

~2018 年數理教育研究所~
(2018 年 2 月至 2018 年 7 月)

指導老師：林碧珍教授

課程名稱：數學臆測與論證教學

授課時間：星期一 13:20-16:10

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分機號碼：72753

課程目標：

- 一、 瞭解數學臆測與論證的意義及內涵
- 二、 建立數學臆測的理論及論證品質
- 三、 分析數學課堂論證教學
- 四、 數學推理與論證關係

教科書及參考資料：

1. Asterhan, C. S., & Schwarz, B. B. (2009). Argumentation and explanation in conceptual change: Indications from protocol analyses of peer-to-peer dialog. *Cognitive science*, 33(3), 374-400.
2. Chen, Y. C., Hand, B., & Norton-Meier, L. (2017). Teacher roles of questioning in early elementary science classrooms: A framework promoting student cognitive complexities in argumentation. *Research in Science Education*, 47(2), 373-405.
3. Conner, A., Singletary, L. M., Smith, R. C., Wagner, P. A., & Francisco, R. T. (2014). Identifying Kinds of Reasoning in Collective Argumentation. *Mathematical Thinking and Learning*, 16(3), 181-200.
4. Forman, E. A., Larreamendy-Joerns, Stein, M. K., & Browns, C. A. (1998). „You’re going to want to find out which and prove it“: Collective argumentation in a mathematics classroom. *Learning and Instruction*, 8(6), 527-548.
5. Hufferd-Ackles, K., Fuson, K., & Sherin, M. G. (2004). Describing levels and components of a math-talk learning community. *Journal for Research in Mathematics Education*, 35, 81-116.
6. Krummheuer, G. (2000a). Mathematics learning in narrative classroom cultures: Studies of argumentation in primary mathematics education. *For the Learning of Mathematics*, 20(1), 22-32.
7. Krummheuer, G. (2000b). Studies of argumentation in primary mathematics education. *ZDM*, 5, 155-161.
8. Krummheuer, G. (2007). Argumentation and participation in the primary mathematics classroom: Two episodes and related theoretical abductions. *Journal of Mathematical Behavior*, 26(1), 60-82.
9. Nussbaum, E. M. (2008). Collaborative discourse, argumentation, and learning: preface and literature review. *Contemporary Educational Psychology*, 33, 345-359.

10. Erna, Y. (2004). Theoretical perspectives for analyzing explanation, justification and argumentation in mathematics classrooms. *Journal of the Korea Society of Mathematics Education Series D: Research in Mathematical Education*, 8(1). 1-18
11. McNeill, K. L., Katsh-Singer, R., González-Howard, M., & Loper, S. (2016). Factors impacting teachers' argumentation instruction in their science classrooms. *International Journal of Science Education*, 38(12).
12. Ayalon, M., & Even, R. (2014). Factors shaping students' opportunities to engage in argumentative activity. *International Journal of Science and Mathematics Education*, 1-27. 10.1007/s10763-014-9584-3
13. International Journal of Educational Research Editorial (2014). Textbook analyses on reasoning-and-proving: Significance and Challenges. *International Journal of Educational Research*, 63-70.
14. Bieda, K. N., Ji, X., Drwencke, J., & Picard, A. (2014). Reasoning-and-proving opportunities in elementary textbooks. *International Journal of Educational Research*, 64, 71-80.
15. 林碧珍主編 (2016) 。數學臆測任務設計與實踐。台北：師大書苑。

教學進度：

| 日期 | 教學內容 | 備註 |
|-------|------------------------|--|
| 02/26 | 課程準備週 | |
| 03/05 | 數學課堂論證的理論架構 Ref #10 | Erna, Y. (2004). |
| 03/12 | 數學課對話的理論架構 Ref #5 | Hufferd-Ackles, K., Fuson, K., & Sherin, M. G. (2004). |
| 03/19 | 數學課堂的集體論證 Ref #8 | Krummheuer, G. (2007). |
| 03/26 | 數學課堂的集體論證 Ref #7 | Krummheuer, G. (2000a) |
| 04/02 | 數學課堂的集體論證 Ref #6 | Krummheuer, G. (2000b). |
| 04/09 | 數學課堂的集體論證 Ref #4 | Forman, E. A., Larreamendy-Joerns, Stein, M. K., & Browns, C. A. (1998) |
| 04/16 | 論證與學習 Ref#1 | Asterhan, C. S., & Schwarz, B. B. (2009). |
| 04/23 | 論證與推理關係 Ref#3 | Conner, A., Singletary, L. M., Smith, R. C., Wagner, |

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|-------|------------------------|--|
| | | P. A., & Francisco, R. T. (2014). |
| 04/30 | 論證與證明 Ref#5 | Forman, E. A., Larreamendy-Joerns, Stein, M. K., & Browns, C. A. (1998). |
| 05/07 | 教師在論證教學中扮演的角色 Ref#2 | Chen, Y. C., Hand, B., & Norton-Meier, L. (2017). |
| 05/14 | 影響論證教學的因素 Ref#11 | McNeill, K. L., Katsh-Singer, R., González-Howard, M., & Loper, S. (2016). |
| 05/21 | 影響論證教學的因素 Ref#12 | Ayalon, M., & Even, R. (2014). |
| 05/28 | 論證的教科書分析 Ref#13 | International Journal of Educational Research Editorial (2014). |
| 06/04 | 論證的教科書分析 Ref#14 | Bieda, K. N., Ji, X., Drwencke, J., & Picard, A. (2014). |
| 06/11 | 數學臆測任務設計實務 | 林碧珍主編 (2016) |
| 06/18 | 數學臆測任務設計實務 | 林碧珍主編 (2016) |

評量方法：

上課參與：40%

數學反思日誌：40%

教學實作：30%