The Effects of Cooperative Learning on Senior High School Students' Biology Class

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ABSTRACT

The purpose of this research was to understand the effect of a one-year teaching experiment of cooperative learning in 10th grade students. The main objective was to compare the biological achievements and the differences of classroom learning experi-ences of a control group and an experimental group of students under biological teach-ing, and to understand their cooperative learning attitudes, social skills, team participa-tion, teacher involvement and biological experiment courses. Using the scores in the natural science section from The Basic Competence Test for Junior High School Students as covariate, the result of the analysis of covariance on biology grade differences of the control group and the experimental group of students showed that the grades of the experimental group of students were clearly higher than those of the control group of students. On their experience of classroom learning envi-ronment, analysis of covariance using the covariate of the prior test showed that the ex-perimental group of students gave higher ratings on teacher support, student participa-tion, and exploration than the control group of students after this project. Furthermore, after surveying the experimental group of students ’ opinions toward cooperative learn-ing, we found positive feedback on social skills, team participation, teacher involvement, and biological experiment courses. Additionally, by receiving written data from students, we can also gain further understand the advantages and disadvantages of cooperative learning and teaching.

Keywords : Cooperative learning ; Learning environment ; Social skill ; Team participation ; Biological teaching

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REFERENCES

一、中文部份 丁惠琪(1999)，合作學習應用在國小數學教學之探究，國立台北師範學院課程與教學研究所未出版之碩士論文。 于富雲(2001)，從理論基礎探究合作學習的教學效益，教育資料與研究，38，22-28。 王永昌、張永宗(2002)，創造雙贏的教學策略:合作學習，生活科技教育，35(3)，2-11。 王坦(2001)，合作學習-原理與策略，北京:學苑出版社。 王柏壽(1986)，幼兒同儕關係之研究。嘉義師專

學報，16，56-63。 王坦(2002)，合作學習簡論，中國教育學刊，1，32-35。 王欣宜(2003)，高職階段智能障礙學生社交技巧課程綱要發展與應用關係，國立師範大學特殊教育研究所未出版之博士論文。 朱堅章、劉興善、華力進、邊裕淵、范珍輝、劉義周(1992)，社會科學概要晨曦，台北:國立空中大學。 江俊明(2006)，應用合作學習教學法提昇國三學生物理解題成效 之行動研究，國立彰化師範大學物理系研究所未出版之碩士論文。 吳福源(2000)，國民小學優良教師與一般教師之班級氣氛比較研究，花蓮師範學報，10，171-191。 吳麗寬、周台傑(2001)，合作學習對國小學習障礙學生閱讀理解效果與同儕社會關係之研究，特殊教育學報，15，217-271。 吳明隆、涂金堂(2006)，SPSS與統計應用分析，台北市，五南。 李田英(1995)，國小三至五年級自然科學課程學習困難之教材分析，師大學報，40，475-508。 李原、郭德俊、王巧莉(1995)，合作學習對小學生同伴關係、成就動機和成就影響的研究，心理科學，4，216-220。 李曉東、張柄松(2001)，成就目標、社會目標、自我效能及學習成績與學生求助關係，心理科學，1，54-58。 李?□u(1994)，合作學習的技術層面，國立台灣師範大學教育研究所集刊，35，151-168。 