

A Team Approach Sets the Stage to Enhance Learning Outcomes in Classrooms

Norman P WATERS¹

Group SolutionS, Central Queensland University
Rockhampton, Queensland, 4701, Australia

and

James L CALLAN

School of Marketing and Tourism, Central Queensland University
Rockhampton, Queensland, 4701, Australia

ABSTRACT

Despite system-wide support favouring the integration of information and communications technologies (ICTs) to leverage classroom teaching, many teachers continue to relegate such technologies to the periphery of classroom practice. Technical proficiency imposes demands that overshadow teaching requirements. Teachers all too often see the complexity associated with ICTs to be a barrier to their use.

Given the backdrop of four acknowledged dimensions to productive learning in Education Queensland schools, progress is reported here with respect to an ongoing investigation into the use of an ICT, a group support system (or GSS), to effect a shift in teaching methods.

Specifically, the application of the Zing Team Learning System (ZTLS) is considered from the standpoint of leveraging teaching and assessment. The findings stress that teachers can integrate the power of a single computer to better manage teaching. Indeed, the use of the ZTLS paves the way for collaborative teamwork. This motivates and engages students (as team participants) to move through a process based on "congenial practices" embedded within the "talk, type, read and review" operating procedure. Such an approach improves skills, extends knowledge and understanding, and provides enhanced assessment possibilities.

Keywords: Educational Informatics, Group Support Systems, Team Learning Outcomes

INTRODUCTION

Recently introduced curriculum requirements in the Queensland State Education system emphasise four dimensions to productive learning in classrooms [1]. These comprise intellectual quality, supportive classroom environments, recognition of difference, and connectedness [10].

In addressing these imperatives, research [17, 20, 35, 36] is being undertaken to ascertain the efficacy of employing the Zing Team Learning System (a GSS) for teaching and assessment in middle to upper primary class levels.

The central research question relates to the use of the ZTLS to enhance learning and assessment outcomes. While the use of GSS in educational programs has been previously documented elsewhere [15, 21, 23, 25, 29, 31, 35], few researchers have extensively sought to identify implications for mainstream pedagogy.

Early evidence suggests a range of learning activities that result in identifiable outcomes when using the ZTLS. Whether a class' attention is being taken up with a collective writing exercise, or generating rules associated with the use of a mathematical algorithm or to manage classroom behaviour, the ZTLS provides a definite means to achieve learning and assessment outcomes. The GSS literature, moreover stresses other gains such as time saved in processing ideas, fostering collaboration, and securing improved commitment and participation [8, 19, 25, 35]. Despite these claims, however, the question remains: under what rubric of teaching methods can teachers use systems like the ZTLS to incorporate the ideals of productive learning, whilst also keeping an eye on assessment requirements?

After a number of trials using the ZTLS, we claim with some confidence that the gains for both students and teachers are substantial, despite several caveats. The first involves teachers being confident enough to step back during teaching and facilitate, rather than direct the learning process [23, 28]. The second involves advanced skills associated with questioning techniques in order to sequentially lead student enquiry toward particular learning outcomes.

¹ Research Associate with the Faculty of Informatics and Communication and practicing Year 7 Teacher at Taranganba State School Yeppoon, Central Queensland, 4703, Australia

The third involves a degree of competence in being able to scan team responses to set questions, because teachers often have to renegotiate the learning focus as the class progresses through issues. These transitions are not easy, as the teacher's principal role requires a shift from that of instructor to that of facilitator in some instances, and from co-ordinator to that of negotiator in others. Finally, a teacher has to manage the basics of operating a computer and peripheral technology that makes up the GSS.

Gergen's [16] "congenial practices" framework is suggested as a purposeful approach upon which teachers and students can apply the ZTLS "talk, type, read, and review" procedure to build the basis for classroom investigation across a broad range of topics. Students come to share a multiplicity of perspectives, and reveal attitudes, knowledge and understandings with summative ease. With some planning, a teacher is enabled by a number of tools within the ZTLS to help teams co-create meaning [16, 32], thereby underwriting procedures which develop, extend and enrich the shared understanding and reasoning capacity of a learning team or an entire class.

