

交互教學法對國中生自我效能與學業成就之影響

林佳慧、謝智玲

E-mail: 389485@mail.dyu.edu.tw

摘要

本研究目的在於設計一套適合國中七年級學生學習的交互教學融入數學科課程，並探討該課程對數學科自我效能與學業成就之影響。研究者以彰化縣K(化名)國中兩班七年級學生為研究對象，其中一班為實驗組，學生人數為29人；另一班為對照組，學生人數為30人，共59位學生。實驗組進行八週，每週四節課的實驗教學；對照組則未接受實驗處理。兩組在實驗處理前後，分別實施前測、後測，以瞭解實驗處理之差異。研究工具為「自我效能量表」與「國中新生數學能力測驗-數與式分測驗」，資料分析採用「單因子共變數分析」進行統計檢定，同時分析「活動回饋單」作為輔佐研究資料。結果發現在數學科自我效能方面，實驗組的整體自我效能、以及在數學的自我概念、數學能力與動機的信心分量表的表現優於對照組；在學業成就方面，實驗組在國中新生數學能力測驗-數與式分測驗的表現優於對照組；學生對於交互教學持正向肯定的態度。本研究根據研究目的與結果進行討論，並提出結果應用與未來研究的建議。

關鍵詞：交互教學，自我效能，學業成就

目錄

中文摘要	iii	英文摘要	iii
iv 誌謝辭		v 內容目錄	
vi 表目錄		viii 圖目錄	
x 第一章 緒論		1 第一節 研究動機	
1 第二節 研究目的		5 第三節 研究問題	
5 第四節 名詞解釋		6 第五節 研究範圍與限制	
7 第二章 文獻探討		10 第一節 交互教學	
10 第二節 自我效能		20 第三節 交互教學、自我效能與學業成就之相關研究	
25 第三章 研究方法		29 第一節 研究設計與架構	
29 第二節 實驗課程的實施		32 第三節 研究對象	
33 第四節 研究工具		33 第五節 實施程序	
41 第六節 資料處理與分析		45 第四章 研究結果	
47 第一節 交互教學對自我效能之影響		47 第二節 交互教學對學業成就之影響	
53 第三節 上課意見調查與活動回饋		56 第四節 討論	
61 第五章 結論與建議		66 第一節 結論	
66 第一節 建議		67 參考文獻	
70 附錄A 自我效能量表		83 附錄B 國中數學科交互教學教案設計	
104 附錄D 心理出版社股份有限公司同意書		85 附錄C 課程活動回饋表	
		106	

參考文獻

- 一、中文部份：吳明隆(2007)。SPSS統計應用學習實務：問卷分析與統計。台北：知城。吳明隆、涂金堂(2006)。SPSS與統計應用分析。台北：五南。李麗貞、王淑惠(2008)。交互教學法對國小學習障礙學生閱讀理解成效之研究。特殊教育中心東台灣特殊教育學報，10，71-92。周台傑、巫春貴(1994)。國中新生數學能力測驗。台北市：心理。周玉秀(2006)。從PISA看數學素養與中小學數學教育。科學教育月刊，293，2-21。洪碧霞、林素微、吳裕益(2011)。臺灣九年級學生閱讀樂趣與策略對PISA閱讀素養解釋力之探討。課程與教學季刊，14(4)，1-24。洪碧霞、蕭嘉偉、林素微(2010)。PISA數學素養認知成份分析對補救教學的意涵。課程與教學季刊，13(1)，47-66。邱亞琴、陳彩卿(2008)。國民中學學生之性別、性別角色、數學自我效能與數學成就之研究-以彰化縣國民中學三年級學生為例。立德學報，6(1)，44-58。徐千惠(2009)。交互教學法對七年級學生自我效能與國文學業成就之影響(未出版之碩士論文)。大葉大學，彰化縣。秦麗花(2007)。數學閱讀指導的理論與實務。台北市：洪葉。康桂萍(2011)。國小五年級學童閱讀理解能力與數學文字題解題能力之相關研究(碩士論文)。國立臺東大學，台東市。張宇樑(2011)。國小五年級學生數學自我效能感之調查研究。科學教育學刊，19(6)，507-530。張建妤、柯華葳(2012)。數學成就表現與閱讀理解的關係：以TIMSS 2003數學試題與PIRLS 2006閱讀成就測驗為工具。國立臺灣師範大學

