华东师范大学亚洲数学教育中心
第三届学术研讨会

THE THIRD ACME SYMPOSIUM ON MATHEMATICS EDUCATION

主　办

华东师范大学亚洲数学教育中心

协　办

上海市核心数学与实践重点实验室

上海“立德树人”数学教育教学研究基地（华东师大）

華東師範大學 | 数学科学学院

School of Mathematical Sciences, East China Normal University

2023年11月9日－12日

WELCOME TO SHANGHAI

目录（Contents）

欢迎辞

尊敬的各位与会者：

您好！

漫长的三年疫情之后，在这个春种秋收的美好季节里，我们迎来了华东师范大学亚洲数学教育中心第三届国际学术研讨会。本次会议由华东师范大学亚洲数学教育中心主办、上海“立德树人”数学教育教学研究基地（华东师大）和上海市核心数学与实践重点实验室共同协办。会议主题为“现代数学教育改革和发展：问题与挑战”，也兼顾数学教育其他领域。

华东师范大学亚洲数学教育中心首届和第二届国际学术研讨会已先后于2018年和2019年成功举办，反响热烈。本次学术研讨会希望继续依托亚洲数学教育中心数学教育研究资源优势，邀请国内外（包括六大洲二十多个国家和地区）的三百多名数学教育学者和所有关心、支持数学教育研究和实践发展的同行相聚于上海共同交流探讨，促进国内外数学教育交流，为中国、亚洲和世界的数学教育和教育事业的进步作出贡献。

在此，我们谨代表主办方、协办方以及全体会议组织者对出席会议的各位嘉宾、国内外专家学者和所有与会者表示热烈的欢迎！同时也衷心祝愿会议的每一位参与者，在美丽的华东师范大学闵行校区和世界“魅力之都”上海，度过一段愉快和有收获的会议时光！

范良火

国际程序委员会主席

华东师范大学数学科学学院特聘教授

华东师范大学亚洲数学教育中心主任

Celia Hoyles

国际程序委员会主席

女爵, 英国伦敦大学学院教授

首届（2004 年）Hans Freudenthal 奖获得者

贾挚

当地组织委员会主席

华东师范大学数学科学学院副教授

华东师范大学数学科学学院党委书记

Welcome Message

Dear Colleagues,

It is our great pleasure to invite you to participate in the Third International Symposium on Mathematics Education organized by the Asian Centre for Mathematics Education (ACME), East China Normal University (ECNU), or the Third ACME International Symposium, to be held from 9th to 12th November, 2023.

The theme of this symposium is "Reform and Development of Contemporary Mathematics Education: Issues and Challenges". It includes contributions in various areas concerning mathematics education. The symposium is also supported by the Shanghai "Nurturing Character and Developing People" School Mathematics Education Research Base (ECNU) and the Shanghai Key Laboratory of Core Mathematics and Mathematical Practice as co-organizers.

The first and second ACME International Symposium were successfully held in 2018 and 2019, respectively, and highly commended. The Third ACME International Symposium is committed to maintaining a level of excellence. We are glad to see that more than 300 participants from all over the world, including six continents and over 20 countries/regions, will meet in the symposium to share ideas and discuss issues concerning mathematics education in Shanghai, contributing to the advancement of mathematics education and education in China, Asia and the world.

On behalf of the organizer, co-organizers and all the organization team members of the symposium, we extend our warm welcome to the guests, friends and participants to the symposium! We hope each and every one of you will have a happy and fruitful time at the beautiful Minhang campus of ECNU and in Shanghai, one of the most dynamic and charming cities in the world, during the symposium!

Lianghuo Fan

Chair, International Programme Committee

Distinguished Professor/East China Normal University

Director, Asian Centre for Mathematics Education, ECNU

Celia Hoyles

Chair, International Programme Committee

Dame, Professor/University College London, UK

First Recipient, Hans Freudenthal Medal (2004)

Zhi Jia

Chair, Local Organization Committee

Associate Professor/East China Normal University

Chair, Board of the School of Mathematical Sciences, ECNU

组织结构

国际程序委员会（IPC）

主席：

范良火（华东师范大学特聘教授，亚洲数学教育中心主任）

Celia Hoyles（女爵，英国伦敦大学学院教授，首届/2004 年 Hans Freudenthal 奖获得者）

荣誉主席：

顾泠沅（华东师范大学数学科学学院荣誉教授，上海青浦数学教育教改实验创立者）

成　员：

鲍建生（华东师范大学教授，亚洲数学教育中心副主任）

蔡金法（美国特拉华大学 Kathleen and David Hollowell 终身讲席教授，*Journal for Research in Mathematics Education* 前主编）

郭玉峰（北京师范大学教授，第一届张奠宙数学教育奖获得者）

梁贯成（香港大学讲座教授，国际数学教育委员会主席）

吕长虹（华东师范大学教授，数学科学学院院长）

綦春霞（北京师范大学教授，课程与教学研究院副院长）

Alan Schoenfeld（美国加州大学伯克利分校教授，2011 年 Felix Klein 奖获得者）

Gert Schubring（巴西里约热内卢联邦大学教授，2019 年 Hans Freudenthal 奖获得者）

佘伟忠（澳大利亚墨尔本大学教授，*Mathematics Education Research Journal* 副主编）

Yoshinori Shimizu（日本筑波大学教授，日本数学教育学会会长）

谈胜利（华东师范大学教授，亚洲数学教育中心副主任）

Catherine P. Vistro-Yu（菲律宾雅典耀大学教授，《亚洲数学教育学刊》副主编）

王建磐（华东师范大学原校长，亚洲数学教育中心国际顾问委员会主席）

熊斌（华东师范大学教授，上海市核心数学与实践重点实验室主任）

徐斌艳（华东师范大学教授，亚洲数学教育中心副主任）

秘书：

李淑惠 博士（华东师范大学明园晨晖学者，数学科学学院讲师）

李娜 博士（华东师范大学数学科学学院博士后，亚洲数学教育中心科研助理）

本地组织委员会（LOC）

主席：

贾挚 （华东师范大学数学科学学院党委书记）

委员：

曹思圆、程靖、丁丹凤、范良火、房爱莲、李娜、李淑惠、柳笛、刘攀、鲁小莉、罗栗、吴颖康、吴酉毅、杨琪、余富团、张凤华、张广潮、张红艳、朱雁

秘书：

张凤华、张广潮

注：*所有本地组织委员会成员均为华东师范大学数学科学学院、教师教育学院和计算机科学与技术学院的教师和工作人员。*

International Programme Committee (IPC)

Chair：

Lianghuo Fan (Distinguished Professor/East China Normal University, China; Director of Asian Centre for Mathematics Education)

Celia Hoyles (Dame, Professor/University College London, UK; First Recipient of the Hans Freudenthal Medal in 2004)

Honorary Chair:

Lingyuan Gu (Honorary Professor/East China Normal University, China; Founder of the "Shanghai Qingpu" Teaching Reform Experiment)

Member:

Jiansheng Bao (Professor/East China Normal University, China; Deputy Director of Asian Centre for Mathematics Education)

Jinfa Cai (Kathleen and David Hollowell Professor/The University of Delaware, USA; Former Editor-in-Chief of *Journal for Research in Mathematics Education*)

Yufeng Guo (Professor/Beijing Normal University, China; Recipient of the First Zhang Dianzhou Award in Mathematics Education)

Frederick Leung (Chair Professor and Kintoy Professor/The University of Hong Kong, China (Hong Kong); President of the International Commission on Mathematical Instruction)

Changhong Lv (Professor/East China Normal University, China; Dean of the School of Mathematical Sciences)

Chunxia Qi (Professor/Beijing Normal University, China; Deputy Director of the Institute of Curriculum and Teaching of Beijing Normal University)

Alan Schoenfeld (Elizabeth and Edward Conner Professor/The University of California-Berkeley, USA; Recipient of the 2011 Felix Klein Award)

Gert Schubring (Professor/The Universidade Federal do Rio de Janeiro, Brazil; Recipient of the 2019 Hans Freudenthal Medal)

Wee Tiong Seah (Professor/The University of Melbourne, Australia; Associate Editor of *Mathematics Education Research Journal*)

Yoshinori Shimizu (Professor/The University of Tsukuba, Japan; President of Japan Society of Mathematics Education)

Shengli Tan (Professor/East China Normal University, China; Deputy Director of Asian Centre for Mathematics Education)

Catherine P. Vistro-Yu (Professor/Ateneo de Manila University, Philippines; Associate Editor of *Asian Journal for Mathematics Education*)

Jianpan Wang (Professor/East China Normal University, China; Chair of the International Advisory Board of Asian Centre for Mathematics Education);

Bin Xiong (Professor/East China Normal University, China; Director of Shanghai Key Laboratory of Core Mathematics and Mathematical Practice)

Binyan Xu (Professor/East China Normal University, China; Deputy Director of Asian Centre for Mathematics Education)

Secretary:

Shuhui Li (Lecturer/East China Normal University, China; Mingyuan Chenhui Scholar)

Na Li (Post-doc Research Fellow/ACME, East China Normal University, China)

Local Organizing Committee (LOC)

