Adolescent usage of multimedia messaging in the negotiation, construction, and sharing of meaning about local environments

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Recent developments in handheld telephony have given rise to the 'mobile internet' - a range of technologies, from multimedia-messaging to access of the internet through handheld devices. These trends have been accompanied by the increasing consumerization of the mobile phone. Many students today have access to a tool, which allows them to connect to potentially anyone else, regardless of spatial co-location. This paper describes a study which was carried out in the early months of 2004, focusing on how the social software of the mobile internet, such as text- and picture-messaging, is used by adolescents in the process of constructing negotiated and shared understandings of unfamiliar environments in which they may find themselves. Students were presented with opportunities to collaboratively explore and navigate unfamiliar environments using the technologies of the mobile internet, as well as to engage in debate, and used multimedia evidence recorded in the field to defend their positions both to peers in the field and subsequently in the classroom.

Background

One of the primary theoretical constructs underpinning collaborative learning would be 'distributed intelligence', first described by Perkins (1992):

> people think and remember with the help of all sorts of physical aids, and we commonly construct new physical aids to help ourselves yet more. People think and remember socially, through interaction with other people, sharing information and perspectives and developing ideas … People sustain thinking through socially shared symbol systems – speech, writing, the technical argot of specialties, diagrams, scientific notations, and so on. (p.133)

Perkins elaborated on three ways in which intelligence can be distributed; namely physically (student output such as the completion of traditional problem sets, journals and portfolios, simple programming and desktop publishing), socially (co-operative learning), and symbolically (for example, through diagrams & charts, mental maps, and role-play). These insights have their roots in Vygotsky's cultural-historical theory of activity, first formulated in the 1920s, in which the relationships between human agents and objects in their environment are mediated by culture, tools and symbols.

Putnam (1993) used the term 'social capital' to refer to social networks which go beyond traditional familial ties and connect friends and strangers for mutual benefit. Social capital is therefore the basis of collaborative behavior. The basic unit of social capital is information, defined by Boeck (in press) as "material which is selected by individuals to be transformed by them into knowledge to solve a problem in the specific social domains to which they belong". Such 'problems' in which students find themselves can be described through what Johnson and Johnson (1979) term 'Structured Academic Controversies'. Defined as the "deliberate stimulation of intellectual conflict by creating a highly structured situation wherein one student's ideas, information, conclusions, theories, and opinions are incompatible with those of another, and the two seek to reach an agreement by engaging in Aristotelian 'deliberate discourse'" (Johnson, Johnson and Smith (1997). Academic controversies permit investigations of the social distribution of intelligence, by building on traditional models of debate and encouraging participants to reach shared consensual values.

Recently, various authors (e.g., Palloff and Pratt, 1999; Russell and Ginsburg, 1999) have made explicit reference to the formation and sustenance of learning communities in conjunction with online learning. In these latter studies, the focus has been less on individual learning, and more on the social nature of cognition and the making of meaning; as Zukas and Malcolm (2000) succinctly express it; "students and teachers are considered to be social and cultural actors with identities emerging from their wider social experiences".

Synthesizing these various strands is a term that has gained currency only recently. 'Social software' has been defined as "any software which enables groups of people to communicate and to collaborate, and which exists for the benefit of the everyday non-specialist user…[it] supports and improves mainstream social practices, both offline and online" (Davies, 2003). To this, Coates (2003) has added that social software augments collaborative activities by facilitating creative processes in groups, structuring the processes so as to have a distinct and productive end result. In the context of this paper, therefore, examples of social software are the text- and multimedia-messaging technologies, and multi-player games, of the mobile phone.

The geographical context of this study

Thirty years ago, Tuan (1974) wrote:

> in our mobile society, the fleeting impressions of people passing through cannot be neglected. Generally speaking, we may say that only the visitor (and particularly the tourist) has a viewpoint; his perception is often a matter of *using his eyes to compose pictures* [emphasis added]. (p. 63).

Present-day messaging technologies have enabled these once personal perceptions to be analyzed in ways that have not formerly been possible. The study described in this paper was carried out among geography students in a secondary school in Singapore, with the following objectives:

- To investigate how students help each other explore and navigate unfamiliar environments, through an examination of their synchronous discourse, as well as of pictorial clues with which they provide and request of each other;
- To investigate the nature and quality of non-mediated real-time text-based debate between students, and how they might use multimedia recorded *in situ* to augment their views;
- To investigate how students transpose their conceptions of actual locations into two-dimensional representations of space, and the extent to which these transpositions can be successfully communicated to their peers.