李復芝、張靜嶬(2004)，國小自然科教師是型科學價值教學之行動研究-PCDC科學探究與價值澄清法之搭配，科學教育，14，61-84。 周立勳(1994)，國小班級分組合作教學學習之研究，國立政治大學教育研究所未出版之博士論文。 Shaffer, D. R. (2003)，發展心理學(林翠湄、王雪貞、連廷嘉、黃俊豪譯)，台北市:學富書局，75-79，(原文於1999年出版)。 林生博(1989)，新數學理論與策略，台北市:五南。 林生傳(1998)，建構主義的教學評析，課程與教學，1-13。 林志彥(2002)，以「學習者為主體」的觀點探究學生心目中理想的生物教學，科學教育月刊，246，49-52。 林殷如、段曉林(2000)，國中生物課室教學活動面貌之個案研究，科學教育，10，327-343。 邱垂昌(2006)，應用概念構圖學習策略於商業會計學之研究-合作學習抑或個別學習，高雄師大學報， 21(2)，87-104。 施頂清(2000)，自我發問策略與合作學習（小組討論）對國中生國文閱讀理解的效果比較考驗，國立中山大學教育研究所未出版之碩士論文。 洪琮琪、于富雲、程炳林(2005)，網路出題與合作學習策略運用對學力提昇與學習焦慮之影響，新竹師院學報，20，219-244。 洪婭娥(1984)，實驗室在科學教學上的功能。中等教育，35(6)， 25-27。 洪蓉宜(2002)，合作學習策略在國中生物實驗教學之效益研究，國立彰化師範大學生物研究所未出版之碩士論文。 徐學正(2002)，運用合作學習教學法與班級經營策略改進國中學生學習之行動研究，國立彰化師範大學物理學系在職進修專班未出版之碩士論文。 高啟順(2003)，合作學習在班級經營上的運用，台灣教育，624，62-64。 張春興(1994)，教育心理學，台北市:東華書局。 張新仁、許桂英(2004)，國小數學領域採合作學習之教學成效，教育學刊，23，111-136。 張新仁、王金國(2003)，國小六年級實施國語科合作學習之研究，教育學刊，23，111-136。 張德銳(1993)，動機理論與教師工作士氣，台北市立師範學院學報，21，53-78。 張正仁(2005)，合作學習對國小六年級學生國語文學習成效與同儕互動影響之研究，屏東科技大學技術及職業教育研究所未出版之碩士論文。 曹永松(2001)，國中理化合作學習之行動研究，國立高雄師範大學教育學習研究所未出版之碩士論文。 莊雪芳、鄭湧涇(2003)，國中學生對生物學的態度與學習環境之研究，科學教育期刊，11(2)，171-194。 許芳菊(2005)，培養孩子面對未來的關鍵能力，天下雜誌，335，206-207。 許春蘭(2001)，國小自然科實施合作學習對低成就學生學習成效之研究，國立台中師範學院自然科教育學習未出版之碩士論文。 許美華、林坤燦(2006)，合作學習對國小普通班學習障礙兒童數學學習成效之研究，特殊教育中心東台灣特殊教育學報，8，39-69。 許崇憲(2002)，影響合作學習成效的因素:建構性活動、真實的學習情境與團體組成方式，國立政治大學學報，84，203-226。 郭重吉、張惠博(2005)，從政策層面評述國際間科學教育的改革。科學教育月刊，284，23-35。 郭文禎、張文華(2000)，國小學生投入實驗活動的方式與其對實驗看法之關係，科學教育，10，344-358。 陳忠志、Aldridge, J. M. & Taylor, P. C. (1997)，國中教師科學本質及科學教學信念對理化教室環境的影響，科學與教育學刊，6(4)，383-402。 陳美紀、徐芳敏(1999)，合作學習法應用在實用技能班會計科目學習研究，商業職業教育季刊，74，12-21。 陳鴻明(2002)，試行自然與生活科技教學模組下學生知覺的教室環境之研究，國立彰化師範大學科學教育研究所未出版之碩士論文。 教育部(2007)，普通高級中學必修科目「基礎生物(1)」課程綱要〔線上資料〕，來源: http://block.sec.ntnu.edu.tw/3c/ public/ biology.pdf〔2008, May 3〕。 章淑婷、蘇建文(1990)，幼兒人際問題解決能力與其同儕關係之研究，家政教育，11(4)，56-63。 游惠音(1996)，同儕交互發問合作學習對國小六年級學生社會科學習成就表現、勝任目標取向及班級社會關係之影響，國立台灣師範大學教育心理與輔導學系未出版之碩士論文。 黃月霞(2002)，兒童輔導與諮商-了解兒童、諮商服務、技巧訓練，台北市:五南書局。 黃台珠、Aldridge, J. M. & Fraser, B.(1998)，台灣和西澳科學教室環境的跨國研究:結合質性與量的研究方法，科學教育學刊，6(4)，343-362。 黃台珠、李嘉祥(2000)，合作學習對國中學生生物學習動機之影響，科學與教育學報，4，61-81。 黃台珠、李靜宜(1998)，一位國中生物教師班級經營與教室學習環境，科學與教育學報，2，1-32。 黃台珠、陳昱宏(2000)，從社會建構主義的觀點看一個高中生物教室的合作學習，科學與教育學報，4，21-60。 黃建瑜(1999)，國中理化教師試行合作學習之行動研究，國立高雄師範大學科學教育研究所未出版之碩士論文。 黃政傑、林佩璇(1996)，合作學習，台北市:五南書局。 黃寶園、林世華(2002)，合作學習對學習效果影響之研究:統合分析，教育心理學報，34(1)，21-41。 楊榮祥、Fraser, B. (1998)，台灣與西澳科學教室環境的合作研究－研究架構、方法及對台灣科學教育的啟思，科學教育學刊，9(2)，169-196。 楊裕灝、王國華(2002)，高中學生對生態課程興趣的探討，科學教育，12，111-126。 廖伯仁(2001)，高中生活科技合作學習之觀察研究，生活科技教育，34(11)，9-15。 劉新、林如愔、李秀玉、楊雯仙、張永達(2006)，小組合作學習的教學理念與實務，科學教育月刊，294，34-46。 蔣波(2003)，小學生競爭-合作學習與社會性發展關係的實驗研究，南京師範大學。 蔡珮穎、張文華(1999)，國一學生參與生物實驗活動之過程分析與成效檢討，科學教育，9，108-126。 蔡慧君(2004)，合作學習對學生學習成效影響之後設分析，國立新竹大學教育研究所未出版之碩士論文。 