Chair:

Zhi Jia (Chair, Board of the School of Mathematical Sciences, ECNU)

Member:

Siyuan Cao, Jing Cheng, Danfeng Ding, Lianghuo Fan, Ailiang Fang, Na Li, Shuhui Li, Li Luo, Pan Liu, Di Liu, Xiaoli Lu, Yingkang Wu, Youyi Wu, Futuan Yu, Qi Yang, Fenghua Zhang, Guangchao Zhang, Hongyan Zhang, Yan Zhu

Secretary:

Fenghua Zhang, Guangchao Zhang

Note: *All LOC members are faculty/staff members of the School of Mathematical Sciences, College of Teacher Education and School of Computer Science and Technology, East China Normal University.*

参会指南

欢迎您参加“华东师范大学亚洲数学教育中心第三届学术研讨会”，我们将竭诚为您提供优质服务。请仔细阅读如下事项：

一、会议时间：

报到时间：2023 年 11 月 8 日（仅限报名学校参访者）

2023 年 11 月 9 日

报到地点：上海市闵行区东川路 500 号 华东师范大学 学生之家

学校参访时间：2023 年 11 月 9 日

参访学校：上海惠灵顿外籍人员子女学校、上海民办华曜宝山实验学校、上海市闵行区教育学院附属友爱实验中学、上海市洋泾菊园实验学校

会议时间：2023 年 11 月 10 日-12 日

地点：华东师范大学（闵行校区）：**学生之家 C 区** 和 **第二教学楼**

二、会议秩序：

1. 请会议代表凭胸牌准时进入会场；
2. 会场内，请将手机设置为关机、振动或静音状态；
3. 未经会务组同意，请勿擅自在现场摄录；
4. 会议期间，请妥善保管好自己的随身物品，谨防遗失。

三、会议用餐地点和时间：

与会代表凭当日餐券到**夏雨厅（华闵食堂）**三楼用餐（除 11 月 11 日中午餐厅地点为**冬日厅**一楼外）。

用餐时间：

日期	11.8	11.9	11.10	11.11	11.12
午餐	/	/	12:15-13:15	12:00-13:00	11:30-12:30
晚餐	17:30-18:30		17:00-18:00		/

四、会务组联系方式：

联系人：张凤华 18621 800506；李娜 18818272441

会务邮箱：acmeconf@math.ecnu.edu.cn

大会志愿者均佩戴黄色胸牌，如有疑问或需要帮忙，请直接与他们咨询、联系。

五、医疗服务：

1. 上海市闵行区中西医结合医院

地址：上海市闵行区剑川路 155 号

就诊时间：07:30-20:30

急诊电话：(021)64502371

2. 复旦大学附属上海市第五人民医院

地址：上海市闵行区瑞丽路 128 号

就诊时间：除中医科、皮肤科外，全院各科急诊 24 小时对外开放

急诊电话：(021)64308151

六、相关网站：

中心网址：http://acme.ecnu.edu.cn

会议网址：https://math.ecnu.edu.cn/academia/acme2023/index.html

General Information for Participants

Welcome to the Third ACME Symposium. We will spare no effort to offer you a high-quality service. Please read the following information carefully:

I. Time & Venue of the Symposium Activities

Registration

Dates: 8 November 2023 (For those who join the school visit) & 9 November 2023

Venue: Home of Students (Campus Centre), East China Normal University, 500 Dongchuan Road, Minhang District, Shanghai, China

School Visit

Time: 9 November 2023

School to visit: Wellington College International Shanghai; Shanghai Huayao Baoshan Experimental School; You Ai Experimental Middle School Affiliated to Minhang Education Institute; Shanghai Yangjing-Juyuan Experimental School

Symposium

Time: 9 to 12 November 2023

Venue: ECNU Minhang Campus: Campus Centre C & Teaching Building No. 2.

II. General Guidelines

1. Please go to the venues in time, wearing your conference badge;
2. When you are in the symposium venues, please set your mobile to mute or vibration mode, or turn it off;
3. Please **DO NOT** videotape in the venue without the permission from the Symposium organizers;
4. During the symposium, please take good care of your personal safety and belongings.

III. Time & Venue for Dining

Participants dine on the third floor of Xiayu Canteen with given coupons, except for the lunch on 11 November on the first floor of Dongri Canteen with given coupons.

Lunch/Dinner time:

Date	8 Nov.	9 Nov.	10 Nov.	11 Nov.	12 Nov.
Lunch	/	/	12:15-13:15	12:00-13:00	11:30-12:30
Dinner	17:30-18:30		17:00-18:00		/

IV. Contact

When needed, please call ZHANG Fenghua at +8618621800506 or LI Na at +8618818272441, email to acmeconf@math.ecnu.edu.cn, or ask a volunteer, wearing a conference badge with a yellow lanyard.

V. Medical Service

1. Shanghai Minhang TCM-integrated Hospital

   Address: 155 Jianchuan Road, Minhang District, Shanghai

   Office hour: 07:30-20:30

   Emergency Call phone number: +86(021)64502371

2. Shanghai Fifth People's Hospital, Fudan University

   Address: 128 Ruili Road, Minhang District, Shanghai

   Office hour: Except for Chinese Medicine Department and Dermatology Department, all departments' emergency offices are open for 24 hours.

   Emergency Call phone number: +86(021)64308151

VI. Symposium Websites

ACME website: http://acme.ecnu.edu.cn

The Third ACME Symposium website:

https://math.ecnu.edu.cn/academia/acme2023/en/index.html

校园地图


宝龙艺悦酒店
剑川路399号校门
N
W
E
S
冬日厅
校医院
华东师范大学
学生之家（大学生活动中心）
夏雨厅（华闵食堂）
虹梅南路5800号校门
第二教学楼
莲花南路5005号校门
数学楼
紫竹高新区地铁站8号口
莲花南路
东川路
东川路辅路
广场路

Campus Map


Shanghai Wujing Artels Hotel
宝龙艺悦酒店
Gate (399 Jianchuan Road)
剑川路399号校门
East China Normal University
Dongri Canteen
冬日厅
华东师范大学
N
W
E
S
Infirmary
校医院
Home of Students (Campus Centre)
学生之家（大学生活动中心）
Xiayu Canteen
夏雨厅（华闵食堂）
Gate (5800 Hongmei South Road)
虹梅南路5800号校门
No. 2 Teaching Building
第二教学楼
Gate (5005 Lianhua South Road)
莲花南路5005号校门
Mathematics Building
数学楼
Metro Station (Zizu High-tech Zone)
紫竹高新区地铁站8号口
莲花南路
东川路
东川路辅路
广场路

会议日程

Symposium Schedule

总日程

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<tr><th>时间
(UTC+8)</th><th>11月8日
星期三</th><th>11月9日
星期四</th><th>11月10日
星期五</th><th>11月11日
星期六</th><th>11月12日
星期日</th><th>时间
(UTC+8)</th></tr>
<tr><td>8:00</td><td rowspan="19">报到&注册
（学校观摩者）
14:00-17:30</td><td rowspan="10">学校观摩*</td><td colspan="3">注册 & 展览
8:00-8:30</td><td>8:00</td></tr>
<tr><td>8:30</td><td>开幕式
8:30-9:00
（主持人：周国栋教授）</td><td rowspan="2">大会报告三
第一届张奠宙数学教育奖获奖人报告
8:30-9:30
郭玉峰教授
（主持人：柳笛副教授）</td><td rowspan="2">大会报告六
8:30-9:30
Trena Wilkerson教授
（主持人：李淑惠博士）</td><td>8:30</td></tr>
<tr><td>9:00</td><td rowspan="2">大会报告一
9:00-10:00
Susanne Prediger 教授
（主持人：蔡春霞教授）</td><td>9:00</td></tr>
<tr><td>9:30</td><td rowspan="2">大会报告四
第二届张奠宙数学教育奖获奖人报告
9:30-10:30
朱雁副教授
（主持人：鲁小莉副教授）</td><td>休息 & 交流 & 展览
9:30-10:00</td><td>9:30</td></tr>
<tr><td>10:00</td><td>休息 & 交流 & 展览
10:00-10:30</td><td rowspan="2">大会报告七
10:00-11:00
梁贯成教授
（主持人：徐斌艳教授）</td><td>10:00</td></tr>
<tr><td>10:30</td><td rowspan="2">大会报告二
10:30-11:30
Takeshi Miyakawa教授
（主持人：莫雅慧副教授）</td><td>休息 & 交流 & 展览
10:30-10:50</td><td>10:30</td></tr>
<tr><td>11:00</td><td rowspan="2">大会圆桌讨论
(Panel Discussion)
10:50-12:00
主持人：范良火教授
讨论人：
Jonei Cerqueira Barbosa教授,
Martin Dyke教授, Anjum Halai教授,
Moneoang Leshota博士,
Frederick K. S. Leung教授,
Wee Tiong Seah教授,
Trena Wilkerson教授</td><td rowspan="2">闭幕式
11:00-11:30
（主持人：张凤华）</td><td>11:00</td></tr>
<tr><td>11:30</td><td>展览
11:30-12:15</td><td rowspan="2">午餐
11:30-12:30</td><td>11:30</td></tr>
<tr><td>12:00</td><td rowspan="2">午餐
12:00-13:00</td><td>12:00</td></tr>
<tr><td>12:30</td><td rowspan="3">午餐
12:15-13:30</td><td rowspan="8">离会
12:30-</td><td>12:30</td></tr>
<tr><td>13:00</td><td rowspan="2">展览 & 新书发布会
13:00-14:00</td><td>13:00</td></tr>
<tr><td>13:30</td><td rowspan="3">平行论坛一
TSG1(1), 3(1), 4(1), 4(2), 5(1), 7(1); 工作坊1 & 2(1)
13:30-15:00</td><td>13:30</td></tr>
<tr><td>14:00</td><td rowspan="2">报到&注册
14:00-17:30</td><td rowspan="2">大会报告五
14:00-15:00
Jeremy Hodgen教授
（主持人：吴颖康副教授）</td><td>14:00</td></tr>
<tr><td>14:30</td><td>14:30</td></tr>
<tr><td>15:00</td><td>休息 & 交流
15:00-15:30</td><td>休息 & 交流
15:00-15:30</td><td>15:00</td></tr>
<tr><td>15:30</td><td rowspan="4">平行论坛二
TSG1(2), 2(1), 3(2), 4(3), 4(4), 7(2); 工作坊 3
15:30-17:00</td><td rowspan="4">平行论坛三
TSG1(3), 2(2), 3(3) & 6, 4(5), 4(6), 5(2); 工作坊 2(2)
15:30-17:00</td><td>15:30</td></tr>
<tr><td>16:00</td><td>16:00</td></tr>
<tr><td>16:30</td><td>16:30</td></tr>
<tr><td>17:00</td><td>17:00</td></tr>
<tr><td>17:30</td><td rowspan="2">晚餐
17:30-18:30</td><td rowspan="2">晚餐
17:30-18:30</td><td rowspan="2">晚餐
17:00-18:00</td><td>晚餐
17:00-18:00</td><td>17:30</td></tr>
<tr><td>18:00</td><td>数学话剧
18:00-21:00</td><td>18:00</td></tr>
</table>