METHODS

Individual participation that lays the groundwork for participant interdependence within a team or group is a cornerstone of GSS procedures. The ZTLS, in this instance, is particularly suited to bringing particular benefits to classrooms [4, 8]. Indeed, as recent observers of GSS facilitation techniques can attest [1-3, 18, 34, 37] the merit of such technologies [12, 30] is a consequence of both explicit and tacit responses between participants and the facilitator [32, 33]. In a classroom where a GSS is being used, a teacher's efforts to support learning can be substantial. This is because the ZTLS does not rely on participant anonymity to secure "dialogue". [13, 31, 34]. The process supports openness and transparency, as student "talk" and "type" ideas into assigned "playspaces". As ideas are transferred from "playspaces" to the "teamspace", a teacher can take a team or even an entire class through a "read" and "review" of the pooled contributions. Ideas are individually or collectively rephrased, reworked, and examined for knowledge content. This process of reconstruction, established as it is on the "duality" of a technology normally used to enhance electronic meetings [12, 32, 37], sets in train a relationship dynamic between the teachers, the

learners and the ZTLS [32]. Learners reveal aspects of their understanding and knowledge. The ZTLS provides mechanisms for that knowledge to be made explicit, immediate, and accessible for further development, extension and elaboration. The teacher engages both the learners and the technology to surface learning outcomes in concrete and explicit ways. With a working record of such outcomes, the teacher is able to profile the extent of individual contribution to the shared body of knowledge, and conduct assessment [5, 6], thereby substantiating the level of skill and knowledge a team or an entire class holds [9].

The ZTLS, in short, lends itself to grounding a wide ranging dialogue between teachers and students. This effectively underscores a social constructionist [26, 27] or poststructuralist epistemology [14, 22]. A compelling social and educational dynamic [24], that is as elegant as it is transformative, emerges as a classroom engages the ZTLS to enhance learning outcomes. Indeed a teacher is free to juxtapose any other pedagogical framework to complement the "congenial practices" [16] associated with deploying the ZTLS. For example, the use of Bloom's Taxonomy [7] can be used to pinpoint the lesson objectives that underscore learning or assessment involving the ZTLS. The operational scope for teaching is substantially enhanced from the point of facilitating delivery of curriculum, securing informed dialogue with teams of learners, as well as being able to profile the extent of learning that has taken place.

Congenial Practices - Implications for Pedagogy

Six principal components derive from the "Congenial Practices" framework which sees a pedagogical approach emphasising: (i) Relational responsibility (ii) Self-Expression (iii) Affirming the other (iv) Coordinating action (v) Self-reflexivity, and (vi) Co-creation [16].

The immediate social and educational implications, after details given in Gergen *et al.* [16, p. 679 *et seq.*], derive from using the framework congruently with the ZTLS and these comprise:

i. Relational Responsibility

This emphasises that individuals hold unique perspectives and understandings. Within the ZTLS, teams strive to accept all participants as individuals without bias or favour, without 'put downs' or ridicule (eg., where typing skills or errors with spelling are excused).

ii. Self-Expression

Recognition of difference sees that each team participant is considered central to their own narrative. To each is extended the right to 'have their story heard' and to have their say. This encourages team participants to engage each session and support the creation of composite narratives, or viewpoints.

iii. Affirming the other

Ensures team participants acknowledge the input of others through shared reading and processing of contributions. All entries are given equal and sufficient "air time" through shared appreciation of contributions that are moved from "playspace" to "teamspace", or from "teamspace" to successive layers where salient themes and leading ideas are captured or categorised.

iv. Coordinating Action

The establishment of a shared goal and suitable introduction (staging) initiates lines of enquiry using the ZTLS. A teacher negotiates a shared goal. *Co-constituting* is achieved through the teacher leading a process that establishes many useful, salient, and interesting inputs as possible. Facilitating understanding of these thereby *affirms, validates, and legitimises* the collective effort.

v. Self-Reflexivity

Team participants, firstly, reflect about their own contributions having seen what others have put forward. Secondly, each team participant is encouraged to 'let go' of his or her own idea and help scan for *best practice* while the ZTLS facilitates a "moving along" or "layering" of ideas. As individuals relinquish ownership of the ideas put forward, allied processes of analysis, refinement, synthesis and co-creation engage the learners. A number of critical thinking practices can help with this step of self-reflexivity. The teacher can explain merits of processing multiple inputs simultaneously as a working approach to developing composite narratives

vi. Co-creation

This is the goal of *transformative dialogue* borne of a facilitated and collaboratively constructed set of ideas that suggest *new realities, and new knowledge*. The shared understanding that emerges as a consequence of the ZTLS process simply

enhances team participant understanding of a topic or task.