The study explores how mobile phones can be used as tools for collaborative learning around two geographical tasks designed to give insights into how teenagers perceive their local environment. The intervention was a staged implementation design in such a way that pairs of Grade 9 students undertook a two-part pre-test, followed by the two distinct tasks of the intervention itself, and finally a post-test (which was identical to the pre-test).

The pre-test comprised:

- Tests of spatial intelligence developed according to Gaughran's (1996) sub-factor theory.
- The orientation of a QuickTime VR panoramic scene to match a map of the same area – students were scored by the time taken, the accuracy of the orientation and the accuracy of their location on the map of the axis of panoramic rotation.

As for the two tasks of the intervention itself, the first was the orienteering task. This comprised the following steps:

- Both pairs of students were brought to a neighborhood that was unfamiliar to them; Team A proceeded to navigate to the first checkpoint, using conventional means (following clues on a worksheet). Along the way, the team members were to keep a pictorial record of any significant landmarks or exemplars of land-use;
- Once sufficient time had elapsed, Team B proceeded to navigate to the first checkpoint. The only means Team B had at its disposal was to engage in an exchange of text- and picture-messaging with Team A about the correct route to follow. The exchange of messages was saved for subsequent examination. Further, just like Team A, Team B was also to keep a pictorial record of significant landmarks or exemplars of land-use along the route;
- The steps were repeated for additional checkpoints, time permitting.
- Team performance was analyzed in terms of the time taken to complete the route, as well as in terms of deviation from the desired route.

The second task required students to adopt and defend non-congruent social perspectives about the same neighborhood. The model followed the design below:

Team A	Exploring an area, gathering evidence to support a given point-of-view	Engaging in a Structured Academic Controversy regarding the optimal land-use of the given area
Team B	Exploring the same area, gathering evidence to support another point-of-view	

In the second task, teams of students explored a bounded area, looking for pieces of evidence that they could use to support non-congruent points-of-view. They recorded these pieces of evidence pictorially, using the phones, and exchanged these pictures in real time while still in the field, physically separated from each other. This task was only feasible given the affordances of the new generation of camera phones. Students used the evidence to explore given geographical issues regarding the bounded area, in the format of a Structured Academic Controversy. By analyzing the pictorial exchange, the study was able to identify which particular aspects of their local environments the students perceive to be relevant to the given geographic themes.

Specifically, the perspectives task comprised the following steps:

- Each team was made up of two pairs of students. Both teams were given forty-five minutes to explore a well-delineated area, with a view to gathering pictorial evidence to support a certain point-of-view. Pairs of students from the same team were encouraged to share their findings with each other, via MMS;
- For example, teams could have been tasked to investigate the extent to which a particular neighbourhood was meeting the needs of residents of public housing;
- After the initial time-period was over, both teams were given time to engage in a dialogue along the lines of a Structured Academic Controversy. This dialogue did not take place through face-to-

face interaction, but through an exchange of text- and picture-messaging, allowing the nature of the discourse to be easily archived for subsequent analysis.

In the above procedure, both teams are described to have been engaged in a dialogue regarding the needs of residents of public housing. Other topics which students were given the opportunity to investigate included discussing the site and situation of a large convention centre / exhibition complex; evaluating the tourism potential of a given neighbourhood; discussing the tension between urban renewal and the preservation of cultural heritage; exploring the compatibility of land-use around areas of scenic beauty or strategic importance; and projecting the extent to which the particular demographics of a given neighbourhood lent themselves to catalysing environmental activism.

Once they were back in class, students had to paste their pictures and printouts of the SMS exchanges (printed by the investigator) onto a large map of the area.

Some schoolmates who did not participate in the field study were invited to look at this large composite tableau about the unfamiliar locale, and stick post-its onto the tableau. These post-its were questions about the site, in relation to the given tasks. These questions were those that students felt were not addressed during the messaging exchange while in the field, and were also questions of clarification.

As a penultimate step, the students who participated in the field study collected these post-its, and proceeded to craft the end-product (typically a presentation authored in Microsoft PowerPoint), taking into account the questions from their peers. In this way, the end-product was therefore a summation of learning about the given issue pertaining to the site, as well as a document of their recommendations, based not only on their own observations in the field, but also tempered with the views of their peers.

Finally, a post-test was administered to the same students who took the pre-test. The post-test was identical in task to the pre-test, and analyses of the results enabled the extent of the assumed contribution of multimedia-messaging to students' powers of observation, cognitive mapping abilities and appreciation of multiple points-of-view to be determined.