*观摩学校包括上海惠灵顿外籍人员子女学校、上海民办华曜宝山实验学校、上海市闵行区教育学院附属友爱实验中学、上海市洋泾菊园实验学校四所学校。

Overall Schedule

<table>
<tr><th>Time (UTC+8)</th><th>8 November Wednesday</th><th>9 November Thursday</th><th>10 November Friday</th><th>11 November Saturday</th><th>12 November Sunday</th><th>Time (UTC+8)</th></tr>
<tr><td>8:00</td><td rowspan="17">Arrival & Registration
Only for those who join the school visit
14:00-17:30</td><td rowspan="8">Visiting Schools*</td><td colspan="3">Registration & Exhibition
8:00-8:30</td><td>8:00</td></tr>
<tr><td>8:30</td><td>Opening Ceremony
8:30-9:00
(Chair: Prof. Guodong Zhou)</td><td rowspan="2">Plenary Lecture 3
8:30-9:30
Prof. Yufeng Guo
(Chair: Dr. Di Liu)</td><td rowspan="2">Plenary Lecture 6
8:30-9:30
Prof. Trena Wilkerson
(Chair: Dr. Shuhui Li)</td><td>8:30</td></tr>
<tr><td>9:00</td><td rowspan="2">Plenary Lecture 1
9:00-10:00
Prof. Susanne Prediger
(Chair: Prof. Chunxia Qi)</td><td>9:00</td></tr>
<tr><td>9:30</td><td rowspan="2">Plenary Lecture 4
9:30-10:30
Dr. Yan Zhu
(Chair: Dr. Xiaoli Lu)</td><td>Break & Networking
9:30-10:00</td><td>9:30</td></tr>
<tr><td>10:00</td><td>Break & Networking
10:00-10:30</td><td rowspan="2">Plenary Lecture 7
10:00-11:00
Prof. Frederick K. S. Leung
(Chair: Prof. Binyan Xu)</td><td>10:00</td></tr>
<tr><td>10:30</td><td rowspan="2">Plenary Lecture 2
10:30-11:30
Prof. Takeshi Miyakawa
(Chair: Ida Ah Chee Mok)</td><td>Break & Networking
10:30-10:50</td><td>10:30</td></tr>
<tr><td>11:00</td><td rowspan="3">Panel Discussion
10:50-12:00
Moderator: Prof. Lianghuo Fan
Panelist:
Prof. Jonei Cerqueira Barbosa,
Prof. Martin Dyke,
Prof. Anjum Halai, Dr. Moneoang Leshota,
Prof. Frederick K. S. Leung,
Prof. Wee Tiong Seah,
Prof. Trena Wilkerson</td><td>Closing Ceremony
11:00-11:30
(Chair: Ms. Fenghua Zhang)</td><td>11:00</td></tr>
<tr><td>11:30</td><td>Exhibition
11:30-12:15</td><td rowspan="2">Lunch
11:30-12:30</td><td>11:30</td></tr>
<tr><td>12:00</td><td rowspan="2">Lunch
12:00-13:00</td><td>12:00</td></tr>
<tr><td>12:30</td><td rowspan="2">Lunch
12:15-13:30</td><td rowspan="7">Departure
12:30-</td><td>12:30</td></tr>
<tr><td>13:00</td><td rowspan="2">Exhibition & New Book Release
13:00-14:00</td><td>13:00</td></tr>
<tr><td>13:30</td><td rowspan="3">Parallel Session 1 for TSG1(1), 3(1), 4(1), 4(2), 5(1), 7(1); Workshop 1 & 2(1)
13:30-15:00</td><td>13:30</td></tr>
<tr><td>14:00</td><td rowspan="4">Arrival & Registration
14:00-17:30</td><td rowspan="2">Plenary Lecture 5
14:00-15:00
Prof. Jeremy Hodgen
(Chair: Dr. Yingkang Wu)</td><td>14:00</td></tr>
<tr><td>14:30</td><td>14:30</td></tr>
<tr><td>15:00</td><td>Break & Networking
15:00-15:30</td><td>Break & Networking
15:00-15:30</td><td>15:00</td></tr>
<tr><td>15:30</td><td rowspan="3">Parallel Session 2 for TSG1(2), 2(1), 3(2), 4(3), 4(4), 7(2); Workshop 3
15:30-17:00</td><td rowspan="3">Parallel Session 3 for TSG1(3), 2(2), 3(3) & 6, 4(5), 4(6), 5(2); Workshop 2(2)
15:30-17:00</td><td>15:30</td></tr>
<tr><td>16:00</td><td>16:00</td></tr>
<tr><td>16:30</td><td>16:30</td></tr>
<tr><td>17:00</td><td>17:00</td></tr>
<tr><td>17:30</td><td rowspan="2">Dinner
17:30-18:30</td><td rowspan="2">Dinner
17:30-18:30</td><td rowspan="2">Dinner
17:00-18:00</td><td>Dinner
17:00-18:00</td><td>17:30</td></tr>
<tr><td>18:00</td><td>Mathematical Drama
18:00-21:00</td><td>18:00</td></tr>
<tr><td colspan="7">*Supporting schools: Wellington College International Shanghai; Shanghai Huayao Baoshan Experimental School; You Ai Experimental Middle School Affiliated to Minhang Education Institute; Shanghai Yangjing-Juyuan Experimental School.</td></tr>
</table>

每日议程 Daily Schedule

11 月 10 日 星期五　10 November Friday	
8:00-8:30	**注册 & 展览 Registration & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
8:30-9:00	**开幕式 Opening Ceremony** 领导致辞、专家介绍 主持人：周国栋教授（华东师范大学） Chair: Prof. Guodong Zhou (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
9:00-10:00	**大会报告 1 Plenary Lecture 1** **Bridging Language for Developing Conceptual Understanding: A Research Journey** **连结语言以发展概念理解——一段研究的旅途** **报告人：Susanne Prediger 教授**（德国多特蒙德工业大学） **Speaker: Prof. Susanne Prediger** (TU Dortmund University, Germany) 主持人：綦春霞教授（北京师范大学） Chair: Prof. Chunxia Qi (Beijing Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
10:00-10:30	**休息 & 交流 & 展览 Break & Networking & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
10:30-11:30	**大会报告 2 Plenary Lecture 2** **Studying the Cultural Aspect of Japanese Mathematics Teaching and Learning from a Perspective of the Anthropological Theory of the Didactic** **从教学理论的视角研究日本数学教与学的文化层面** **报告人：Takeshi Miyakawa 教授**（日本早稻田大学）**Speaker: Prof. Takeshi Miyakawa** (Waseda University, Japan) 主持人：莫雅慈副教授（香港大学） Chair: Dr. Ida Ah Chee Mok (The University of Hong Kong) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
11:30-12:15	**展览 Exhibition** *地点：闵行学生之家 C 区 Location: Home of Students (Campus Centre) C*
12:15-13:30	**午餐 Lunch** *地点：夏雨厅（华闵食堂）三楼 Location: Third floor, Xiayu Canteen*

