared
(14:32:08) speedy: 8 mm
(14:32:41) dr.math: so $\pi \times 8 \times 8$ the result will be in mm squared
(14:34:12) speedy: okay thanks

(13:19:56) beauty: hey
(13:20:09) dr.math: hello, can I help you today at all?
(13:20:42) beauty: yes..wat i7 an interger
(13:20:43) beauty: is
(13:21:10) dr.math: an integer is a number without a decimal part or a fractional part like 1, 2, 3 but it can also be negative
(13:21:32) beauty: ok..thought so
(13:21:50) beauty: G2g..im in class

And others were quite long and involved:

(14:32:09) Farmer: how can i get n easy whey to simplify big numbers white out n calculator
(14:32:51) dr.math: Do you mean find the prime factors of a number?
(14:33:32) Farmer: yes bat easy whey
(14:34:19) dr.math: You have to get your fingers dirty. If the number is even, then 2 is a prime factor. Then divide the number by two and try again.
(14:34:43) dr.math: If the number ends in a 5 or 0, then 5 is a prime factor. Then divide the number by five and try again.
(14:35:32) Farmer: okey
(14:35:32) dr.math: There are "tricks" for lots of numbers. If all the digits of the number add up to 3, then 3 is a prime factor. Divide by 3 and try again.
(14:36:09) Farmer: okey
(14:36:25) dr.math: Do you want to try one? What are the prime factors of 90?
(14:39:48) Farmer: 45
(14:40:11) dr.math: Ok, now $4+5 = 9$ and that is divisible by 3. Keep going, divide it by 3 and see what you get.
(14:40:20) Farmer: 2
(14:40:49) Farmer: 15
(14:41:10) dr.math: Good now does 15 end with a 5 or 0? yes, so it is divisible by 5. keep going
(14:41:38) Farmer: 3
(14:43:19) dr.math: Somewhere we lost something, I would work it out like

this $90/2=45$ $45/5=9$ $9/3=3$ $3/3=1$ prime factors are 2 5 3 3
 (14:44:19) Farmer: okey i thoth souw to
 (14:44:39) dr.math: Just keep dividing and keeping track of the numbers until you divide and get 1.
 (14:45:19) Farmer: souw you must end up by 1
 (14:46:00) dr.math: Yes, let me do another one for you. Let's take $50/2=25$ $25/5=5$ $5/5=1$ the prime factors are 2, 5, and 5
 (14:46:47) Farmer: cant you just say 2 and 5
 (14:47:31) dr.math: No, because there are two 5s in the list. Let's take the number 100 $100/2=50$ $50/2=25$ $25/5=5$ $5/5=1$, the prime factors are 2, 2, 5, and 5
 (14:48:38) Farmer: okey sowe you must name them all
 (14:49:17) dr.math: If the teachers asks for the prime factors of a number, yes, you must name them all. So you tell me, now, what are the prime factors of 54?
 (14:50:40) Farmer: 2,3,3,3
 (14:51:17) dr.math: Very good. And you can always check your answer by calculating $2 \times 3 \times 3 \times 3$
 (14:52:35) Farmer: okey!thanks i will come to you if there is somthing els

We even had a few Grade 7s doing pre-algebra work topics and wanted to use Dr Math to test them:

(12:47:32) dr.math: ok. What grade are you in? what are you covering in math?
 (12:48:25) Spark plug: 7
 (12:48:39) dr.math: grade 7?
 (12:48:49) Spark plug: yes
 (12:49:06) dr.math: are u doing "pre algebra" stuff like What is the value of X if $x + 3 = 10$?
 (12:49:24) Spark plug: yes
 (12:49:39) dr.math: ok, so what is the value of x if $x + 3 = 10$?
 (12:49:52) Spark plug: 7
 (12:50:13) dr.math: ok. how about $(15 \times 2) + x = 35$
 (12:50:29) Spark plug: 5
 (12:50:58) dr.math: (I am going to use * for multiply so not to confuse it with x, ok?)
 (12:51:15) Spark plug: ok
 (12:51:31) dr.math: $(2 * x) + 8 = 18$
 (12:51:45) Spark plug: 5
 (12:51:54) dr.math: very good. can you explain to me how you figured that out?
 (12:53:57) Spark plug: $18 - 8$ is 10 so $2*$ what is 10 and the answer is 5
 (12:54:27) dr.math: Excellent. How about $(x / 2) + 2 = 17$
 (12:54:52) Spark plug: 30
 (12:55:55) dr.math: gee, I'm so impressed. How about $(30 * x) + 9 = 99$
 (12:56:11) Spark plug: 3
 (12:56:52) dr.math: Ok, now maybe this next one is difficult $((20 * x) + 4) / 11 = 4$
 (12:57:44) Spark plug: 2

5. Hints for Tutors

Being a tutor “on duty” for *Math on MXit* could be stressful at times. As stated previously, *Math on MXit* covered the entire high school mathematics syllabus and the questions were varied.