教育心理與輔導學系教育心理學報, 44(1), 95-116。張春興(2004)。現代心理學。台北市:東華。教育部全國資訊網(2011)。2007國際數學與科學教育成就趨勢調查(TIMSS)。2012年12月14日取自 http://www.edu.tw/news.aspx?news_sn=5950&pages=0。陳怡君(2010)。交互教學法對國中七年級生物科學學習態度與學習成就之影響(碩士論文)。大葉大學,彰化縣。陳彥廷、柳賢(2009)。中學生對代數式中文字符號之語意理解研究:不同管道的探討。科學教育學刊, 17(1), 1-25。黃志強(2005)。閱讀與數學文字題解題歷程關係之探究。中華民國特殊教育學會年刊, 57-73。謝新傳(2010)。這樣學數學才有趣。台北市:尖端。魏佐容(2011)。提升國小六年級學童數學文字題閱讀理解能力之研究(碩士論文)。國立臺北教育大學,台北市。

二、英文部份: Abramovich, S., & Brouwer, P. (2007). How to show one-fourth? Uncovering hidden context through reciprocal learning. *International Journal of Mathematical Education in Science and Technology*, 38(6), 779 – 795. Ali, S. R., & McWhirter, E. H. (2006). Rural appalachian youth 's vocational/educational postsecondary aspirations: Applying social cognitive career theory. *Journal of Career Development*, 33(2), 87-111. Ayotola, A., & Adedeji, T. (2009). The relationship between mathematics self-efficacy and achievement in mathematics. *Procedia Social and Behavioral Sciences* 1, 953 – 957. Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review*, 84(2), 191-215. Bandura, A. (1978). Reflections on Self-efficacy, *Advances in behavior Research and Therapy*, 1, 237-269. Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147. Bandura, A. (1986). *Social Foundation of thoughts and action*. Englewood Cliffs, NJ: Prentice Hill, 92-113. Bandura, A. (1991). Social cognitive theory of moral thought and action. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Handbook of moral behavior and development*, 1, 45-103. Bandura, A. (1994). Self-efficacy. In V.S. Ramachandran (Ed.), *Encyclopaedia of human behaviour* (vol.4, pp. 71-81). New York: Academic Press. Bandura, A. (1995). *Self-efficacy in changing societies*. New York: Cambridge University Press. Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W. H. Freeman. Bandura, A. (2000). *Self-efficacy: The exercise of control*. New York: Freeman. Bandura, A. (2001). Guide for constructing self-efficacy scales. An unpublished manuscript. Stanford, CA: Stanford University. Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41, 586-598. Brown, A. L., & Campione, J. C. (1996). Psychological theory and the design of innovative learning environments: On procedures, principles, and systems. In L. Schauble, & R. Glaser (Eds.), *Innovations in learning New environments for education* (pp. 289-325). Mahwah, NJ: Lawrence Erlbaum Associates. Brown, A. L., Palincsar, A. S., & Armbruster, B. B. (1984). Instructing comprehension-fostering activities in interactive learning situations. In H. Mandi, N. Stein, & T. Trabasso (Eds.), *Learning and comprehension of texts* (pp. 757 – 787). Hillsdale, NJ: Erlbaum. Brown, S. D., & Lent, R. W. (2006). Preparing adolescents to make career decisions: A social cognitive perspective. In F. Pajares & T. Urdan (Eds.), *Adolescence and education: Vol. 5. Self-efficacy beliefs of adolescents* (pp. 201 – 223). Greenwich, CT: Information Age. Brunstein, J. C., & Kieschke, U. (2009). Improving students ' reading comprehension skills: Effects of strategy instruction and reciprocal teaching. *Learning and Instruction*, 19, 272-286. Caprara, G.V., Barbaranelli, C., & Pastorelli, C. (1998). Comparative test of longitudinal predictiveness of perceived self-efficacy and big five factors. Paper presented at the Ninth Conference on Personality, University of Surrey, UK. Carter, C. (1997). Why reciprocal teaching? *Educational Leadership*, 54 (6), 