<table>
<tr><th colspan="6">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="8">13:30-15:00</td><td>TSG1(1)：数学教师教育与专业发展
主席：Dubravka Glasnović Gracin 副教授
（克罗地亚萨格勒布大学）
张侨平博士
（香港教育大学）
地点：二教 409</td><td>TSG3(1)：数学课程改革和教材研究
主席：Marc van Zanten 博士
（荷兰课程开发研究所；乌特勒支大学弗赖登塔尔研究所）
诸方淳博士
（上海建桥学院）
地点：二教 406</td><td>TSG4(1)：数学课堂教学和评价
主席：程靖博士
（华东师范大学）
徐伟民教授
（台湾屏东大学）
地点：二教 410</td><td>工作坊 1
主持人：
张伟平副教授
（上海师范大学）
地点：二教 431</td></tr>
<tr><td>报告 1-1
A Visual-Dialogic Approach: Professional Development for Preservice Mathematics Teachers in China
Ying Zhang[1], Jieting Xin[1], Zixiang Yu[2], Yu Liu[3], Wenjun Zhao[4], Na Li[5], Gaowei Chen[1]
(1. 香港大学；2. 英国爱丁堡大学；3. 西南大学；4. 四川师范大学；5. 华中师范大学)</td><td>报告 3-1
Opportunities and Constraints in Digital Textbook Tasks
Dubravka Glasnović Gracin[1]
(1. 克罗地亚萨格勒布大学)</td><td>报告 4-1
小学数学跨学科综合教学设计与实践——以“日影的故事”为例
张月 [1]；王春英 [2]；吕立杰 [1]；史宁中 [1]
(1. 东北师范大学；2. 东北师范大学附属小学)</td><td rowspan="7">新加坡数学之基于真实情境的数学问题解决
黄卫民 [1]
(1. TP Education)
13:30-14:30</td></tr>
<tr><td>报告 1-2
职前数学教师学习机会与数学教师知识的关系研究
邓钧 [1]；杨新荣 [1]
(1. 西南大学)</td><td>报告 3-2
小学数学数的概念一致性与运算一致性研究
赵莉 [1]；史宁中 [2]
(1. 长春师范大学；2. 东北师范大学)</td><td>报告 4-2
逆向教学设计视野下基于“教、学、评”一致性的课堂实践路径
陈丹妮 [1]
(1. 宁波大学)</td></tr>
<tr><td>报告 1-3
小学教师数学教学知识水平与课堂提问行为的关系研究
玉婧宝 [1]；费亚欣 [2]；董连春 [2]
(1. 普洱市第一中学；2. 中央民族大学)</td><td>报告 3-3
中国初中数学教科书中的非文本元素是如何呈现的
李玲珠 [1]；李娜 [1]；陈秋雨 [1]；范良火 [1,2 通讯作者]
(1. 华东师范大学；2. 英国南安普顿大学)</td><td>报告 4-3
立足市域·走向全国：章起始课为抓手的初中数学大单元教学实践探索
邢成云 [1]；陈元云 [2]
(1. 山东省滨州市教育科学研究院；2. 山东省惠民县辛店镇中学)</td></tr>
<tr><td>报告 1-4
数学建模背景下职前教师关注力的培养——一项基于录像的干预研究
左思宇 [1]；綦春霞 [1]
(1. 北京师范大学)</td><td>报告 3-4
素养导向的课程改革及其启示——基于中、澳、加、爱四国最新颁布的数学课程标准
江漂 [1]；张维忠 [1]
(1. 浙江师范大学)</td><td>报告 4-4
上海小学数学专家教师视野中发展学生主体性（student agency）的课堂特征
成佳蕾 [1]；黄兴丰 [1]
(1. 上海师范大学)</td></tr>
<tr><td>报告 1-5
课例研究视角下教师学科教学知识的生成路径
张浩羽 [1]；于露露 [1]
(1. 南京师范大学)</td><td rowspan="2">报告 3-5
上海高中数学新教材例习题的评价研究
程靖 [1]；诸方淳 [2]；王一粟 [1]；季春玉 [1]；陈梦舒 [3]；朱梦娇 [4]；范良火 [1*通讯作者]
(1. 华东师范大学；2. 上海建桥学院；3. 安庆市统计局；4. 苏州工业园区星海实验高级中学)</td><td>报告 4-5
基于聚类分析的小学生函数思维发展阶段的研究
邓茜茜 [1]；丁锐 [1]
(1. 东北师范大学)</td></tr>
<tr><td>报告 1-6
数学史对小学数学教师的内容与教学知识（KCT）的影响
李卓忱 [1]
(1. 扬州大学)</td><td>报告 4-6
指向深度学习的二次函数单元整体教学设计与实践
韩湘宇 [1]
(1. 上海师范大学)</td></tr>
<tr><td>15:00-15:30</td><td colspan="4">休息 & 交流</td></tr>
</table>

注：报告者姓名已用下划线标注。

<table>
<tr><th colspan="5">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="7">13:30-15:00</td><td>TSG1(1): Mathematics teacher education and professional development
Chair: Dr. Dubravka Glasnović Gracin (University of Zagreb, Croatia)
Dr. Qiaoping Zhang (The Education University of Hong Kong)
Location: Room 409, No. 2 Teaching Building</td><td>TSG3(1): Mathematics curriculum and textbooks
Chair: Dr. Marc van Zanten (Netherlands Institute for Curriculum Development SLO/Freudenthal Institute, Utrecht University)
Dr. Fangchun Zhu (Shanghai Jianqiao University)
Location: Room 406, No. 2 Teaching Building</td><td>TSG4(1): Mathematics classroom teaching, learning and assessment
Chair: Dr. Jing Cheng (East China Normal University)
Prof. Weimin Hsu (Pingdong University)
Location: Room 410, No. 2 Teaching Building</td><td>Workshop 1
Chair: Dr. Weiping Zhang (Shanghai Normal University)
Location: Room 431, No. 2 Teaching Building</td></tr>
<tr><td>Presentation 1-1
A Visual-Dialogic Approach: Professional Development for Preservice Mathematics Teachers in China
Ying Zhang[1], Jieting Xin[1], Zixiang Yu[2], Yu Liu[3], Wenjun Zhao[4], Na Li[5], Gaowei Chen[1]
(1. The University of Hong Kong; 2. The University of Edinburgh; 3. Southwest University; 4. Sichuan Normal University; 5. Central China Normal University)</td><td>Presentation 3-1
Opportunities and Constraints in Digital Textbook Tasks
Dubravka Glasnović Gracin[1]
(1. University of Zagreb, Croatia)</td><td>Presentation 4-1
Design and Practice of Interdisciplinary Comprehensive Teaching for Primary School Mathematics: Taking “The Story of Sunshadow” as an Example
Yue Zhang[1], Chunying Wang[2], Lijie Lv [1], Ningzhong Shi[1]
(1. Northeast Normal University; 2. Primary School Affiliated to Northeast Normal University)</td><td rowspan="6">Mathematics in Singapore: Problems in Real-World Context
David Ng Wei Min[1]
(1. TP Education)
13:30-14:30</td></tr>
<tr><td>Presentation 1-2
The Relationship between Pre-Service Mathematics Teachers’ Opportunities to Learn and Professional Knowledge
Jun Deng[1], Xinrong Yang[1]
(1. Southwest University)</td><td>Presentation 3-2
The Study of the Consistency of Concept of Numbers and the Consistency of Operation of Numbers in Primary Schools Mathematics
Li Zhao[1], Ningzhong Shi[2]
(1. Changchun Normal University; 2. Northeast Normal University)</td><td>Presentation 4-2
Classroom Practice Based on the Consistency of “Teaching, Learning, and Evaluation” from the Perspective of Reverse Instructional Design
Danni Chen[1]
(1. Ningbo University)</td></tr>
<tr><td>Presentation 1-3
A Study on the Relationship between Primary School Teachers' Mathematics Teaching Knowledge Levels and Classroom Questioning Behaviors
Nanbao Yu[1], Yaxin Fei[2], Lianchun Dong[2]
(1. Pu’er No.1 Middle School; 2. Minzu University of China)</td><td>Presentation 3-3
How Are Non-Textual Elements (Ntes) Designed in Chinese Secondary School Curriculum? An Investigation of Mathematics Textbooks
Lingzhu Li[1], Na Li[1], Qiuyu Chen[1], Lianghuo Fan[1,2*corresponding author]
(1. East China Normal University; 2.University of Southampton)</td><td>Presentation 4-3
Based on the City, towards the Country: Exploration on the Practice of Teaching Large Units of Mathematics in Junior Middle School by Using Chapter Beginning Class
Chengyun Xing[1], Yuanyun Chen[2]
(1. The Institute of Education Sciences of Binzhou; 2. Xindian Middle School)</td></tr>
<tr><td>Presentation 1-4
Developing Preservice Teacher Noticing within the Context of Mathematical Modelling: A Video-Based Intervention Study
Siyu Zuo[1], Chunxia Qi[1]
(1. Beijing Normal University)</td><td>Presentation 3-4
Competencies Oriented Curriculum Reform and Its Enlightenment: Based on the Latest Mathematics Curriculum Standards Issued by China, Australia, Canada, and Ireland
Piao Jiang[1], Weizhong Zhang[1]
(1. Zhejiang Normal University)</td><td>Presentation 4-4
The Elementary School Mathematics Classroom Teaching for Developing Student Agency: Perspectives from Expert Teachers
Jialei Cheng[1], Xingfeng Huang[1]
(1. Shanghai Normal University)</td></tr>
<tr><td>Presentation 1-5
The Generation Path of Pedagogical Content Knowledge for Mathematics Teachers from the Perspective of Lesson Study
Haoyu Zhang[1], Lulu Yu[1]
(1. Nanjing Normal University)</td><td rowspan="2">Presentation 3-5
Evaluation of the Tasks in Shanghai High School New Mathematics Textbook
Jing Cheng[1], Fangchun Zhu[2], Yisu Wang[1], Chunyu Ji[1], Mengshu Chen[3], Mengjiao Zhu[4], Lianghuo Fan[1*] corresponding author
(1. East China Normal University; 2. Shanghai Jian Qiao University; 3. Anqing Municipal Bureau of Statistics; 4. Suzhou Industrial Park Xinghai Experimental High School)</td><td>Presentation 4-5
Research on the Development Stages of Elementary Students’ Functional Thinking Based on Cluster Analysis
Xixi Deng[1], Rui Ding[1]
(1. Northeast Normal University)</td></tr>
<tr><td>Presentation 1-6
The Influence of the History of Mathematics on the Knowledge of Content and Teaching (KCT) of Primary School Mathematics Teachers
Zhuochen Li[1]
(1. Yangzhou University)</td><td>Presentation 4-6
Overall Teaching Design and Practice of Quadratic Function Unit for Deep Learning
Xiangyu Han[1]
(1. Shanghai Normal University)</td></tr>
<tr><td>15:00-15:30</td><td colspan="4">Break & Networking</td></tr>
</table>

