TEACHING PRACTICES FOR EFFECTIVE TEACHER-STUDENT RELATIONSHIPS IN MULTIETHNIC MATHEMATICS CLASSROOMS

ROBIN AVERILL

Victoria University of Wellington

Te Whare Wānanga o te Ūpoko o te Ika a Māui

robin.averill@vuw.ac.nz

Teacher-student relationships can strongly influence academic achievement and motivation, particularly for minority group students. Teaching practices contributing to strong academic relationships are therefore vital to understand. This article describes such practices drawn from observations of 100 Year 10 mathematics lessons involving six teachers and their classes across three mid-low socio-economic schools. For many indigenous (Māori), New Zealand Pacific, and New Zealand European students, evidence emerged that essential caring teacher behaviours include and extend beyond traditional mathematics teaching practices. Findings are presented using an holistic model of health and well-being that encompasses cognitive, social, physical, and spiritual dimensions.

Introduction

Culturally-linked issues affecting academic achievement are essential for educators to address (e.g., Alton-Lee, 2003; Castagno & Brayboy, 2008; Ministry of Education, 2008; Pang, 2005; Tyler et al., 2008; Villegas & Lucas, 2002), particularly in mathematics, a gate-keeper subject, where differences in achievement by ethnicity are often found. The importance of effective teacher-student relationships for learning, particularly for indigenous and marginalised students, is well documented (e.g., Bishop, Berryman, Tiakiwai, & Richardson, 2003; Eccles, 2004; Gay, 2000; Gorinski, Ferguson, Wendt-Samu, & Mara, 2008; Ladson-Billings, 1994). Teachers' care for their students is seen by many as an essential component of learning-focussed teacher-student relationships (e.g., Bishop et al., 2003; Gay, 2000; Hackenberg, 2010; Hill & Hawk, 2000; Noddings, 1992). Students who see their teachers as caring are more likely to continue with mathematical study (Noblit, Rogers, & McCadden, 1995; Ocean, 2005), and have positive academic attitudes, motivation, and engagement (Gay, 2000; Hudley & Daoud, 2007; Wentzel, 1997).

New Zealand schools, like many internationally, are becoming increasingly ethnically and culturally diverse. This paper describes factors that contribute to teacher care found within one part of a mixed-method study carried out with six New Zealand

multiethnic (indigenous Māori, New Zealand Pacific[1], and New Zealand European) mathematics classes and their teachers. Firstly, the theoretical and contextual background to the study is discussed. Next, Durie's (1998) holistic model of health and well-being is described in relation to this study, and then the study, analysis, and findings are outlined.

Theoretical background

Teachers showing care for their students is advocated by many and a broad range of caring teacher behaviours are discussed in the literature (e.g., Hackenberg, 2010; Haynes, Ben-Avie, & Ensign, 2003; Noddings, 1992, 1995). Authors in the field of culturally responsive teaching also promote caring teacher practices (e.g., Bishop et al., 2003; Gay, 2000; Ladson-Billings, 1994; Wlodkowski & Ginsberg, 1995). Yet how caring relationships can be nurtured may vary across ethnicities (Thompson, 1998) and research is needed to illuminate such differences and teacher care in general within mathematics instruction (Hackenberg, 2010).

Particularly relevant to this study, *manaakitanga* (nurturing relationships) is a bedrock concept for all *tikanga* (Māori cultural practices) (Macfarlane, Glynn, Grace, Penetito, & Bateman, 2008). Caring for people is also fundamental for many Pacific groups and, using a Tongan example, involves developing three aspects of the "*tangata kakato*" (the total person) (Koloto, 2004, p. 61): "*mo'ui fakasino*" (physical well-being), "*mo'ui faka'atamai*" (intellectual well-being), and "*mo'ui fakalaumalie*" (spiritual well-being) (p. 62). Implications of such cultural perspectives of interpersonal care within classrooms include expectations by students and their families of the constant use of caring teacher practices.

Care can be shown in many ways: such as by showing respect, giving advice, or by acknowledging someone or their feelings (Noddings, 1992). Students' experiences of teacher care are affected by the classroom environment (e.g., Bishop et al., 2003) and teaching practices (e.g., Anthony & Walshaw, 2007; Bishop et al., 2003; Gay, 2000; Noddings, 1992; Pang, 2005; Wlodkowski & Ginsberg, 1995). Specific teacher practices found to help develop caring teacher-student relationships include: involving students in classroom decision-making (e.g., Alton-Lee, 2003); using 'safe' questioning practices (e.g., Bills, 2000); creating a sense of shared endeavour; and incorporating particular pedagogies, for example, collaborative work (e.g., Hill & Hawk, 2000).