In addition, analyses of the reasons for deviation from prescribed routes, the time taken to navigate such routes, and the exchange of text- and picture-messages among students as they seek to navigate the routes, gave valuable insights into how adolescents sought to explore and understand their local environments, in addition to how such understandings of three-dimensional environments are communicated to their peers via the media of text, pictures and video.

The study employed, as its primary pedagogical foundation, the experiential framework known as the Structured Academic Controversy. Traditionally, Academic Controversies are structured such that participants engage in face-to-face debates. This forum of interaction is somewhat contrived and cannot accurately mirror modes of adolescent discussion and negotiation outside of the formal learning environment. By taking direct advantage of the affordances of the mobile internet, the study makes the following contributions to the yet nascent body of research on pedagogical applications of social software. Specifically, the requirement that the students engage in real-time collaborative interaction while still onsite in multiple remote locations can only be properly realized with the mobile internet. No longer should students have to wait until they return to school before sharing their thoughts with their peers:

- The study thus permitted direct comparison between how students navigate in a traditional way and using the technologies of the mobile internet. Because students had to ask their peers for directions, and because their peers had to try to direct them precisely (using only text and photos), this study gave insight into how adolescents perceive issues of space and place in an urban environment.
- Further, the study encouraged students to empathize with, and defend, different points-of-view. Through this debate, students gained an appreciation of the issues pertaining to the geography of their local environments. The quality of the debate was a function of their powers of observation, and this again gave the investigator insight into what adolescents perceive as meaningful in their environment.

- Third, by marrying the use of social software to the collaborative learning framework of the Structured Academic Controversy, the study represented an attempt to redefine the traditional parameters of the Structured Academic Controversy against the more contemporary context of the hyper-connected, 'always-on', world of the adolescent.

By focusing on how the social software of the mobile internet was used by adolescents in the process of constructing negotiated and shared understandings of unfamiliar environments in which they may find themselves, the study addressed Kress's (in press) contention that, whereas speech happens in time:

> image, by contrast, is organized by the logic of space. That which I wish to represent has to be depicted in space, and the relations of the elements that I wish to depict have to be displayed through the semiotic means of space … the shift from the dominance of the book and the page to the new dominance of the screen is paralleled by a change in canonical modes of representation, away from the dominance of writing to an increasing use of image.

As educators, we should make the choice to learn more about (if not embrace) the technologies from which our charges derive so much interest, to investigate how we might best channel these sources of motivation towards improving the learning process. To quote Rheingold (2003) "the emphasis on social software today ought to be a reminder that the real capabilities of augmentation lie in the thinking and communication practices these tools enable."

Epilogue

As this study was concluded only in March 2004, initial results are tentative. Students in the study enthusiastically adopted the mobile technology in their social negotiations. The ability to rapidly understand visual representations of place and to interpret the meanings for spatial movement and communication is not a trivial task. This study sought to provide a vehicle for the students to demonstrate other forms of multimodal literacy and to situate their understandings of spatial relationships in real geographical settings.

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Appendix: Sample discourse between pairs of students

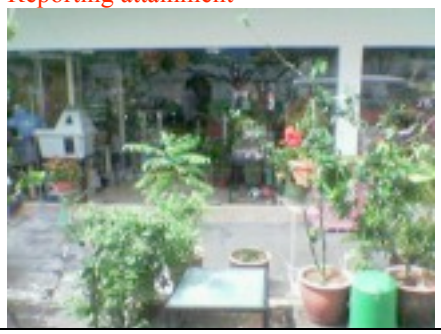
School: YTSS

Date: 30 Jan

Locale: HV

Lead: Lavina & Ziwei (0010)
Follow: Michelle & Poh Sian (0013)

Time	Lead	Follow
1452		Exploratory question A .. Where r u
1452	Instruction Hey, when u al go down , l0ok 4 the signb0ard, 'V.E.R.I.T.A.S. Check 4 understanding Got it an0t? Urgency Re asap	
1453		Acknowledgment Gt it
1455		Procedural question Then hw
1456	Instruction Walk thr0ugh the lane then turn left..Find al breed pets. Directed tip The signb0ard is hiden am0ng the trees so open ur eyes.Hehe	
1456	Walk thr0ugh the lane then turn left..Find al breed pets. The signb0ard is hiden am0ng the trees so open ur eyes.Hehe	
1456		Urgency Faster reply
1457	Walk thr0ugh the lane then turn left..Find al breed pets. The signb0ard is hiden am0ng the trees so open ur eyes.Hehe	
1459		Qn seeking elab Where is e lane
1502		Procedural qn Wat is nex
1503	Statement addressing misconception U dont walk past that veritas. Directed tip The lane is b4 the veritas. It's between the veritas and an0ther building	
1504		Reporting attainment Reach le. Procedural qn Wat is nex
1507	Verification of attainment Reach the pets le? Instruction Then cr0s the rd, walk straight, c a big signb0ard 'P'..	
1508		Reporting attainment Hav le. Found p .. Procedural qn Then?
1511	Instruction Walk towards the left then turn right..There gt a signb0ard medical centre above wats0ns..U need to cr0s rd after that	
1509		Verification of attainment Gt houses hor
1511		Reporting attainment We r at hse no.26. ,jln rumia rd
1513		Declaration of lack of understanding Wat