We did come up with a couple of tricks that worked well. Prior to coming “on duty”, the tutors would bring up a few browsers pointed to wikipedia or google. This would give the tutors quick access to pages to help remind them of trigonometric identities, logarithmic functions, history of famous mathematicians, and various other formula that learners need.

Another trick that the tutors learned was that if a learner had a problem with some aspect of class, there would probably be another learner with the same problem. We started keeping our scrap paper and notes between sessions so that we could easily repeat help which we had given to another learner on the previous day.

It also became clear that learners had no concept that their cell phone could be used as a tool instead of a toy or convenience.

We often referred them to Opera Mini [9] so they could easily research topics for other classes such as History and Life Orientation:

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(12:48:39) Wild Fire: tnx dr. Im bored
(12:49:07) dr.math: but in the mean time, why don't you put mini opera on
your phone then you can surf to your heart's content
(12:49:56) Wild Fire: whats mini opera
(12:50:27) dr.math: mini opera is a full fledged web browser but it works
over wap and it is much nicer than most wap browsers.
(12:50:53) Wild Fire: And cheaper?
(12:51:20) dr.math: it's free, how cheap do you want it. But you have to
have wap on your phone first - which I'm sure you do other wise you
couldn't download MXit.
(12:51:51) Wild Fire: Ya how do i get opera
(12:52:12) dr.math: go to mini.opera.com using wap. Then follow the
download link
(12:52:28) Wild Fire: tnx.
----- later -----
(13:03:09) Wild Fire: Hi. Opera rocks
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We also found that many learners did not have scientific calculators and were trying to do trigonometry with business calculators. In such cases we referred them to various websites with calculator software which ran on cell phones to help them:

6. Some Difficulties

There were obviously difficulties in not being able to make drawings of triangles and graphs. Instant messaging protocols (including MXit) do support the transmission of extra files including images. Unfortunately, this facility is not supported by all cell phones and we didn't use it. That meant that both the learner and the tutor had to describe drawings verbally.

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(15:06:46) mechanic: No bt I dnt get da wat dey r asking
(15:07:07) dr.math: Can I help then?
(15:08:24) mechanic: R u dat bord
(15:08:54) mechanic: It is geometry
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(15:08:55) dr.math: ;-) This is my job. I sit on MXit for 15 hours a week helping kids. Help me justify my salary ;-)

(15:09:05) dr.math: Geometry is often difficult over MXit but let's try.

(15:12:36) mechanic: I just need 2 no wat dey r asking... Given: triangle ABC with $AB=AC$. EDT is the perpendicular bisector of AB. BC produced meets EDT in T. Prove that BT is the third proportional to BC & AB

(15:13:35) dr.math: what is EDT

(15:17:22) mechanic: A line going thru the triangle perpendicular to AB ending at 2 points outside the triangle: E on the side of AB & T on the side of AC where it intersects AB it is called D where it intersects AC it is called F

(15:19:07) dr.math: sec

(15:19:30) mechanic: Ok

(15:20:01) dr.math: "Prove that BT is [what goes here] proportional to BC and AB" I don't understand what you must prove

(15:20:56) mechanic: The third proportional

(15:21:04) mechanic: I don't understand either

----- conversations continues -----

(15:39:50) mechanic: Sorry I got dc

(15:40:11) dr.math: Did you get $BF/BT = (BC/2) / AB$ you can work it out from there quite easily." You can work it from there

(15:42:48) mechanic: Thanx man u r brilliant!!!

(15:42:59) dr.math: but you are solving it yourself. well done.

7. Language Issues

Dr Math was held in English primarily because the original tutors used on the project did not speak Afrikaans. We found that Afrikaans speaking learners were perfectly willing to jump in and ask questions interspersing English and Afrikaans – in some cases with rather humorous results:

(13:04:20) Captain Kirk: hey Dr.