Note: The names of presenters are underlined.

<table>
<tr><th colspan="5">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="8">13:30-15:00</td><td>TSG4(2)：数学课堂教学和评价
主席：程靖博士
（华东师范大学）
徐伟民教授
（台湾屏东大学）
地点：二教 414</td><td>TSG5(1)：比较和国际数学教育
主席：Dyana Wijayanti 博士
(华东师范大学)
赵晓燕博士
（南京师范大学）
地点：二教 418</td><td>TSG7(1)：其他数学教育相关研究
主席：Ariel Lindorff 博士
（英国牛津大学）
周达博士
(东北师范大学)
地点：二教 420</td><td>工作坊 2(1)
主持人：唐佳丽（华东师范大学）
地点：二教 H401</td></tr>
<tr><td>报告 4-7
思维导图助力传统教学思想融入小学数学教学
孙露 [1]
(1. 黄山学院)</td><td>报告 5-1
数学教育研究中工具化理论的应用——一个系统性文献综述
谭奇 [1]；袁智强 [2]
(1. 华东师范大学；2. 湖南师范大学)</td><td>报告 7-1
中国数学教育研究三十年：1993-2022
——基于中国（大陆）数学教育博士学位论文的统计与分析
樊惟媛 [1]；徐文彬 [1]
(1. 南京师范大学)</td><td rowspan="7">卡西欧计算器助力数学教与学
林素华 [1]
(1. 卡西欧（中国）贸易有限公司)
13:30-14:00</td></tr>
<tr><td>报告 4-8
小学数学微项目化学习设计与实践研究
唐黎明 [1]
(1. 深圳小学)</td><td>报告 5-2
国际视野下数学奥林匹克的实践与特点
陈锦华 [1,2]；何忆捷 [1,2]；罗振华 [1,2]
(1. 华东师范大学；2. 上海市核心数学与实践重点实验室)</td><td>报告 7-2
个体数学建模过程的特征分析：一种建模路线重建的方法
付裕 [1]；杨向东 [1]；徐斌艳 [1]
(1. 华东师范大学)</td></tr>
<tr><td>报告 4-9
聚焦学生问题提出的高中数学教学实践研究
杨凤文 [1]
(1. 北京市第四中学)</td><td>报告 5-3
符号学视角下中日数学教科书的文化性探微——基于初中“函数与方程”内容的比较
陈志辉 [1]；陈卓君 [1]
(1. 华南师范大学)</td><td rowspan="2">报告 7-3
小学生一般教育价值观的实证研究及其教学启示
李艳 [1]；杨韵莹 [2]；佘伟忠 [3]
(1. 四川师范大学；2. 华南师范大学；3. 墨尔本大学)</td></tr>
<tr><td>报告 4-10
探析数学专业本科生的证明阅读理解能力
——以柯西微分中值定理为例
王博 [1]
(1. 东北师范大学)</td><td>报告 5-4
中日小学数学教材计数单位内容编写的比较研究——以人教版和启林馆教材为例
冯小爽 [1]；王艳玲 [1]
(1. 东北师范大学)</td></tr>
<tr><td>报告 4-11
中国小学数学课堂中的师生话语：对三个年代的 8 节示范课的研究
赵冬臣 [1]；向坤 [2]；范良火 [2,3]
(1. 哈尔滨师范大学；2. 英国南安普顿大学；3. 华东师范大学)</td><td rowspan="2">报告 5-5
中国、芬兰数学教材中的推理与证明——以初中方程内容为例
付钰 [1]；王嘉瑶 [2]
(1. 南京信息工程大学；2. 北京师范大学)</td><td rowspan="2">报告 7-4
分类讨论思想的深度解题研究——以一道数列题为例
刘倩 [1]
(1. 华南师范大学)</td></tr>
<tr><td>报告 4-12
Cultivating Students' Mathematical Creative Thinking Ability in Inquiry-Based Classroom
徐彦辉 [1]
(1. 温州大学)</td></tr>
<tr><td>15:00-15:30</td><td colspan="4">休息 & 交流</td></tr>
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<tr><th colspan="6">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="8">13:30-15:00</td><td>TSG4(2): Mathematics classroom teaching, learning and assessment
Chair: Dr. Jing Cheng
(East China Normal University)
Prof. Weimin Hsu
(Pingdong University)
Location: Room 414, No. 2 Teaching Building</td><td>TSG5(1): Comparative and international studies in mathematics education
Chair: Dr. Dyana Wijayanti
(East China Normal University)
Dr. Xiaoyan Zhao
(Nanjing Normal University)
Location: Room 418, No. 2 Teaching Building</td><td>TSG7(1): Other research areas related to mathematics education
Chair: Dr. Ariel Lindorff
(University of Oxford, UK)
Dr. Da Zhou
(Northeast Normal University)
Location: Room 420, No. 2 Teaching Building</td><td rowspan="8">Workshop 2(1)
Chair: Jiali Tang
(East China Normal University)
Location: Room H401, No. 2 Teaching Building</td></tr>
<tr><td>Presentation 4-7
Mind Mapping Assists Integrate Traditional Teaching Ideas into Primary School Mathematics Teaching
Lu Sun[1]
(1. Huangshan University)</td><td>Presentation 5-1
A Systematic Review on the Application of Instrumentation Theory in Mathematics Education Research
Qi Tan[1], Zhiqiang Yuan[2]
(1. East China Normal University; 2. Hunan Normal University)</td><td>Presentation 7-1
Thirty Years of Research on Mathematics Education in China (1993-2022): Statistics and Analysis Based on Doctoral Dissertations in Mathematics Education in China (Mainland)
Weiyuan Fan[1], Wenbin Xu[1]
(1. Nanjing Normal University)</td></tr>
<tr><td>Presentation 4-8
Study on Design and Practice of Micro-project Leaning of Mathematics of Primary School
LiMing Tang[1]
(1. Shenzhen Primary School)</td><td>Presentation 5-2
Practice and Characteristics of Mathematical Olympiads from an International Perspective
Jinhua Chen[1, 2], Yijie He[1, 2], Zhenhua Luo[1, 2]
(1. East China Normal University; 2 Shanghai Key Laboratory of Pure Mathematics and Mathematical Practice)</td><td>Presentation 7-2
Characteristics Analysis of Students' Individual Mathematical Modeling Process
Yu Fu[1], Xiangdong Yang[1], Binyan Xu[1]
(1. East China Normal University)</td></tr>
<tr><td rowspan="2">Presentation 4-9
Research on the Practice of High School Mathematics Teaching Focusing on Students' Questions
Fengwen Yang[1]
(1. Beijing No. 4 High School)</td><td>Presentation 5-3
An Exploration on the Cultural Attribute of Chinese and Japanese Mathematics Textbooks from the Perspective of Peirce Semiotics: Based on the Comparison Study on the Domain of Functions and Equations in the Level of Junior High School
Zhihui Chen[1], Zhuojun Chen[1]
(1. South China Normal University)</td><td rowspan="2">Presentation 7-3
An Empirical Study of General Educational Values of Chinese Elementary School Students and Its Teaching Implications
Yan Li[1], Yunying Yang[2], Wee Tiong Seah[3]
(1. Sichuan Normal University; 2. South China Normal University; 3. The University of Melbourne)</td></tr>
<tr><td>Presentation 5-4
A Comparative Study on the Compilation of Counting Units in Primary Mathematics Textbooks in China and Japan: Takes the Textbooks of the PEP Edition and the Qilin Guan Edition as Examples
Xiaoshuang Feng[1], Yanling Wang[1]
(1. Northeast Normal University)</td></tr>
<tr><td>Presentation 4-10
Exploring Math Major Students' Reading Comprehension Ability of Proofs: Taking the Cauchy Generalized Mean Value Theorem as an Example
Bo Wang[1]
(1. Northeast Normal University)</td><td rowspan="2">Presentation 5-5
Reasoning and Proof in Mathematics Textbooks: Taking Equation Content in Chinese and Finnish Mathematics Textbooks as an Example
Yu Fu[1], Jiayao Wang[2]
(1. Nanjing University of Information Science and Technology; 2. Beijing Normal University)</td><td rowspan="2">Presentation 7-4
An In-depth Problem Solving Study of Categorical Discussion: Taking a Problem on Sequence of Numbers as an Example
Qian Liu[1]
(1. South China Normal University)</td></tr>
<tr><td>Presentation 4-11
Teacher-Student Discourse in Chinese Primary Mathematics Classrooms: A Study of Eight Exemplary Lessons across Three Decades
Dongchen Zhao[1], Kun Xiang[2], Lianghuo Fan[2,3]
(1. Harbin Normal University; 2. University of Southampton; 3. East China Normal University)</td></tr>
<tr><td>Presentation 4-12
Cultivating Students' Mathematical Creative Thinking Ability in Inquiry-Based Classroom
Yanhui Xu[1]
(1. Wenzhou University)</td></tr>
<tr><td>15:00-15:30</td><td colspan="4">Break & Networking</td></tr>
</table>