鄧國基(2004)，小組合作學習形式對學生學習行為的影響，國立台灣師範大學物理研究所未出版之碩士論文。 盧秀琴、楊明達(2005)，國小自然科合作學習的教學理論與實例介紹，國民教育，45(6)，78-87。 賴淑玲(1996)，教學策略相關研究之探討:以ARCS動機模式為架構，教學科際與教學媒體，26，36-46。 簡妙娟(2000)，高中公民科合作學習教學實驗之研究，國立高雄師範大學教育研究所未出版之博士論文。 蕭世裕(2008)，生物科技的應用〔線上資料〕，來源: http://nr.stpi.org. tw/ejournal/NSCM/9301/9301-00.pdf〔2008, May 3〕。 顏瓊芬、黃世傑(1999)，職前生物教師進行開放式科學探究過程之研究，科學教育，10，46-64。 蘇敬菱、王國華(2004)，九年一貫課程下國－學生學習環境感受之研究－以自然與生活科技領域為例，科學教育，14，127-148。 鐘樹椽、林菁(1994)，問題引導式電腦合作學習在槓桿學習成就上之研究，嘉義師院學報，8，57-92。 二、

英文部份 Abrami, P. C., & Chambers, B. (1996). Research on cooperative learning and achievement: Comments on Slavin. Contemporary Educational Psychology, 21, 70-79. Adams, D. M., & Hamm, M. E. (1990). Cooperative learning: Criti-cal thinking and collaboration across the curriculum. Illinois: Charles C Thomas. Ames, C. (1984). Achievement attributions and self-instructions under competitive and individualistic goal structures. Journal of Ex-perimental Education, 76(3), 478-487. Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Student learning strategies and motivation process. Journal of Educational Psychology, 80(3), 260-267. Ashman, A. F., & Gillies, R. M. (1997). Children ’ s cooperative be-havior and interactions in trained and untrained work groups in regular classrooms. Journal of School Psychology, 35(3), 261-279. Bandura, A. (1986). Social foundations of thought and action : A so-cial cognitive theory. New Jersey: Prentice Hall. Barkley, J. M. (2006). Reading education: Is self-efficacy important? Read Improvement, 43 (4), 194-210. Cheng, K. W. (2006). Does cooperative learning enhance the residual effects of student interpersonal relationship skills. Journal of American Academy of Business, 10 (1), 312-316. Cowie, H., Smith, P. K., Boulton, M., & Laver, R. (1994). Coopera-tion in the multi-ethnic classroom: The impact of cooperative group work on social relationship in middle school. London: David Fulton Publishers. Dinan, F. J. (2006). Opening Day: Getting started in a cooperative classroom. Journal of College Science Teaching. 35(4), 12-14. Dekker, R., & Elshout-Mohr, M.(2004). Teacher interventions aimed at mathematical level raising during collaborative learning. Educational Studies in Mathematics, 56, 39-65. Elliott, S. N., & Gresham, F. M. (1993). Social skill interventions for children. Behavior Modification. 