(13:04:36) dr.math: Hey Captain Kirk. haven't talked in a while. How's math going.

(13:08:02) Captain Kirk: sorry good

(13:08:12) dr.math: what r u covering?

(13:09:36) Captain Kirk: foursided numbers but i am struggle

(13:10:20) dr.math: "foursided numbers" I don't recognize the term. Explain what you do know

(13:11:16) Captain Kirk: okay can i say it in afr.

(13:11:25) dr.math: sure, I will try to understand

(13:12:17) Captain Kirk: vierkants getalle

(13:13:03) dr.math: vierkant could that mean "square" like in square numbers $2 \times 2 = 4$, $3 \times 3 = 9$ $4 \times 4 = 16$?

But usually the language was not an issue:

14:13:00) dr.math: so you never told me what you moved onto in math after logs

(14:14:05) Arthur Dent: I don't know what it's called in english:0

(14:14:36) dr.math: OIC. try it in Afrikaans maybe I can understand.

(14:15:26) Arthur Dent: Ok it's called "rye en reekse":D but that's easy:D

(14:16:03) dr.math: That's beyond my limited Afrikaans vocab. But I'll look it up this weekend

(14:17:42) Arthur Dent: Its like numbers following one another in a pattern:D the first number is usually called T1 and the second one is T2 and so forth:D
(14:18:10) dr.math: series and sequences. Like Fibonnaci 1, 2, 3, 5, 8, 13, 21 etc
(14:24:36) Arthur Dent: Exactly:P my maths teacher says its the easiest part of Gr12 maths:D
(14:25:17) dr.math: so do u know what fibonnaci series are
(14:27:44) Arthur Dent: Yea:D the one number plus the next one equals the third:D and the second plus the third equals the fourth:D
(14:28:23) dr.math: So here's a joke for you: How much does a large bag of Fibonnaco potato chips cost?
(14:28:58) Arthur Dent: Haha:P i dont know...:P
(14:30:40) dr.math: The cost of the small bag of Fibonnacos plus the cost of the medium bag of Fibonnacos ;-)
(14:32:59) Arthur Dent: HAHA(G) i get it:P so i still dont know if you're a human...:P
(14:33:13) dr.math: could a computer tell a joke like that?

We have created Dr Math accounts in Afrikaans, Zulu, and Tswana. Unfortunately, we currently do not have tutors to handle those languages.

8. Ethical Concerns

There were (and still are) a number of ethical concerns with the project. Most of these concerns dealt with the fact that the people using the system were minor children and that they were freely distributing their cell phone numbers to total strangers.

All conversations were logged. During the first extended conversation with the learner, they were asked for an alias, nickname, or handle and informed that the conversations were logged. This was done for four reasons:

- Research purposes: we wanted to know if the learners were actually using the facility and we wanted to monitor the quality of the questions they posed to the tutors
- Quality purposes: we wanted to determine whether or not the tutors were answering the learners questions correctly
- Safety of the learners: we needed to ensure that the learners were not being enticed into any unsafe or illegal activities
- Safety of the tutors: we needed to be able to protect the tutors from false allegations if the need arose

Another major concern was the security of the cell phone numbers of the minor children. By contacting our facility via MXit, the learners were freely distributing their cell phone numbers. Our tutors were not allowed to contact any of the cell numbers or learners outside of the scope of this project. And our tutors were not allowed to ask or answer any personal questions.

One completely unexpected feature of this project was the number of learners who asked for counselling from the tutors. In fact, the learners seemed to like the anonymous character of MXit. At the time of writing of this paper, however, we have unfortunately not been able to find a counselling service to help these learners over MXit.

9. Social Aspect of Math on MXit

Learners developed a virtual social relationship with Dr Math. They would often check in right after school was out just to say hello.