<table>
<tr><th colspan="4">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="8">15:30-
17:00</td><td>TSG1(2)：数学教师教育与专业发展
主席：Dubravka Glasnović Gracin 副教授
（克罗地亚萨格勒布大学）
张侨平博士
（香港教育大学）
地点：二教 409</td><td>TSG2(1)：技术与数学教育的融合
主席 r：丁美霞教授
（美国天普大学）
Mailizar 教授
（印度尼西亚 Syiah Kuala 大学）
地点：二教 H401</td><td>TSG3(2)：数学课程改革和教材研究
主席：Marc van Zanten 博士
（荷兰课程开发研究所；乌特勒支大学弗赖登塔尔研究所）
诸方淳博士
（上海建桥学院）
地点：二教 406</td></tr>
<tr><td>报告 1-7
专家教师和新手教师课堂中以素养为导向的学生活动差异——基于认知网络分析（ENA）视角
梁海丽 [1]；杜剑南 [1]
(1. 北京师范大学)</td><td>报告 2-1
关于数学电子教材功能的研究综述
金敏 [1,2]
(1. 华东师范大学；2. 南京市建邺区教师发展中心)</td><td>报告 3-6
A Systematic Review of Research Study in the Area of Indonesian Mathematics Textbooks
Dyana Wijayanti[1,2]；Muhammad Taqiyuddin[3]
(1. 华东师范大学；2. 苏丹阿贡伊斯兰大学；3. 奥克兰大学)</td></tr>
<tr><td>报告 1-8
职前数学教师的信息技术教学技能提升实证研究——基于交互式电子白板课程实施
强毅 [1]；范良火 [2]
(1. 九江学院；2. 华东师范大学)</td><td>报告 2-2
Facilitating Math Teaching through Artificial Intelligence Generated Contents (AIGC)
段凯耀 [1]
(1. 重庆巴蜀常春藤学校)</td><td>报告 3-7
项目学习的本土化：初中数学单元项目学习的开发与实施
李睿思 [1]；綦春霞 [1]
(1. 北京师范大学)</td></tr>
<tr><td>报告 1-9
Reconstruction of Mathematics Teacher Identity in Education Reforms in China: A Mixed Method Study
陈冠华 [1]；莫雅慈 [1]
(1. 香港大学)</td><td>报告 2-3
利用 Excel 进行高中数学仿真模拟实验：一种技术与数学教育的融合策略
简焕森 [1,2]
(1. 华东师范大学；2. 澳门新华学校)</td><td>报告 3-8
核心素养视域下数学教材中数学史和数学文化设置研究
刘晓萱 [1]
(1. 宁波大学)</td></tr>
<tr><td>报告 1-10
HPM 课例研究如何影响教师的数学教学观？
孙丹丹 [1]
(1. 山东师范大学)</td><td>报告 2-4
使用 PLS-SEM 方法预测中学数学教师的数字化教学行为
汤欣 [1]；袁智强 [1]；邓茜 [1]；向利平 [2]
(1. 湖南师范大学；2. 湖南省长沙市岳麓区教师发展中心)</td><td>报告 3-9
数学教材例习题的整体性——基于浙教版初中教材中“函数”内容的分析
盛昊灿 [1]；张景斌 [1]
(1. 首都师范大学)</td></tr>
<tr><td>报告 1-11
通过课例研究促进数学师范生和数学教师教育者的专业学习
吴颖康 [1]
(1. 华东师范大学)</td><td rowspan="2">报告 2-5
小学数学教师使用人工智能辅助教学意愿的影响因素
赵闻敏 [1]；袁铭谦 [1]；龙沛贤 [1]；何紫晴 [1]；陈昊妹 [1]；梁锦涛 [1]
（1. 广东第二师范学院）</td><td rowspan="2">报告 3-10
中国小学数学教材分数和小数内容编写比较研究及对未来教材编写的启示
徐思迪 [1]；史宁中 [1]
(1. 东北师范大学)</td></tr>
<tr><td>报告 1-12
高中数学教师空间向量学科教学知识(PCK)的评价指标构建
于露露 [1]；张浩羽 [1]
(1. 南京师范大学)</td></tr>
<tr><td>17:00-
18:00</td><td colspan="3">晚餐
地点：夏雨厅（华闵食堂）三楼</td></tr>
</table>