17, 287-313. Farivar, S. H. (1985). Developing a cooperative learning program in a elementary classroom: Comparative study of innovative and tradition middle teaching and learning strategies. University of California, Los-Angeles. Fraser, B. J., & Tobin, K. (1989). Student perception of psycho-social environment in classrooms of exemplary science teachers. Journal of Research in Science Teaching, 11(1), 19-21. Franks, G. G. (2004). Cooperative Education: A Principal ’ s View. Delta Kappa Gamma Bull, 70(4), 35-37. Freedman, M. P. (1997). Relationship among laboratory instruction, attitude toward science, and achievement in science knowledge. Journal of Research in Science Teaching, 34(4), 343-357. Ghaith, G. M., Shaaban, K. M. & Harkous, S. M. (2007). An investin-gation of the relationship between forms of positive interde-pendence, social support, and selected aspects of classroom climate. Science Direct System, 35, 229-240. Gillies, R., & Ashman, A. (1998). Behavior and interactions of chil-dren in cooperative groups in lower and middle elementary grades. Journal of Educational Psychology, 90, 746-757. Gillies. R. M. (2003). Structuring cooperative group work in class-rooms. International Journal of Educational Research, 39, 35-49. Gillies. R. M. (2004). The effect of cooperative learning on junior high school during small group learning. Learning and Instruc-tion,14, 197-213. Glasser W. (1997). Choice theory and students success. The Education Digest, 63(3) , 16. Hamachek, D. (1987). Humanistic psychology : Theory, postulate and implication for educational process. In J. Glover & R. Ron-ning(Eds.), Historical Foundations of Educational Psychology, pp. 159-182. New York : Plenum Press. Hamm, M., & Adams, D. (2002). Collaborative inquiry: Working to-ward shared goals. Kappa Delta Pi Record, 38, 115-118. Johnson, D. W., & Johnson, R. T. (1985). The internal dynamics of cooperative learning groups. In Slovenia, R., et al. (Eds.) Learning to cooperate, cooperating to learn (pp. 103-124), Edina, MN: Interaction Book Company. Johnson, D. W., & Johnson, R. T. (1988). Circles of learning. Alexan-dria, VA: Association for Supervision and Curriculum Devel-opment. Johnson, D. W., & Johnson, R. T. (1989). Cooperation and competi-tion: Theory and research. Edina, Minnesota: Interaction Book Company. Johnson, D. W., & Johnson, R. T. (1991). Learning together and alone: Cooperative, competitive, and individualistic learning (4). Englewood Cliffs, New Jersey: prentice-Hall. Johnson, D. W., & Johnson, R. T. (1999). Making cooperative learning work. Theory into Practice, 38(2), 67-74. Johnson, D. W., Johnson, R. J., & Hulubec, E. J. (1990). Circles of Learning: Cooperation in the classroom. Edina, Minnesota: In-teraction Book Company. Johnson, D. W., & Johnson, R. T. (1994). Learning together and along: Cooperative, competitive, and individualistic learning (4ed). Boston: Allyn & Bacon. Joseph R. J., Laurence R. A., Susan K. W., & Patricia F. V. (2003). How