(14:42:15) Swimmer: Hello
(14:42:25) dr.math: hello Swimmer. How are things?
(14:44:20) Swimmer: Fine im going to tour tomorrow till saturday
(14:44:47) dr.math: that sounds fun. where are u going?
(14:45:16) Swimmer: Cant remember
(14:45:36) dr.math: then I won't hear from you until next week, right?
have a good time.
(14:45:59) Swimmer: Yes and thanks

(14:33:36) pilot: Hey werk j leka
(14:33:53) dr.math: ja
(14:34:15) pilot: Dis kul
(14:34:26) dr.math: any math questions for me?
(14:35:14) pilot: Lots bt I dnt hav the motivation nor energy 2 ask rite
nw

The learners also enjoyed the enigma of Dr Math – whether Dr Math was male or female, old or young, married or unmarried:

(14:38:25) unknown-11: HEY WATS UP
(14:38:43) dr.math: Nothing much, please give me a screen name or handle for you. Not your real name.
(14:39:02) unknown-11: JOE
(14:39:18) dr.math: That sounds like a real name. I want a fake name or handle please
(14:40:10) dezi: Eagle
(14:40:57) dr.math: OK, Eagle it is then. Plus, Eagle, I need to tell you that these conversations are recorded for research purposes. Is that ok with you?
(14:41:39) Eagle: YA R U MALE OR FEMALE
(14:42:06) dr.math: That's much too personal a question. Don't you have a question in mathematics to ask?
(14:42:38) Eagle: PLZ AWNSER I JUST WANNA KNOW
(14:43:06) dr.math: It's against the rules here. This is impersonal help in mathematics. :)
(14:44:36) Eagle: K WEL IF U HAVE A GIRL AND SHE DOES NOT KNOW WHOM SHES TALKING 2 WATS THE AWNSER
(14:45:04) dr.math: huh?
(14:45:33) Eagle: R U A DUDE OR DUDET

(15:42:59) dr.math: but you are solving it yourself. well done.
(15:44:33) mechanic: Ja its fine btw how old r u

(15:44:52) dr.math: Hmm, that's much too personal a question. Let's stick to math ;-)
(15:45:35) mechanic: Ok

And Dr Math had the influence to encourage learners to do mathematics even when they didn't have any homework to do:

(15:16:04) camper: Lets do some beta maths: wen a map sez 1:16m it means 1mm is actualy 16m rite?
(15:16:44) dr.math: I'm not really a geographer I know what 1:16 means but not really want 1:16m means :-(
(15:18:47) camper: Ok bt I am asuming dat makes it 784m nw 2 get km I must multiply by 10 to the power of 3 rite?
(15:19:19) dr.math: sec
(15:23:00) dr.math: sorry back
(15:23:49) dr.math: I don't understand ur question. you have 784 m and u want to get kms? yes, multiply by 10^3
(15:24:30) dr.math: so 784m is .784 km
(15:28:03) camper: Ja bt its divide...bt dats imposible
(15:28:34) dr.math: sure my bad ;-)
(15:29:06) camper: Take it 4 joburg rite? Its imposible
(15:29:46) dr.math: are we talking joburg to inhabane?
(15:30:09) camper: Ja
(15:31:19) dr.math: IC, how many mm from joburg to maputo?
(15:31:43) camper: I dnt no y
(15:31:53) dr.math: i thought you had the atlass in front of u
(15:32:44) camper: I did bt dat 4 like almost half hour ago Il go get it
(15:33:09) dr.math: just measure joburg-maputo, then maputo-inhambane
(15:36:01) camper: Bt joburg-inhambane is 49mm bt I tink its a printing eror cz I tink it is suposd 2 be 1:16km instead of 1:16m dat makes it 784km & dat makes it 74.7 litres
(15:36:47) dr.math: looks like it. are u saying 784 kms joburg-maputo?
(15:38:38) camper: No 784km joburg-inhambane joburg-maputo is 440km wich makes it 42 litres
(15:39:18) dr.math: that can't be right. Maputo is further than that, I'm sure
(15:39:52) camper: I dnt no
(15:40:05) dr.math: I looked it up. Joburg-maputo 593 kms
(15:41:10) dr.math: so let's change the question, can you go to joburg-maputo-and back with one fillup in the hummer 4x4?
(15:41:12) camper: I dnt hav dat luxury
(15:41:32) dr.math: Use opera! That's what's there for. turn your phone into a research tool!
(15:41:46) camper: Wat size is a hamer's tank
(15:42:26) camper: Ok bt den I must log off
(15:42:30) dr.math: sec
(15:44:41) dr.math: Hl hummer capcity is 51 gallons - u do the maths ;-)
(15:44:53) dr.math: sorry two tanks of 51 gallons
(15:45:37) camper: Just as I get comfy again
(15:46:12) dr.math: It would have been easier to do your math homework ;-)
(15:47:00) camper: No