In working towards achieving a number of superordinate educational goals the framework has provided an insightful set of principles with which to engage learning teams using the ZTLS. To date the following class-based learning activities have been successfully applied:

1. The development of class rules
2. Modelled Genre Writing
3. Evaluation of a recent camp (across an entire year level)
4. Collective composition of a modern version of a traditional children's story
5. Summative assessment of learning outcomes for an entire class

Team participants invariably find that the use of the ZTLS lends itself to pivotal questions such as:

- i. What have you learned?
- ii. How well can you now do this task?
- iii. What do you understand now that can help with the re-write of your first draft?
- iv. What improvements can you suggest, based on what you have learned?

In the *Guide to Productive Pedagogies: Classroom reflection manual* [10], the suggestion is made that learning outcomes are derived by guiding learners along a continuum of learning experiences. In classroom settings where the approach to pedagogy is underpinned by a commitment to transformative dialogue, the ZTLS offers scope to achieve an interchange in understanding and reasoning between the learners and the teacher.

RESULTS AND DISCUSSION

The following demonstrations provide two instances of such an interchange. The first, table 1, involves collective writing activity based on Roald Dahl's 'Revolt Rhymes' [11]. The second, table 2, gives a three-part insight into the formulation and eventual assessment of a set of class rules.

In the case of the first task, the topic was introduced by reading a selection of 'revolt rhymes'. Discussion between team participants followed, and the task objective to work collaboratively was identified. The teams had to incorporate at least one contribution from each participant and come up with a workable "revolt rhyme". Contributions were keyed-in, and a line from each participant was selected (relational responsibility). All participants generated a line of poetry (self-expression) and all offerings were discussed

and considered (affirmation) before being reviewed and voted upon (reflexivity) for inclusion.

Table 1: Collective Writing Activity

ZTLS approaches to learning task	Outcomes
<p>1. Collectively create a modern version of a traditional children's story based on a number of Roald Dahl's "Revolting Rhymes". Rhymes were read to stimulate creativity and introduce the genre.</p> <p>A story, The Three Billy Goat's Gruff, was chosen for group parody. Teacher typed in the lead line and all participants were invited to add their own next line. Responses were read, discussed and one was chosen or reconstructed from the range of contributions.</p>	<p>After 75 minutes of committed effort each student had contributed at least one line in the collectively worded poem.</p> <p>The team worked enthusiastically for the whole time and were very pleased with the process as well as the product. Some differences of opinion over the literary merit or otherwise tended to diminished the enthusiasm of some individuals at times.</p>

Sharing and melding of elements of different inputs (coordination) was encouraged and attention was drawn to the many different ways of expressing a particular idea. Eventually a modernised version of the "Three Billy Goats Gruff" was compiled (co-creation) wherein each participant had at least one identifiable contribution (superordinate goal). Both the product and the process were warmly received, but a small group (3 team participants) found the reflexivity quite challenging. This group held out on choices to proceed with one offering over another.

With the second task, a set of classroom rules was developed based on an initial assessment

of a world without rules. All agreed that a classroom requires a set of rules. Rules reflect an understanding of the rights, responsibilities afforded to individuals and to groups. For rules to have meaning it was decided to draw up a log of suitable consequences. Therefore, the "relational responsibility" associated with this task involved peer group effort to produce (collaboratively) a set of rules by which the class standards of behaviour would prevail. All participants were allowed equal opportunity for input (self expression) and through 'round robin reading' all keyed-in entries were considered (affirmation).

Table 2: Developing a Set of Classroom Rules

ZTLS approaches to learning task	Outcomes
2. Democracy in action - develop appropriate systems of class rules; class members contributed via keyboards though some very reluctant to engage in class discussions;	Full class agreement to adopt the rules and a high degree of ownership due to the open and engaging ZTLS process.
3. Democracy in action extension; reflection on rights and responsibilities articulated in each class rule and a review of consequences of non-compliance.	A month after compiling a set of class rules ZTLS used to review and elaborate understanding and gauge social impact of rules. Contributions were via teams of two or three respondents with roles alternating so each got to be typist and discussion leader; consensus or majority vote as needed. A very high volume of contributions allowed a full spectrum of views to aired, discussed, questioned and defended. General agreement was reached on the rights and responsibilities of each rule and a range of consequences.
4. Summative assessment of the understanding and discernible level of thinking of individuals on task - review the set of class rules (in 2 above). Individual logs of playspace entries enabled (teacher) tracking of each response.	Critically insightful data was gathered as to which participant (student) contributed unique or insightful content. The log transcript providing evidence of which team participants were, and were not, sharing, contributing, innovating, integrating knowledge and being supported by the contributions of other classmates. Quality and quantity of individual contributions were profiled as part of summative assessment record with notations for teaching consolidation, or extension.