cooperative learning works for special education and re-medial students. Exceptional Children, 3, 279-292. Kaiser, H. F. (1974). Little Jiffy, Mark IV. Educational and Psycho-logical Measurement, 34, 111-117. Kramareski, B., Mevarech, Z. R. (2003). Enhancing mathematical reasoning in the classroom: The effects of cooperative learning and metacognitive training. American Educational Research Journal, 40, 281-310. Ke, F., & Grabowski, B. (2007). Gameplaying for math learning: co-operative or not? British Journal of Educational Technology, 38(2), 249-259. King, A. (2002). Structuring peer interaction to promote high-level cognitive rocessing. Theory into Practice, 41(1), 33-39. Klein, J. D., Erchul, J. A., & Pridemore, D. R. (1994). Effects of indi-vidual versus cooperative learning and type of reward on per-formance and continuing motivation. Contemporary Educa-tional Psychology, 19, 24-32. Leman, P. J. (2002). Argument structure, argument content, and cogni-tive change in children， s peer interaction. The Journal of Ge-netic Psychology, 163(1), 40-57. Lowyck, J. & Poysa, J. (2001). Design of collaborative learning envi-ronments. Computer in Human Behavior, 17, 507-516. Linnenbrink, E. A., & Pintrich, P. R. (2003). The role of self-efficacy beliefs in student engagement and learning in the classroom. Reading & Writing Quarterly, 19, 119-137. Maslow, A. H. (1970). Motivation and Personality (2nd ed.). New York : Harper & Row. Mercer, N. (1996). The quality of talk in children， s collaborative ac-tivity in the classroom. Learning and Instruction, 6, 359-377. Mulryan, C. (1994). Perceptions of intermediate students ’ cooperative small-group work in mathematics. Journal of Educational Re-search, 87, 280-291. Meixia, D., Xiaobao, L., & Diana Piccolo. G. K. (2007). Teacher in-terventions in cooperative learning mathematics classes. Jour-nal Educational Research, 100(3), 162-175. Martin, H., Roland, B. (2007). Cooperative learning, motivational ef-fects, and student characteristic: An experimental study com-paring cooperative learning and direct instruction in 12th grade physics clases. Learning and Instruction, 17, 29-41. Nevgi, A., Virtanen, P., & Niemi, H. (2006). Supporting students to develop collaborative learning skills in technology-based envi-ronments. British Journal of Educational Technology, 37(6), 937-947. Newmann, F. M., & Thompson, J. A. (1987). Effects of cooperative learning on achievement in secondary schools: A summary of research. The Journal of Educational Research, 60(3), 125-137. Nichols, J. D. (1996). The effect of cooperative learning on student achievement and motivation in a high school geometry class.