Understanding factors conducive to caring teacher-student relationships in mathematics learning is particularly important given persistent achievement gaps between those of dominant and marginalised ethnic groups, and the lack of representation of marginalised groups within mathematically-rich and mathematically-dependent disciplines. The literature provides a strong case for teachers to show care to their students. However, less focus has been given to how teacher care can be holistically shown within multi-ethnic classrooms, classrooms with indigenous students, and within *mathematics* learning. In this study, teacher care was explored by focussing on their care for students' mathematical progress and for their students as culturally located individuals.

[1] People living in New Zealand who have strong cultural, heritage, and family connections to their Pacific Island countries of origin.

The whare tapa wha model

Durie's (1998) *whare tapa wha* model of health and well-being (literally translated as 'the four-sided house') was chosen to discuss factors contributing to teacher care found in the study. The model has four mutually supportive dimensions: *taha hinengaro* (representing people's cognitive, psychological, and emotional well-being), *taha whānau* (relating to interpersonal characteristics), *taha wairua* (representing spiritual elements), and *taha tinana* (relating to physical well-being). In Durie's model, balance across the four dimensions is important.

Mathematical thinking can contribute to the *taha hinengaro*, and elements contributing to 'affect' such as mathematical self-concept to *taha hinengaro* and *taha wairua*. The suitability and timeliness exploring the model in this study is confirmed through the more recent use of the *whare tapa wha* model within mathematics educator professional development towards engaging Māori learners (Tertiary Education Commission, 2010).

The study

Participants included six mathematics teachers and their Year 10 classes from three urban mid-low socio-economic secondary schools with roughly equal proportions of Māori, New Zealand Pacific, and New Zealand European students. Teachers' ethnicities included four New Zealand European, one Māori/New Zealand European, and one New Zealand Asian. The 161 student participants included roughly even numbers of the target ethnicities[2] and of males and females. Students' self-reported ethnicities indicated many had multiple heritages, making reporting of results by ethnicity unsuitable.

Māori and New Zealand Pacific cultural advisors were consulted regarding all stages of the study (Averill, 2009). Reported here are the findings from the central data collection method of the larger investigation, classroom observation. An observation schedule was designed using ideas drawn from a wide range of literature, extensive consultation with cultural, teacher, and student advisors, and extensive piloting (Averill & Clark, 2007). Three data gathering periods were used - the initial four weeks of the school year, two-weeks after roughly 10 school weeks had passed, and another two-weeks 10 school weeks later. The complete data set comprised 100 lesson observations.

Analysis

Analysis is largely drawn from the data from the two study teachers whose practice most consistently displayed acts described in the literature as caring. Durie's (1998) *whare tapa wha* model was used as an interpretive typology and results will be discussed as they relate to the four sides of the *whare* in turn.

Taha hinengaro

Practices that assisted in building safe, purposeful, and engaging learning environments are pertinent to the *taha hinengaro*. These included teachers creating warm, caring classroom atmospheres with a clear focus on mathematics learning by consistently reinforcing firm boundaries, and setting high (yet attainable) expectations and ensuring students were aware of these. Teachers showed care for student learning by giving clear

[2] As recorded by schools for the Ministry of Education.

signals ("I'll know you are ready when your arms are folded and your mouths are closed."), being consistent in and explicit about their practice ("I'm coming around to see your progress. You've got five minutes and then we'll see what we think about one another's ideas"), capitalising on students' reactions and responses to promote learning, and by showing they liked and respected their students.

Caring teachers created a sense of urgency for completing tasks and maintained students' engagement by constantly challenging their thinking (e.g., by adding new ideas to discussion, helping students invent and incorporate new rules to a game, and varying activities or their styles of questioning). Involving students in lesson-related decision making (e.g., in selecting tasks or the level of difficulty of the tasks), varying lesson tasks, and sanctioning humour were further practices that showed care for students' mathematical progress.

Observed behaviours less caring of students' mathematical learning relating to *taha hinengaro* included teacher-directed rather than student-centred practices, lack of variety in lesson activities, setting uninspiring tasks, low teacher expectations (e.g., providing little work, accepting off-task behaviour), and reacting negatively to student humour or suggestions.

Taha whānau

Practices relating to *taha whānau*, those that appeared to help develop a sense of community and social responsibility, fell within four areas: nurturing class community; nurturing personal responsibility; care for learning needs; and care for students as individuals within their wider family and community contexts. Teachers nurtured students' sense of class community by letting students know something about them as individuals by telling students about themselves at the start of the year and sharing personal information relevant to students' learning. For example, one teacher discussed her child's collection of cereal box cards when introducing related probability simulation work.