The teacher led discussion raised the merits and demerits of contributions (coordination) before all participants reviewed the full set (reflexivity) and short listed the best contributions (co-creation). The outcome was compiled from over 100 individual contributions. There was full agreement to adopt the rules. There was a high degree of ownership due to the open and engaging process of inclusion and deliberation. A transcript of inputs was retrieved to enable the teacher to conduct further analysis of the quality and quantity of the set of ideas for further planning.

CONCLUSION

The evidence given here suggests that the ZTLS positively supports requirements for intellectual quality, supportive classroom environment, recognition of difference, and connectedness to enhance classroom learning. Teachers who are willing to recognise and acknowledge these requirements can use ICTs, such as the ZTLS, to more positively engage learners.

More research is needed to further elaborate teaching methods and practices associated with ICTs such as the ZTLS. A number of further trials, involving the technology are planned to juxtapose the requirement for assessment of learning outcomes. As each trial is conducted it becomes increasingly obvious that ZTLS helps teachers secure possibilities for profiling individual learners.

The enthusiasm of both students and teachers continues to encourage innovation in teaching in the direction of a more transformative approach to achieving ICT-enhanced pedagogies.

The prospect of setting the stage for dynamic systems of learning predicated on securing a shared commitment to richer and deeper understanding has to be acknowledged. In the face of a growing insistence that ICTs will increasingly play a decisive role in education, teachers and students need to cultivate a renewed sense of participation and collaboration.

REFERENCES

- [1] A&TSI Education Branch, "ICTs for learning: School Information Kit 2002-2003", **Education Queensland**, Accessed December 2002, Last updated 12 July 2002, <http://education.qld.gov.au/itt/learning/docs/infokit.pdf>
- [2] M. Adkins and R. Schwarz. "Embedded facilitation requirements using the skilled facilitator approach: With and across time and space", in **35th Hawaii International Conference on Systems Sciences** Hawaii2002.
- [3] P. Antunes and T. Ho, "The design of a GDSS meeting preparation tool", **Group Decision and Negotiation**, Vol. 10, Nos 1, 2001, pp. 5-25.
- [4] S. Beer, "Put a Little Zing into Your Meeting and Cut the Rut", **Financial Review**, Accessed 6th April 2000, www.afr.com.au/enterprise/innovators/innovators62.html
- [5] P. Black and D. William, "Assessment and Classroom Learning", **Assessment in Education**, Vol. 5, Nos 1, 1998, pp. 7-74.
- [6] P. Black and D. William, "Inside the black box: Raising standards through classroom assessment." **Phi Delta Kappan**, Vol. 80, Nos 2, 1998, pp. 139-148.
- [7] B.S. Bloom and D.R. Krathwohl, **Taxonomy of Educational Objectives**, New York: Addison Wesley, 1984.
- [8] J.L. Callan and G.K. Whymark. "From boardroom to mainstream classroom: Educational informatics to enhance instruction and learning", in **World Multiconference on Systemics, Cybernetics and Informatics**, Orlando, FL. 2002, pp. 585-590.
- [9] G.K.W.K. Chung, H.F. O'Neil Jr, and H.E. Herl, "The use of computer-based collaborative knowledge mapping to measure team processes and team outcomes", **Computers in Human Behavior**, Vol. 15, Nos 3-4, 1999, pp. 463.
- [10] Curriculum Innovation Branch, "A guide to Productive Pedagogies: Classroom reflection manual." **Education Queensland**, Accessed March 2003, Last updated 2002, http://education.qld.gov.au/public_media/reports/curriculum-framework/productive-pedagogies/
- [11] R. Dahl, **Roald Dahl's Revolting Rhymes**, New York: Knopf, 1982.
- [12] A.R. Dennis, et al., "Information technology to support electronic meetings", **MIS Quarterly**, Vol. 12, Nos 4, 1988, pp. 591.
- [13] J. Findlay, et al., **Creating our Future Manual**, Education & Training Foundation of New South Wales, Sydney, 1991.
- [14] M. Foucault, **Politics, Philosophy, Culture: Interviews and other writings 1977-1984**, London: Chapman & Hall, 1988.
- [15] L. Gardner, D. Sheridan, and D. White. "Computer-supported learning: A large-