64-68. Chemers, M. M., Hu, L., & Garcia, B. F. (2001). Academic self-efficacy and first-year college student performance and adjustment. *Journal of Educational Psychology*, 93(1), 55-64. Clarck, L. (2003). Reciprocal teaching strategy and adult high school students, Kean University, Unpublished Master of Arts Degree in Reading comprehension. Collins, J. L. (1982). Self-efficacy and ability in achievement behavior. Paper presented at the meeting of the American Educational Research Association, New York. Doolittle, P. E., Hicks, D., Triplett, C. F., Nichols, W. D., & Young, C. A. (2006). Reciprocal teaching for reading comprehension in higher education: A strategy for fostering the deeper understanding of texts. *International Journal of Teaching and Learning in Higher Education*. 17(2), 106-118. Ferla, J., Valcke, M., & Cai, Y. (2009). Academic self-efficacy and academic self-concept: Reconsidering structural relationships. *Learning and Individual Differences*. 19, 499 – 505. Fuchs, L. S., Fuchs, D., Compton, D. L., Powell, S. R., Seethaler, P. M., Capizzi, A. M., Schatschneider, C., & Fletcher, J. M. (2006). The cognitive correlates of third-grade skill in arithmetic, algorithmic computation, and arithmetic word problems. *Journal of Educational Psychology*, 98(1), 29-43. Garderen, D, V. (2004). Focus on inclusion: Reciprocal teaching as a comprehension strategy for understanding mathematical word problems. *Reading and Writing Quarterly*, 20, 225-229. Gifford, M., & Gore, S. (2008). The effects of focused academic vocabulary instruction on underperforming math students. Association for Supervision and Curriculum Development, Virginia. USA. Greene, B. A., Miller, R. B., Crowson, M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students ' cognitive engagement and achievement: contributions of classroom perceptions and motivation. *Contemporary Educational Psychology*, 29, 462-482. Hacker, D., & Tenent, A. (2002). Implementing reciprocal teaching in the classroom: overcoming obstacles and making modifications. *Journal of Educational Psychology*, 94 (4), 699 – 718. Hashey, J. M., & Connors, D. J. (2003). Learn from our journey: Reciprocal teaching action research. *The Reading Teacher*, 57(3), 224-232. Hoffman, B., & Schraw, G. (2009). The influence of self-efficacy and working memory capacity on problem-solving efficiency. *Learning and Individual Differences*, 19, 91-100. Huber, C. W. (2010). The Impact of Reciprocal Teaching on Mathematics Problem Solving for Grade 4 Students. Doctor of Education for MA Degree. Hyde, A. (2006). *Comprehending math*. Portsmouth, NH: Heinemann. Joshi, R. M. (2005). Vocabulary: A critical component of comprehension. *Reading & Writing Quarterly*, 21(3), 209 – 219. Kintsch, W., & Greeno, J. G. (1985). Understanding and solving word arithmetic problems. *Psychological Review*, 92, 109-129. Kranzler, J. H., & Pajares, F. (1997). An exploratory factor analysis of the mathematics self-efficacy scale-revised (MSES-R). *Measurement and Evaluation in Counseling and Development*, 29, 215-228. Larwin, K. H. (2010). Reading is Fundamental in Predicting Math Achievement in 10th Graders. *International Electronic Journal of Mathematics Education*, 5(3), 131-145. Lee, J. (2009). Universals and specifics of math self-concept, math self-efficacy, and math anxiety across 41 PISA 2003 participating countries. *Learning and Individual Differences* 19, 355 – 365. LeFevre, D., Moore, D., & Wilkinson, I. (2003). Tape