Teachers nurtured students' sense of personal responsibility by showing interest in and concern for them within and outside mathematics learning (e.g., discussing health issues related to smoking with a student athlete smoker). Teachers used inclusive language (e.g., "let's see what happens when…"), prioritised students and their learning, and incorporated activities that encouraged a sense of community (e.g., mathematical games, group tasks, stories). They carefully selected learning activities that required or enabled students to share aspects of their own knowledge and personalities and used opportunities to acknowledge shared endeavours (e.g., a school athletics competition). Caring practices included addressing students' learning needs by attending to students' concerns, making calculators, equipment, and homework books available, and by showing care regarding *whakaiti* (humility) and *whakamā* (shyness, embarrassment).

Practices relating to *taha whānau* that undermined students' senses of community and community purpose included not knowing or making mistakes with students' names, disregarding students' concerns and interests, and public admonishment.

Taha wairua

Teacher practices relating to caring for the *taha wairua* included showing respect for students (e.g., by using praise, providing timely feedback about learning, and explaining

their practice) and encouraging students to self-assess their progress. The teachers typically exhibiting most care for their students incorporated one-to-one interaction with all students every lesson, often multiple times. These teachers enhanced students' sense of personal mathematical identity through modelling their own, showing students they were aware of their progress, providing many suitable engaging tasks to fill the lesson, relating tasks to students' lives, and being positive and encouraging.

Teach care was less apparent in lessons with few opportunities for students to share responsibility for their learning and little provision for student enjoyment, interest, one-to-one teacher-student interactions, or mathematical success.

Taha tinana

Practices pertaining to students' physical well-being and movement and were interpreted as relating to the *taha tinana*. Examples included students writing mathematical questions and working on the board, moving as part of a game or to indicate their progress, carrying out mathematical tasks outside the classroom, and being able to move around the room (e.g., to obtain assistance from peers or open windows). Teachers showed care for students' physical well-being through ensuring the classroom environment was comfortable, acknowledging the effects of the environment (e.g., heat) on students' learning, and showing concern for students' physical well-being. In the most caring classrooms teachers worked close to students, placing the students as important participants, showing them that the teacher was ready to assist, and enabling privacy.

Teachers less caring of students' physical well-being included few opportunities for movement and at times gave instructions resulting in student discomfort (e.g., insisting on the removal of non-uniform jersey).

In summary, teacher practices relating to care for students as culturally located individuals fitting within one or more dimensions of Durie's (1998) model were present, with many discussed above. Other examples included teachers pronouncing students' names correctly, acknowledging students' culturally-based knowledge, and greeting or praising students using Māori or Pacific Nations' languages. However, very few instances of further use of Māori and Pacific languages or of mathematical contexts drawn from these cultures were observed.

Discussion and conclusion

Attaining equitable access to mathematical achievement has been a persistent challenge for many education communities. Caring teacher-student relationships focused on enhancing learning offer one pathway towards maximising motivation and achievement. This study adds to the literature on teacher care by illustrating how caring classroom practices can be linked to the interrelated cognitive, social, emotional, physical, and dispositional aspects of mathematics learning.

Few culturally-linked models for mathematics teaching exist. This study illustrates how a model drawn from indigenous perspectives can inform teaching of indigenous, minority, and dominant culture students. Whilst the framework is drawn from indigenous Māori perspectives, the dimensions are universal and transferable to other cultures as they relate directly to the human condition and interpersonal relationships. Similar models drawn from other communities are worthy of investigation to further

add to our understanding of how best to enhance teacher-student relationships towards maximising mathematics learning.

Further exploration is possible into ways of using the model to develop teachers' practice in mathematics and other curriculum areas, and how caring teacher-student relationships can be enhanced through reflecting students' families, cultures, cultural identities, and lives in instruction.

This study indicates that a model recommended for teachers to improve their teaching of a group of students less well served by mathematics education can be relevant for teachers of students of many ethnicities. With increasingly diverse combinations of students' ethnic backgrounds and the challenges sometimes found within projects targeting specific ethnic groups (e.g., McKenzie & Scheurich, 2008; Theoharis, 2007), the generic nature of many aspects of caring teaching practice as suggested by this study provides a way towards enhancing equity of access to mathematics learning.

References

Alton-Lee, A. (2003). *Quality teaching for diverse students in schooling: Best evidence synthesis*. Wellington: Ministry of Education.

Anthony, G. & Walshaw, M. (2007). *Effective pedagogy in mathematics/pāngarau: Best evidence synthesis.* Wellington: Ministry of Education.

Averill, R. (2009). *Teacher-student relationships in diverse New Zealand Year 10 classrooms: Teacher care.* Unpublished PhD thesis, Victoria University of Wellington, New Zealand.

Averill, R., & Clark, M. (2007, April). *Development of an observation tool for multicultural classrooms.* Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago, April 9–13, 2007.

Bills, E. J. (2000). Politeness in teacher-student dialogue in mathematics: A socio-linguistic analysis. *For the Learning of Mathematics, 20*(2), 40–47.