<table>
<tr><th colspan="4">11 月 10 日 星期五　10 November Friday</th></tr>
<tr><td rowspan="8">15:30-
17:00</td><td>TSG1(2): Mathematics teacher education and professional development
Chair: Dr. Dubravka Glasnović Gracin (University of Zagreb, Croatia)
Dr. Qiaoping Zhang (The Education University of Hong Kong)
Location: Room 409, No. 2 Teaching Building</td><td>TSG2(1): ICT and mathematics education
Chair: Prof. Meixia Ding (Temple University, USA)
Prof. Mailizar (Universitas Syiah Kuala, Indonesia)
Location: Room H401, No. 2 Teaching Building</td><td>TSG3(2): Mathematics curriculum and textbooks
Chair: Dr. Marc van Zanten (Netherlands Institute for Curriculum Development SLO/Freudenthal Institute, Utrecht University)
Dr. Fangchun Zhu (Shanghai Jianqiao University)
Location: Room 406, No. 2 Teaching Building</td></tr>
<tr><td>Presentation 1-7
Comparing Competency-Oriented Student Activities between Expert and Novice Teachers in China: Insights from an Epistemic Network Analysis (ENA)
Haili Liang[1], Jiannan Du[1]
(1. Beijing Normal University)</td><td>Presentation 2-1
A Review of the Research on the Functions of Digital Mathematics Textbooks
Min Jin[1,2]
(1. East China Normal University; 2. Nanjing Jianye Teacher Development Center)</td><td>Presentation 3-6
A Systematic Review of Research Study in the Area of Indonesian Mathematics Textbooks
Dyana Wijayanti[1,2], Muhammad Taqiyuddin[3]
(1. East China Normal University; 2. Universitas Islam Sultan Agung; 3. University of Auckland)</td></tr>
<tr><td>Presentation 1-8
An Empirical Study on the Development of Pre-Service Mathematics Teachers' Competency in Using Information and Communication Technology: The Case of Use of Interactive Whiteboard
Yi Qiang[1], Lianghuo Fan[2]
(1. School of Teacher Education, Jiujiang University; 2. East China Normal University)</td><td>Presentation 2-2
Facilitating Math Teaching through Artificial Intelligence Generated Contents (AIGC)
Kaiyao Duan[1]
(1. Chongqing BI Academy)</td><td>Presentation 3-7
The Localization of Project-based Learning: Design and Implementation of Math Project-based Learning Unit in Junior High School in China
Ruisi Li[1], Chunxia Qi[1]
(1. Beijing Normal University)</td></tr>
<tr><td>Presentation 1-9
Reconstruction of Mathematics Teacher Identity in Education Reforms in China: A Mixed Method Study
Guanhua Chen[1], Ida Ah Chee Mok[1]
(1. The University of Hong Kong)</td><td>Presentation 2-3
Leveraging Excel for High School Mathematics: A Novel Approach to Integrating Technology and Mathematics Education
Huansen Jian[1,2]
(1. East China Normal University; 2. Escola Sun Wah)</td><td>Presentation 3-8
Research on the Setting of Mathematics History and Mathematics Culture in Mathematics Textbooks from the Perspective of Core Literacy
Xiaoxuan Liu[1]
(1. Ningbo University)</td></tr>
<tr><td>Presentation 1-10
How does HPM Lesson Study Affect Teachers' Conceptions of Mathematics Teaching?
Dandan Sun[1]
(1. Shandong Normal University)</td><td>Presentation 2-4
Predicting Secondary School Mathematics Teachers' Digital Teaching Behavior Using Partial Least Squares Structural Equation Modeling
Xin Tang[1], Zhiqiang Yuan[1], Xi Deng[1], Liping Xiang[2]
(1. Hunan Normal University; 2. Yuelu District Teacher Development Center)</td><td>Presentation 3-9
Integration of Examples and Exercises in Mathematics Textbooks: Analysis of the Content of "Function" in the Junior High School Textbook Based on the Zhejiang Education Publishing House
Haocan Sheng[1], Jingbin Zhang[1]
(1. Capital Normal University)</td></tr>
<tr><td>Presentation 1-11
Promoting Preservice Mathematics Teachers and Teacher Educator's Professional Learning through Lesson Study
Yingkang Wu[1]
(1. East China Normal University)</td><td rowspan="2">Presentation 2-5
Factors Influencing Elementary Mathematics Teachers' AI Adoption
Wenmin Zhao[1],Mingqian Yuan[1],Peixian Long[1],Ziqing He[1],Haomei Chen[1],Jintao Liang[1]
(1. Guangdong University of Education)</td><td rowspan="2">Presentation 3-10
Compilation of Fraction and Decimal Content in Primary School Mathematics Teaching Material: Comparison and Enlightenment
Sidi Xu[1], Ningzhong Shi[1]
(1. Northeast Normal University)</td></tr>
<tr><td>Presentation 1-12
Construction of Evaluation Index of Pedagogical Content Knowledge (PCK) in Spatial Vector of Senior Mathematics Teachers
Lulu Yu[1], Haoyu Zhang[1]
(1. Nanjing Normal University)</td></tr>
<tr><td>17:00-
18:00</td><td colspan="3">Dinner
Location: Third floor, Xiayu Canteen</td></tr>
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11 月 10 日 星期五　10 November Friday				
	TSG4(3)：数学课堂教学和评价 主席：程靖博士 （华东师范大学） 徐伟民教授 （台湾屏东大学） *地点：二教 410*	**TSG4(4)：数学课堂教学和评价** 主席：程靖博士 （华东师范大学） 徐伟民教授 （台湾屏东大学） *地点：二教 414*	**TSG7(2)：其他数学教育相关研究** 主席：Ariel Lindorff 博士 （英国牛津大学） 周达博士 （东北师范大学） *地点：二教 420*	**工作坊 3** 主持人： 李娜博士 （华东师范大学） *地点：二教 431*
15:30-17:00	**报告 4-13** **运用“否定假设法”培养初中生问题提出能力的探索研究** 赵晓燕 [1]；贾笑笑 [1] (1. 南京师范大学)	**报告 4-19** **“三新”背景下高中数学问题链教学的落地研究——以教材“双曲线的简单几何性质”为例** 王华 [1] (1. 桐乡市教育局教研科研室)	**报告 7-5** **中学折纸数学校本课程开发的实践与思考** 金珉 [1,2]；季鑫 [1] (1. 上海市实验学校；2. 华东师范大学)	**“网络画板”赋能数学教育数字化——互联网+动态数学新型工具、资源与应用** 杨承云 [1]；管皓 [1]；吴冠男 [2] (1. 景中动态数学研究院; 2. 浙江桐乡濮院桐星学校) *15:30-17:00*
	报告 4-14 **指向数学创造力的高中 DoPBL 课程设计与实施——以“函数世界的达芬奇”为例** 李华洋 [1] (1. 华东师范大学)	**报告 4-20** **STEAM 教育理念下数学拓展课教学实践探索** 赵千惠 [1,2]；张维忠 [2] (1. 华东师范大学；2. 浙江师范大学)	**报告 7-6** **近十年国际数学焦虑研究综述与启示——基于 CiteSpace 的可视化分析** 刘燕红 [1]；郑欣 [1] (1. 集美大学)	
	报告 4-15 **数学学案导学模式的现状和策略研究** 李强 [1]；吕世虎 [1] (1. 西北师范大学)	**报告 4-21** **基于 PISA 测试和数学核心素养评价框架的测评研究** 许靖悦 [1] (1. 上海师范大学)	**报告 7-7** **高中生数学高阶思维量表的开发与验证** 宁依敏 [1]；徐斌艳 [1] (1. 华东师范大学)	
	报告 4-16 **基于学习路径的数学学习支架设计特征与表现研究** 王艳芝 [1] (1.山东理工大学)	**报告 4-22** **提升初中生数学学习积极情感的四然教学模型构建与实践** 郑瑄 [1]；任俊 [2] (1.宁波市江北区教育局；2.浙江师范大学)		
	报告 4-17 **中学数学教师对数学建模的感知** 任志鹏 [1]；莫雅慈 [1] (1. 香港大学)	**报告 4-23** **基于学习轨迹的数学教学：理论基础、概念分析与框架设计** 杨雪 [1]；缪佳怡 [1]；张春莉 [1] (1. 北京师范大学)	**报告 7-8** **Observing Mathematics Teaching; Tools and Tensions** Ariel Lindorff[1] (1. 英国牛津大学)	
	报告 4-18 **初中生代数推理能力的培养** 陈书才 [1] (1. 安徽师范大学附属萃文中学)	**报告 4-24** **智慧学习体系下的数学教学** 郑跃星 [1] (1. 上海民办华曜宝山实验学校)		
17:00-18:00	**晚餐** *地点：夏雨厅（华闵食堂）三楼*			

11 月 10 日 星期五　10 November Friday				
	TSG4(3): Mathematics classroom teaching, learning and assessment Chair: Dr. Jing Cheng (East China Normal University) Prof. Weimin Hsu (Pingdong University) *Location: Room 410, No. 2 Teaching Building*	**TSG4(4): Mathematics classroom teaching, learning and assessment** Chair: Dr. Jing Cheng (East China Normal University) Prof. Weimin Hsu (Pingdong University) *Location: Room 414, No. 2 Teaching Building*	**TSG7(2): Other research areas related to mathematics education** Chair: Dr. Ariel Lindorff (University of Oxford, UK) Dr. Da Zhou (Northeast Normal University) *Location: Room 420, No. 2 Teaching Building*	**Workshop 3** Chair: Dr. Na Li (East China Normal University) *Location: Room 431, No. 2 Teaching Building*
15:30-17:00	**Presentation 4-13** **An Explorative Study of Improving the Problem-posing Ability of Junior High School Students by Applying the "What-If-Not" Strategy** Xiaoyan Zhao[1], Xiaoxiao Jia[1] (1. Nanjing Normal University)	**Presentation 4-19** **The Research of Question Chain Teaching in High School Mathematics under the Background of the "Three New"** Hua Wang[1] (1. Zhejiang Tongxiang Education Bureau)	**Presentation 7-5** **Practice and Reflection on the Development of Origami Mathematical Curriculum in Secondary School** Min Jin[1,2], Xing Ji[1] (1. Shanghai Experimental School; 2. East China Normal University)	**The "NetPad" Empowers the Digitalization of Mathematics Education: New Tools, Resources, and Applications for Internet+Dynamic Mathematics** Chenyun Yang[1], Hao Guan[1], Guannan Wu[2] (1. Jingzhong Institute of Dynamic Mathematics; 2. Tongxiang Puyuan Tongxing School) *15:30-17:00*
	Presentation 4-14 **Instructional Design and Implementation of DoPBL Lessons Aimed at Mathematical Creativity in High School: Taking "Leonardo Da Vinci in the Function World" for Instance** Huayang Li[1] (1. East China Normal University)	**Presentation 4-20** **Exploration of Mathematics Extension Courses on Teaching Practice under the STEAM Education Concept** Qianhui Zhao[1,2], Weizhong Zhang[2] (1. East China Normal University; 2. Zhejiang Normal University)	**Presentation 7-6** **Review and Inspiration of International Math Anxiety Research in Recent Ten Years: A Visual Analysis Based on CiteSpace** Yanhong Liu[1], Xin Zheng[1] (1. Jimei University)	
	Presentation 4-15 **Research on the Current Situation and Strategies of The Mathematical Learning Plan Guidance Model** Qiang Li[1], Shihu Lv[1] (1. Northwest Normal University)	**Presentation 4-21** **Assessment Research Based on PISA Test and Mathematics Core Literacy Assessment Framework** Jingyue Xu[1] (1. Shanghai Normal University)	**Presentation 7-7** **Development and Validation of Mathematical Higher-Order Thinking Scale for High School Students** Yimin Ning[1], Binyan Xu[1] (1. East China Normal University)	
	Presentation 4-16 **Research on the Design Features and Performance of Mathematics Scaffolding Based on Learning Trajectory** Yanzhi Wang[1] (1. Shandong University of Technology)	**Presentation 4-22** **Construction and Practice of the SNAS Teaching Model to Promote the Positive Emotion of Middle School Students in Mathematics Learning** Xuan Zheng[1], Jun Ren[2] (1. Ningbo Jiangbei District Education Bureau; 2. Zhejiang Normal University)		
	Presentation 4-17 **Teacher Perceptions of Mathematical Modelling in Junior High Schools** Zhipeng Ren[1], Ah Chee Ida MOK[1] (1. The University of Hong Kong)	**Presentation 4-23** **Mathematics Teaching Based on Learning Trajectory: Theoretical Foundations, Conceptual Analysis, and Framework Design** Xue Yang[1], Jiayi Miu[1], Chunli Zhang[1] (1. Beijing Normal University)	**Presentation 7-8** **Observing Mathematics Teaching; Tools and Tensions** Ariel Lindorff[1] (1. University of Oxford)	
	Presentation 4-18 **Developing Algebraic Reasoning Ability for Junior High School Students** Shucai Chen[1] (1. Anhui Normal University Affiliated Cuiwen Middle School)	**Presentation 4-24** **Mathematics Teaching under the Intelligent Learning System** Yuexing Zheng[1] (1. Shanghai Huayao Baoshan Experimental School)		
17:00-18:00	**Dinner** *Location: Third floor, Xiayu Canteen*			