Contemporary Educational Psychology, 21, 467-476. Nichols, J., & Miller, R. (1994). Cooperative learning and student mo-tivation. Contemporary Educational Psychology, 19(2), 167-178. Oishi, S. (1983). Effects of team assisted individualization in mathe-matics on the cross-race and cross-sex interactions of elemen-tary school children. Doctoral dissertation, College Park: Uni-versity of Maryland. Okebukola, P. A. (1986). Cognitive preference and learning mode as determinants of meaningful learning through concept mapping. Science Education, 72, 489-500. Piaget, J. (1962). Play, dreams and imitation in childhood. New York: Norton. Qin, Z., Johnson, D. W., & Johnson, R. T. (1995). Cooperative versus competitive efforts and problem solving. Review of Educational Research, 65, 129-144. Reigeluth, C. M. (1983). Instructional-design theories and models. Hillsdale, New Jersey: Lawrence Erlbaum Associates. Rhoades, J., & McCabe, M. E. (1985). Simple cooperative in the classroom. California : ITA Publications. Rogoff, B. (1994). Developing understanding of the idea of commu-nity of learners. Mind, Culture and Activity, 1, 209-229. Ross, J. (1995). Effects of feedback on student behavior in cooperative learning groups in a grade 7 math class. The Elementary School Journal, 96, 125-143. Schweinle, A., Meyer, D. K., & Turner, J. C. (2006). Striking the right balance: Students ’ motivation and affect in elementary mathe-matics. The Journal of Educational Research, 99(5), 271-293. Shachar, H., & Sharan, S. (1994). Talking, relating, and achieving: Effects of cooperative learning and whole-class instruction. Cognition and Instruction, 12, 313-353. Sharan, S. (1980). Cooperative learning in small groups: Recent methods and effects on achievement, attitudes, and ethnic rela-tions. Review of Educational Research, 50, 241-271. Slavin, R. (1984). Team-assisted individualization: Cooperative learning and individualization instruction in the mainstreamed classroom. Remedial and Special Education, 5(6), 33-42. Slavin, R. E. (1983). When does cooperative learning increase student achievement. Psychological Bulletin, 94(3), 429-445. Slavin, R. E. (1990a). Cooperative learning: Theory, research, and practice. Needham Heights, Massachusetts: Allyn & Bacon. Slavin, R. E. (1990b). Comprehensive cooperative learning models: Embedding cooperative learning in the curriculum and the school. In S. Sharan (Ed), Cooperating Learning Theory and Research. 260-280. New York: Praeger. Slavin, R. E. (1995). Cooperative learning: Theory, research, and practice. (2nd ed). Boston: Allyn and Bacon. Slavin, R., & Karweit, N. (1985). Cognitive and affective outcomes of an intensive student team learning experience. Journal of Ex-perimental Education, 50, 29-35. Slavin, R., Leavey, M., & Madden, N. (1986). Team-accelerated in-struction-mathematics. Watertpwn, MA. Mastery Education Corporation. Slavin, R., Madden, N., & Leavey, M. (1984). Effects of cooperative learning and individualized instruction on the social acceptance, achievement, and behavior of mainstreamed students. Excep-tional Children, 50, 434-443. Stevens, R., & Slavin, R. (1995). The cooperative elementary school: Effects on students ’ achievements, attitudes, and social relations. American Educational Research Journal, 32, 321-351. Tan, I. G. C., Shanar, S., & Lee, C. K. E. (2007). Group investigation effects on achievement, motivation, and perceptions of students in singapore. Journal of Educational Research, 100(3), 142-154. Tapia, J. A. & Pardo, A. (2006). Assessment of learning environment motivational quality from the point of view of secondary and high school learnings. Learning and Instruction, 16, 295-309. Updegraff, k. A., Debra, A., Estrada, A. U., Sales, L. J., & Leonard, S. A. (2002). Young adolescents ’ experiences with parents and friends: Exploring the connections. Family Relations, 51, 72-80. Vygotsky, L. (1978). Mind in society: The development of higher psy-chological processes. Cambridge, Massachusetts: Harvard Uni-versity Press. Web, F. M., & Fariver, S. H. (1994). Promoting helping behavior in cooperative small groups in middle school mathematics. American Educational Research Journal, 13(2), 21-39. Web, N. M. (1985). The role of gender in computer programming learning processes. Journal of Educational Computing Research, 1, 441-457. Wilson, B. G. (1995). Metaphors for instruction: Why we talk about learning environment. Educational Teachnology, 35(5), 25-30. Wittrock, M. C. (1978). The cognitive movement in instruction. Edu-cational Psychology, 13, 15-29.