(15:47:41) camper: How do u get gallons in2 litres
(15:48:48) dr.math: 1 gal = 3.78 litres
(15:51:57) camper: U wud be able 2 get 4m joburg-maputo on 1tank of petrol wif 69.22 litres a spare
(15:52:52) dr.math: u sure? imagine you were doing this calc for an airplane and not a ground vehicle.
(15:54:34) camper: Nt a chance my brain has nw gon in g repairs
(15:54:51) dr.math: ok, I'm not going to check your arithmetic. But math can be fun sometimes. ;-)
(15:56:11) camper: Wen its geometry that I undastand
(15:56:33) dr.math: Ah, lots of good offroading exercises about winching stuck hummers out of the mud ;-)
(15:57:40) camper: Oh my word u defintly r creative
(15:57:56) dr.math: that's my job. chat tomorrow.
(15:58:21) camper: Ok bye
(15:58:27) camper logged out.

10. Learners evaluation of Math on MXit

Learners seemed to enjoy using *Math on MXit*. They often requested additional help programs for various science topics such as chemistry and biology. One learner even requested Tswana help but with everybody communicating via the abbreviated language of instant messaging, helping with a second language could be extremely difficult.

Many of the learners expressed their appreciation of the program and their feeling that the program was a great success:

(21:11:47) Whale: r u guys world wide?
(21:12:40) dr.math: well, we haven't advertised world wide. But our primary goal is to help South African kids with math. BUT we answer any questions that come to us.
(21:13:55) Whale: o ok! pretty kwl
(21:14:24) dr.math: So do good in math and when you graduate, you can take over my job and help high school kids with math :)
(21:14:58) Whale: i wana study biology
(21:15:17) dr.math: well, if this goes well, we might start a science help also.
(21:19:42) Whale: u guys r gonna b a hit!

11. The Dark Side of MXit

Unfortunately, there is also a dark side of the *Math on MXit* project.

It is a sad state of affairs when a paper on mathematics education needs to cover the sexual activities of high school learners but with the current devastating effect HIV/Aids is having on the population, we need to discuss these darker elements of *Math on MXit*.

Remembering that we made a concerted effort to not reveal any personal details about Dr. Math, we still received numerous sexual propositions from participants on *Math on MXit*. These propositions came from both learners who identified themselves as male and learners who identified themselves as female.

Our policy was to remove any contacts that made explicit sexual remarks – regardless of whether they were propositions, or off colour jokes, or remarks.

The comments were often embedded in the middle of discussions about mathematics. The learners would then reconnect and would often be surprised at our restrictions or would blame the comments on a third person who “borrowed the phone.” For example:

(11:25:40) dr.math: just on MXit, afternoons 2-3 and whenever else I may log in. So u said you get 96% in math. well done.
(11:26:04) Giraffe: yeah. do u want a blowjob
----- contact deleted by Dr. Math -----
----- contact reconnected later in the day -----
(14:31:35) dr.math: Sorry, I record these conversations. I deleted u. I don't appreciate your vocabular. keep it clean or I will delete u again.
(14:31:46) Giraffe: how can i study triangles?
(14:32:04) dr.math: Just a sec. I'm recording these conversations, is that ok with you?
(14:32:51) Giraffe: yeah, why u record it?
(14:33:18) dr.math: For research and quality purposes. If this dr.math is successful we may start dr.science, etc.
(14:34:10) Giraffe: What did my friend ask u ths murning- she had m fne?
(14:34:17) dr.math: so my coworkers and boss, etc, read through the log files just to see how everything is going
(14:34:38) dr.math: so we keep the conversations clean. And I don't know who yur friend is
(14:35:09) Giraffe: she chatted on my phne. what did she ask u?
(14:36:20) dr.math: well, not that I necessarily believe everything I read from MXit, but whatever she or you said was not appropriate.
(14:36:29) dr.math: Anyway let's drop it. what do u need to know about triangles.

The sexuality and/or sexual activity of these learners is, unfortunately, really not the scope of this paper. However, due to HIV/Aids issues, perhaps *Math on MXit* could be used as a model for a program to spread the message about safe sexual practices.