Bishop, R., Berryman, M., Tiakiwai, S., & Richardson, C. (2003). *Te Kotahitanga: The experiences of year 9 and 10 Māori students in mainstream classrooms.* Hamilton: Māori Education Research Institute (MERI), School of Education, University of Waikato.

Castagno, A. E., & Brayboy, B. M. J. (2008). Culturally responsive schooling for Indigenous youth: A review of the literature. *Review of Educational Research, 78*(4), 941–993.

Durie, M. (1998). *Whaiora: Māori health development* (2nd ed.). Auckland, New Zealand: Oxford University Press.

Eccles, J. S. (2004). Schools, academic motivation, and stage-environment fit: In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (2nd ed., pp. 125–154). Hoboken, NJ: John Wiley.

Gay, G. (2000). *Culturally responsive teaching: Theory, research, & practice*. New York: Teachers College Press.

Gorinski, R., Ferguson, P., Wendt-Samu, T., & Mara, D. (2008). *An exploratory study of eight schools: A report for the Ministry of Education.* Wellington: New Zealand Council for Educational Research. Retrieved January 29, 2009, from http://www.tki.org.nz/e/community/pasifika/pdf/pasifika-learners.pdf

Hackenberg, A. J. (2010). Mathematical caring relations in action. *Journal for Research in Mathematics Education, 41*(3), 236–273.

Haynes, N. M., Ben-Avie, M., & Ensign, J. (Eds.). (2003). *How social and emotional development add up: Getting results in maths and science education*. New York: Teachers College Press.

Hill, J., & Hawk, K. (2000). *Making a difference in the classroom: Effective teaching practice in low decile, multicultural schools.* Wellington, New Zealand: Ministry of Education.

Hudley, C., & Daoud, A. M. (2007). High school students' engagement in school: Understanding the relationships to school context and student expectations. In F. Salili, & R. Hoosain (Eds.), *Culture, motivation and learning: A multicultural perspective* (pp. 367–391). Charlotte, NC: Information Age.

Koloto, A. (2004). A Tongan perspective on development. In W. Drewery & L. Bird (Eds.), *Human development in Aotearoa: A journey through life* (2nd ed., pp. 61–65). Auckland: McGraw Hill.

Ladson-Billings, G. (1994). *The dream keepers: Successful teachers of African American children.* San Francisco: Jossey-Bass.

Macfarlane, A. H., Glynn, T., Grace, W., Penetito, W., & Batemen, S. (2008). Indigenous epistemology in a national curriculum framework? *Ethnicities, 8*(1), 102–127.

McKenzie, K. B., & Scheurich, J. J. (2008). Teacher resistance to improvement of schools with diverse students. *International Journal of Leadership in Education, 11*(2), 117–133.

Ministry of Education. (2008). *Ka Hikitia - Managing for success: Māori education strategy 2008–2012.* Wellington, New Zealand: Author.

Noblit, G. W., Rogers, D. L., & McCadden, B. M. (1995). In the meantime: The possibilities of caring. *Phi Delta Kappan, 76*(9), 680–685.

Noddings, N. (1992). *The challenge to care in schools: An alternative approach to education.* New York: Teachers College Press.

Noddings, N. (1995). Teaching themes of care. *Phi Delta Kappan, 76*(9), 675–679.

Ocean, J. (2005). Who cares? Students' values and the mathematics curriculum. *Curriculum Matters, 1*, 130–151.

Pang, V. O. (2005). *Multicultural education: A caring-centered, reflective approach* (2nd ed.). Boston: Allyn & Bacon.

Tertiary Education Commission Te Amorangi Mātauranga Matua. (2010). *Knowing your learner: Engaging Māori learners: An introductory resource for adult literacy and numeracy educators.* Wellington: Author.

Theoharis, G. (2007). Social justice educational leaders and resistance: Toward a theory of social justice leadership. *Educational Administration Quarterly, 43*(2), 221–258.

Thompson, A. (1998). Not for the color purple: Black feminist lessons for educational caring. *Harvard Educational Review, 64*(4), 522–554.

Tyler, K. M., Uqdah, A. L., Dillihunt, M. L., Beatty-Hazelbaker, R., Conner, T., Gadson, N., & Stevens, R. (2008). Cultural discontinuity: Toward a quantitative investigation of a major hypothesis in education. *Educational Researcher, 37*(5), 280–297.

Villegas, A. M.,& Lucas, T. (2002). Preparing culturally responsive teachers: Rethinking the curriculum. *Journal of Teacher Education, 53*, 20–33.

Wentzel, K. R. (1997). Student motivation in middle school: The role of perceived pedagogical caring. *Journal of Educational Psychology, 89*(3), 411–419.

Wlodkowski, R. K., & Ginsberg, M. B. (1995). A framework for culturally responsive teaching. *Educational Leadership, 53*(1), 17–21.