– assisted reciprocal teaching: Cognitive bootstrapping for poor decoders. *British Journal of Educational Psychology*, 73 (1), 37 – 58. Liu, X., & Koirala, H. (2009). The effect of mathematics self-efficacy on mathematics achievement of high School students. *Northeastern Educational Research Association (NERA) Annual Conference*, University of Connecticut. Majumder, S. (2003). Factors in mathematical word problem solving: The role of inhibition. Ph.D. dissertation, York University (Canada), Canada. Retrieved July 18, 2010, from *Dissertations & Theses: A&I*. (Publication No. AAT NQ82806). Marzano, R. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA, USA: Association for Supervision and Curriculum Development. Miller, S. P., & Mercer, C. D. (1997). Educational aspects of mathematics disabilities. In D. P. Rivera (Ed.), *Mathematics education for students with learning disabilities: Theory to practice* (pp. 81-96). Austin, TX: Pro-Ed. National Research Council Staff. (1998). *Preventing reading difficulties in young children*. Washington, DC, USA: National Academies Press. Ng, D. K. E., & Stillman, G. (2007). Interdisciplinary learning: Development of mathematical confidence, value, and the interconnectedness of mathematics scales. *Mathematics: Essential Research, Essential Practice*, 2, 533-542. Oczkus, L. (2003). *Reciprocal teaching at work: strategies for improving reading comprehension*. International Reading Association. NY. USA. Oczkus, L. D. (2005). *Reciprocal teaching strategies at work: Improving reading comprehension, grades 2 – 6 [DVD]*. Newark, DE: International Reading Association. Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66, 543-578. Pajares, F., & Miller, M. D. (1994). The role of self-efficacy and self-concept beliefs in mathematical problem-solving. A path analysis. *Journal of Educational Psychology*, 86, 193 – 203. Pajares, F., & Schunk, D. H. (2001). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. In R. J. Riding & S. G. Rayner (Eds.), *International perspectives on individual differences: Self perception* (Vol. 2). Westport CT: Ablex Publishing. Pajares, F., & Valiante, G. (1999). Predictive and Medial role of the writing self-efficacy beliefs of upper elementary school students. *Journal of Educational Research*. Pajares, F., Miller, M. D., & Johnson, M. J. (1999). Gender differences in writing self-beliefs of elementary school students. *Journal of Educational Psychology*, 91, 50 – 61. Palincsar, A. S. (1986). The role of dialogue in providing scaffolded instruction. *Educational Psychologist* (1&2), 73-98. Palincsar, A. S. (1991). Scaffolded instruction of listening comprehension with first graders at risk for academic difficulty. In J. Bruer (Ed.), *Toward the practice of using sound instruction* (pp. 50 – 65). Hillsdale, NJ: Erlbaum. Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1(2), 117 – 175. Palincsar, A. S., & Brown, D. A. (1987). Enhancing instructional time through attention to metacognition. *Journal of Learning Disabilities*, 20(2), 66-75. Palincsar, A. S., & Klenk, L. (1992). Fostering literacy learning in supportive contexts. *Journal of Learning Disabilities*, 25(4), 211 – 225. Palincsar, A. S., & Perry, N. E. (1995). Development, cognitive, and sociocultural perspectives on assessing and instructing reading. *School Psychology Review*, 24(3), 331-344. Palincsar, A. S., David, Y. M., & Brown, A. L. (1989). Using reciprocal teaching in the classroom: a guide for teachers. Unpublished manuscript. Palincsar, A. S., Ransom, K., & Derber, S. (1989). Collaborative research and development of reciprocal teaching. *Educational Leadership*, 46(4), 37-40. Pietsch, J., Walker, R., & Chapman, E. (2003). The relationship among self-concept, self-efficacy, and performance in mathematics during secondary school. *Journal of Educational Psychology*, 95(3), 589 – 603. Pilonieta, P., & Medina, A. L. (2009). Reciprocal Teaching for the Primary Grades: “ We Can Do It, Too! ” . *The Reading Teacher*, 63(2), 120-129. Piper, B. D. (2008). Attitudes, Confidence, and Achievement of High-Ability Fifth Grade Math Students. Summative Projects for MA Degree. Rangappa, K. T. (1993). Effect of reading ability on mathematical performance. *Psycholinguia*, 23, 25-30. Reilly, Y., Parsons, J. & Bortolot, E., (2009). Reciprocal teaching in mathematics. *Mathematics of prime importance*. MAV Annual Conference 2009. Rosenshine, B., & Meister, C. (1994). Reciprocal teaching: A review of the research. *Review of Educational Research*, 64(4), 479-530. Sartawi, S., Alsawaie, O. N., Dodeen, H., Tibi, S., & Alghazo, I. M. (2012). Predicting Mathematics Achievement by Motivation and Self-Efficacy Across Gender and Achievement Levels. *Interdisciplinary Journal of Teaching and Learning*, 2(2), 59-77. Schunk, D. H. (1981). Modeling and attributional effects on children ’ s achievement: A self-efficacy analysis. *Journal of Educational Psychology*, 75, 848 – 856. Schunk, D. H. (1987). Peer models and children ’ s behavioral change. *Review of Educational Research*, 57, 149-174. Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26(3 & 4), 207-231. Schunk, D. H. (1995). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 281-303). New York: Plenum Press. Seymour, J. R., & Osana, H. P. (2003). Reciprocal Teaching procedure and principle: two teachers ’ developing understanding. *Teaching and Teacher Education*, 19, 325-344. Sharma, D., & Silbereisen, R. K. (2007). Revisiting an era in Germany from the perspective of adolescents in motherheaded single-parent families. *International Journal of Psychology*, 42(1), 46-58. Stricklin, K. (2011). Hands-On Reciprocal Teaching: A comprehension technique. *The Reading Teacher*, 64(8), 620-625. Taylor, J., & Cox, B. D. (1997). Microgenetic analysis of group-based solution of complex two-step mathematical word problems by fourth graders. *Journal of the Learning Sciences*, 6, 183-226. Vygotsky, F L. S. (1978). *Mind in society: The development of higher psychological process*. Edited and translated by M. Cole, V. John Steiner, S. Scribner, & E. Souberman. Cambridge, MA: Harvard University Press. Yazici, H., Seyis, S., & Atun, F. (2011). Emotional intelligence and self-efficacy beliefs as predictors of academic achievement among high school students. *Procedia Social and Behavioral Sciences*, 15, 2319 – 2323. Zimmerman, B. J. (1995). Self-efficacy and educational development. In A. Bandura (Ed.), *Self-efficacy in changing societies*, 202-231. New York : Cambridge University Press. Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), 82-91. Zimmerman, B. J., & Kitsantas, A. (2005). Homework practices and academic achievement: The mediating role of self-efficacy and perceived responsibility beliefs. *Contemporary Educational Psychology*, 30, 397 – 417.