- scale, web-based learning and assessment system to support flexible learning", in **34th Annual Hawaii International Conference on Systems Sciences**, Hawaii: IEEE Computer Society, 2001.
- [16] K.J. Gergen, S. McNamee, and F.J. Barrett., "Toward Transformative Dialogue", **International Journal of Public Administration**, Vol., Nos July, 2001, pp. 679 *et seq.*
- [17] I. Hughes and R. William, "Planning Your Action Research Project", **University of Sydney**, Accessed February 2003, Last updated 8 May 2001, <http://casino.cchs.usyd.edu.au/arow/reader/hughes3.htm>
- [18] P.M. Jenlink and K. Kinnucan-Wesch, "Case stories of facilitating professional development", **Teaching & Teacher Education**, Vol. 17, Nos 6, 2001, pp. 705-724.
- [19] L. Kedong and J. Zhao, "Analysis Method for Compositive Factors of Collaborative Learning in Classroom-Based and Web-Based Environment", Accessed 7th January 2002, www.icce2001.org/cd/pdf/p12/cn019.pdf
- [20] S. Kemmis and R. McTaggart, **The Action Research Planner**, Geelong: Deakin University, 1988.
- [21] M. Khalifa, R. Kwok, and R. Davison. "GSS facilitation restrictiveness in collaborative learning", in **34th Annual Hawaii International Conference on Systems Sciences**, Empirical; Students; CLTSL01 Hawaii: IEEE Computer Society, 2001, pp.
- [22] Laetitia Zeeman, *et al.*, "An Introduction to a Postmodern Approach to Educational Research", **Education**, Vol. 123, Nos 2002, pp. 96-103.
- [23] K.W. Lai, "Teachers as Facilitators in a Computer-Supported Learning Environment", **Journal of Information Technology and Teacher Education**, Vol. 2, Nos 2, 1992, pp. 287-302.
- [24] I. Parker, **Discourse Dynamics**, London: Routledge, 1992.
- [25] K.E.H. Race and K.R. Powell, "Assessing student perceptions of classroom methods and activities in the context of an outcomes-based evaluation", **Evaluation Review** Vol. 24, Nos 6, 2000, pp. 635.
- [26] T.A. Schwandt, "Constructivist, Interpretivist Approaches to Human Inquiry", in **Handbook of Qualitative Research**, N. Denzin and Y. Lincoln, Editors, Sage: Thousand Oaks, California. 1994, pp. 118-137.
- [27] J. Shotter, **Cultural Politics of Everyday Life: Social constructionism, rhetoric, and knowing of the third kind**, Milton Keynes: Open University Press, 1993.
- [28] P.G. Taylor, "Thinking About New Learning Environments", Accessed January 2003, Last updated May 2000, <http://www.aare.edu.au/99pap/tay99147.htm>
- [29] J.M. Turley, et al., "The advantages and challenges of teaching students in a virtual classroom using online instruction", **The Sapio Institute's e-learning monthly report**, Accessed 7th January 2002, http://www.nssa.us/nssairnl/NSSAJ161/NSSAJ161PDF/NSSAJ16_1_15.pdf
- [30] G.J. Vreede, de and R. Mgaya. "Supporting higher education through electronic meeting support in Tanzania", in **34th Annual Hawaii International Conference on Systems Sciences**, Hawaii: IEEE Computer Society.
- [31] S. Ward and G. Whymark. "Using GSS technology to support teams of young students dispersed in Australia's remote outback", in **World Multiconference on Systemics, Cybernetics and Informatics** Orlando, Fl. 2002.
- [32] A.M. Whiteley. "The Competitive Edge of the Future is Inimitability" (Invited keynote speaker), in **Group Decision and Negotiation**, Perth, Western Australia: Curtin University, 2002.
- [33] J. Whiteley. "Group Support Systems (GSS) as an Enabler of Ethnomethodology and Conversation Analysis", in **Group Decision and Negotiation Conference 2000** Strathclyde: University of Strathclyde, 2000.
- [34] G.K. Whymark and J.L. Callan. "Facilitating for a shared understanding", in **World Multiconference on Systemics, Cybernetics and Informatics** Orlando, Fl. 2002.
- [35] A.S. Wu, R. Farrell, and M.K. Singley. "Scaffolding group learning in a collaborative networked environment", in **Conference on Computer Support for Collaborative Learning (CSCL '02)**, Boulder, CO.2002, pp. 435-444.
- [36] D.P. Yoong and B. Gallupe, "Using action learning in GSS facilitation training", in **Managing the human side of Information Technology: Challenges and solutions**, E.J.

Szewczak and C.R. Snodgrass, Eds, Idea
Group Publishing. 2002.

- [37] P. Yoong and B. Gallupe, "The Emergence
of a Theoretical Framework for GSS

Facilitation: The Dualities of E-Facilitation."
**Journal of Systems and Information
Technology**, Vol. 5, Nos 1, 2001, pp. 59-80.