		talkin u
1515	Qn seeking to verify attainment, using learner's own terms Y g0t hses? Re-instruction After that P Walk towards the left mah..Then right, then u wil b facing the rd..Then gt wats0ns..Ab0ve it g0t the signb0ard medical centre..Check 4 understanding Gt it?	
1516		Reporting attainment I reach le. Procedural question Then hw
1518		Reporting attainment We r at jin merah saga rd
1519	Instruction Then reach the wats0ns..Turn left then walk straight where u wil pas by c0ld st0rage..U wil c 'better h0mes 4 us'	
1521		Acknowledgment K. Question seeking to verify attainment Holand rd shpin centre huh
1522		Procedural question After tat hw
1523	Exploratory question Where r u nw? Question seeking to verify attainment U c the better home for us already? Instruction That wil b ur next destinati0n after the dental surgery..Check 4 understanding U gt it?	
1524	Where r u nw? U c the better home for us already? That wil b ur next destinati0n after the dental surgery..U gt it?	
1526		Reporting attainment Beter hm 4 us found le . Procedural qn Then
1527		Qn verifying attainment Upgradin huh
1529		Urgency statement Faster
1529	Instruction After that, l0ok 4 senior citizens c0rner. It's under an hdb bl0ck..	
1530		Qn seeking elab Block wat
1531		Acknowledgment K .Procedural qn Then
1532	Admission of fallibility I never n0tice leh..Re-instruction Bt after that better h0me u need to turn right..Directed tip It's near i mean the distance	
1532		Reporting attainment 
1533		Reporting attainment

		
1534		Procedural question Then nex
1536	Question seeking to verify attainment, using the learner's own terms What is the mms u send? Re-instruction U reach the c0rner then..Is u walk al0ng the shelter then walk up the stairs then u wil c the fitness c0rner, Directed tip u have to l0ok out 4 the signb0ard leg lift..	
1540	Check 4 understanding Gt it? I mean the leg lift..Instruction After reach that, l0ok out for blk 10 n 11..Between that 2 bl0cks..G0t semicircle shapes, l0t of them..Request for report on attainment Reply tel us where u r..	
1543		Reporting attainment 
1547	Instruction Nw walk straight then turn right..D0nt cros rd..Bt when u are near the traffic light u wil c a cl0ck in the air, Directed tip meaning u have to l0ok up to sp0t it	
1550		Reporting attainment 
1551		Procedural qn Nex how
1554	Question seeking to verify attainment, using the learner's own terms What that mms again? Instruction After the cl0ck in the air, walk straight, u wil c NPP, nati0nal police post at bl0ck 13.	

1555		Reporting attainment I in front of the clock. Procedural qn How
1557	Qn addressing misconception U gt cr0s the rd ar? U cant cr0s it, Re-instruction just walk straight then u wil c blk 13 where there wil b signb0ard, NPP..	Then how .
1558		Acknowledgment K . Procedural qn How
1601		Reporting attainment Reach
1602	Check 4 understanding U sp0t the npp lez? Instruction Then u wil c staircase..Walk up the stairs, then turn left..U wil c blk 16..Beside it gt swimming p0ol..That what u have to l0ok out 4..	
1604		Procedural qn After swimmin pol how
1606		Reporting attainment We under blk 14
1607	Qn addressing misconception U didnt walk towards the p0ol rite?Er ,u c0uldnt walk there. U sp0t it can le. Instruction After sp0tting it, turn right where u wil c blk 14..Then can c the windmill..Statement addressing misconception D0nt go there..Just sp0t it then st0p walking, Request for report of attainment u tel me if u c the windmill, Statement of reassurance i tel u where to go after that..	
1609		Procedural qn Then how
1611	Check 4 understanding C the windmill le? Instruction If yes, then l0ok behind where there is KFC..We're inside there..C0me in to l0ok 4 us	
1611		Reporting attainment Found e wind mil le. Procedural qn Then how