12.Results

We did not collect hard data on results of mathematics tests of the learners. We do, however, get many comments about mathematics tests (and other tests) from the learners both before and after the tests:

(15:51:06) dr.math: But ask me tomorrow. I'm leaving at 4 today.
(15:52:16) CrazyMan: Y so soon? I write test 2moro

(15:08:32) daisy: do u have any tips 4 me on (veelterme en polinome)?
(15:09:07) dr.math: sure. what's the problem that you seem to be having?
(15:10:26) daisy: no problems jus were writing a test on wednesday jus wanet 2 knw if u hav tips?
(15:10:57) dr.math: OIC. well, not really....
(15:11:43) daisy: nt but ure a computer and do u have any help of sme kine 4 me on that?
(15:12:19) dr.math: will it be covering the roots of the formula, or plotting the formula, we can do some exercises and test questions...
(15:13:38) daisy: ok that would be nice!
----- the next day -----
(14:22:09) dr.math: how was your math test?

(14:22:55) daisy: it was kind of easy 4 me just hope i get gud marks!
(14:23:06) dr.math: that's great. what did it cover?
(14:23:48) daisy: veelterme and smeting like that!

(10:36:03) dr.math: ;-) So r u in class now?
(10:36:28) Speedster: no, its break (
10:36:59) Speedster: After break i will get that test..
(10:37:10) dr.math: a math test?
(10:37:37) Speedster: yeah..
(10:38:01) dr.math: Well I don't wish you "good luck" I wish you "good brains" tell me after how it went
(10:38:41) Speedster: yeah.. i hope its a 100 %
----- the next day -----
(10:36:04) Speedster: whats the answer of: $(10-x)$ To the power of 2= 9x?
(10:36:37) dr.math: are u taking a cycle test or something and needing an answer?
(10:36:46) Speedster: its good to take regular breaks..
(10:37:13) dr.math: do you know how to do $(10 -x)$ power 2?
(10:37:39) Speedster: no, its just a test of yesterday and im not sure about the answer..
(10:38:10) dr.math: the rule is first, outer, inner, last. Have you heard of that?
(10:38:16) Speedster: yeah $(100-x$ power 2)..
(10:38:58) dr.math: u forgot the inner and the outer parts. you only have the first and the last
(10:39:06) dr.math: the inner and outter are $-10x$ and $-10x$

(14:41:04) dr.math: that's good. ur quite clever. how's math going?
(14:41:52) Pac man: Easy i had a test today

(14:43:56) Snow White: yes so far i have past my first test with 87%
(14:44:05) dr.math: well done. That's great.
(14:44:50) Snow white: jip i hope i can keep it up

(12:35:59) dr.math: i understand. do you have lots of homework for the weekend
(12:37:43) Jet: No but i have to study
(12:38:27) dr.math: that's the right attitude. You'll get 95 on the next tech test ;-)
(12:39:05) Jet: No aiming for the big one 100
(12:40:03) dr.math: even better.

So, obviously, the learners themselves thought Dr Math positively helped them to prepare for math tests.

13.Conclusions

Our *Math on MXit* facility was successful in helping learners with their math homework in the afternoons. The cost involved was minimal. From the learners point of view, their conversations with Dr Math cost, at most, R1.00. From the tutors' point of view, there was

the connectivity and the tutors' time. Only freely available opensource software was used on the project.

The learners who participated on our project, showed a real eagerness to communicate with an adult. Despite the fact that we avoided personal questions, most learners rightly assumed that Dr Math was an adult and engaged with us at that level. Once we made it clear that we would not tolerate foul language and sexual content, most learners were extremely polite when dealing with us. Their requests were typically “*Please help me with...*” and usually ended with “*Thx 4 ur hlp.*”

Besides discussing mathematics with Dr Math, many learners developed a social relationship with Dr Math informing Dr Math about tests in other classes and about their wishes and dreams of further education. Many also asked for counselling which was not within the scope of this project and we tried to refer these learners to adults in their lives which were better prepared to help the learners such as favourite school teachers or scout leaders. There seems to be a need for MXit based counselling services for young people. This is an opportunity for counselling organisations to reach millions of teenagers in an extremely low cost manner.

We can recommend this mode of communication with teenagers over a wide scope of topics including science, history, and religion. Besides schools, many other organisations could use this medium as a way of reaching teenagers including church groups, youth clubs, and counselling organisations. The one topic where it might not really be appropriate would be language education because of abbreviated and creative spelling of words.

“The medium is the message.” [10]

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