11 月 11 日 星期六 11 November Saturday	
8:00-8:30	**注册 & 展览 Registration & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
8:30-9:30	**大会报告 3 Plenary Lecture 3** **Reflections on the Mathematics Integrity and Unit Teaching Research** **数学整体性以及单元教学的研究与思考** **报告人：郭玉峰教授**（北京师范大学） **Speaker: Prof. Yufeng Guo** (Beijing Normal University) 主持人：柳笛副教授（华东师范大学） Chair: Dr. Di Liu (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
9:30-10:30	**大会报告 4 Plenary Lecture 4** **Gender Equity in Chinese Mathematics Education** **中国数学教育中的性别平等** **报告人：朱雁副教授**（华东师范大学） **Speaker: Dr. Yan Zhu** (East China Normal University) 主持人：鲁小莉副教授（华东师范大学） Chair: Dr. Xiaoli Lu (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
10:30-10:50	**休息 & 交流 & 展览 Break & Networking & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
10:50-12:00	**大会圆桌讨论 Panel Discussion** **Theme: Issues and Challenges in Contemporary Mathematics Education Research and Development** **主题：当代数学教育研究与发展中的问题与挑战** **主持人：范良火教授**（华东师范大学） **Moderator: Prof. Lianghuo Fan** (East China Normal University) **讨论人：Jonei Cerqueira Barbosa 教授**（巴西巴伊亚联邦大学）， **Martin Dyke 教授**（英国南安普顿大学），**Anjum Halai 教授**（巴基斯坦阿迦汗大学）， **佘伟忠教授**（澳大利亚墨尔本大学），**Moneoang Leshota 博士**（南非比勒陀利亚大学）， **梁贯成教授**（香港大学），**Trena Wilkerson 教授**（美国贝勒大学） **Discussant：Prof. Jonei Cerqueira Barbosa** (Federal University of Bahia, Brazil), **Prof. Martin Dyke** (University of Southampton, UK)**, Prof. Anjum Halai** (Aga Khan University, Pakistan), **Prof. Wee Tiong Seah** (The University of Melbourne, Australia), **Dr. Moneoang Leshota** (University of Pretoria, South Africa), **Prof. Frederick K. S. Leung** (The University of Hong Kong), **Prof. Trena Wilkerson** (Baylor University, USA) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
12:00-13:00	**午餐 Lunch** *地点：冬日厅一楼 Location: First floor, Dongri Canteen*
13:00-14:00	**展览 Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C* **上海教育出版社新书发布会 New Book Release (13:15-13:45)** *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
14:00-15:00	**大会报告 5 Plenary Lecture 5** **Mathematics Reform in England: Lessons, and Challenges, for the Future** **英国数学改革：经验教训和未来的挑战** **报告人：Jeremy Hodgen 教授**（英国伦敦大学学院） **Speaker: Prof. Jeremy Hodgen** (University College London, UK) 报告主持人：吴颖康副教授（华东师范大学） Chair: Dr. Yingkang Wu (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*

<table>
<tr><th colspan="4">11 月 11 日 星期六　11 November Saturday</th></tr>
<tr><td rowspan="6">15:30-17:00</td><td>TSG1(3)：数学教师教育与专业发展
主席：Dubravka Glasnović Gracin 副教授
(克罗地亚萨格勒布大学)
张侨平博士
（香港教育大学）
地点：二教 409</td><td>TSG2(2)：技术与数学教育的融合
主席：丁美霞教授
（美国天普大学）
Mailizar 教授
（印度尼西亚 Syiah Kuala 大学）
地点：二教 H401</td><td>TSG3(3)：数学课程改革和教材研究
主席：Marc van Zanten 博士
（荷兰课程开发研究所；乌特勒支大学弗赖登塔尔研究所）
诸方淳博士
（上海建桥学院）
TSG6：公平与数学教育
主席：方均斌教授
(温州大学)
左浩德博士
(扬州大学)
地点：二教 406</td></tr>
<tr><td>报告 1-13
数学教师学生导向目标与教师情感的关系:个人成就目标的中介作用
蒋政 [1]；胡凤娟 [2]
(1. 上海师范大学；2. 首都师范大学)</td><td>报告 2-6
使用人工智能解题能否缓解数学焦虑？一个 SOR 视角
陈基河 [1]；许延颖 [2]
(1. 东莞市翰林实验学校；2. 东莞市新世纪英才学校)</td><td>报告 3-11
高中数学教师教科书使用水平个案研究——以 2019 人教 A 版为例
杨润冰 [1]
(1. 浙江师范大学)</td></tr>
<tr><td>报告 1-14
数学课堂观察的新视角：新手教师与经验教师的教师关注比较
张侨平 [1]；王小平 [2]；贠涵戈 [3]
(1. 香港教育大学；2. 武汉城市职业学院；3. 西安欧亚学院)</td><td>报告 2-7
信息技术在中学几何教学中的融合现状——基于 21 世纪中国大陆已有研究
徐亚楠 [1]；孙丹丹 [1]
(1. 山东师范大学)</td><td>报告 3-12
Actualization of Legal Core Goals for Mathematics in the Netherlands
Marc van Zanten[1,2]
(1. 荷兰课程开发研究所；2. 乌特勒支大学弗赖登塔尔研究所)</td></tr>
<tr><td>报告 1-15
人工智能视域下中学数学教师数字化转型路径分析
田茂栋 [1]；库在强 [1]；叶蕾 [1]
(1. 黄冈师范学院)</td><td>报告 2-8
非洲数学教育中的信息和通信技术：动因、挑战、举措和启示
朱慧玲 [1]；唐恒钧 [1]
(1. 浙江师范大学)</td><td>报告 6-1
学习压力对处境不利学生数学抗逆的影响——性别的调节作用
王嘉瑶 [1]；付钰 [2]；綦春霞 [1]
(1. 北京师范大学；2. 南京信息工程大学)</td></tr>
<tr><td>报告 1-16
在跨文化实践共同体中数学教师教育者设计能力中的反思能力的发展
黄兴丰 [1]；黄荣金 [2]；丁莉萍 [3]
(1. 上海师范大学；2. 中田纳西州立大学；3. 挪威科技大学)</td><td rowspan="2">报告 2-9
基于网络画板的农村数学教学实践探索
吴冠男 [1]；唐恒钧 [1]
(1. 浙江师范大学)</td><td rowspan="2">报告 6-2
社交媒体作为促进中国大陆本科少数民族学生数学认同的催化剂——一项路径分析研究
左浩德 [1]；刘志伟 [1]
(1. 扬州大学)</td></tr>
<tr><td>报告 1-17
基于“教师与资源”视角的数学教师教学设计能力发展
朱佳雯 [1]；黄兴丰 [1]
(1. 上海师范大学)</td></tr>
<tr><td>17:00-18:00</td><td colspan="3">晚餐
地点：夏雨厅（华闵食堂）三楼</td></tr>
<tr><td>18:00-21:00</td><td colspan="3">数学话剧
开普勒先生如是说
地点：华东师大紫竹教育园区音乐厅（紫风路 350 号）</td></tr>
</table>

<table>
<tr><th colspan="4">11 月 11 日 星期六　11 November Saturday</th></tr>
<tr><td rowspan="6">15:30-17:00</td><td>TSG1(3): Mathematics teacher education and professional development
Chair: Dr. Dubravka Glasnović Gracin
(University of Zagreb, Croatia)
Dr. Qiaoping Zhang
(The Education University of Hong Kong)
Location: Room 409, No. 2 Teaching Building</td><td>TSG2(2): ICT and mathematics education
Chair: Prof. Meixia Ding
(Temple University, USA)
Prof. Mailizar
(Universitas Syiah Kuala, Indonesia)
Location: Room H401, No. 2 Teaching Building</td><td>TSG3(3): Mathematics curriculum and textbooks
Chair: Dr. Marc van Zanten
(Netherlands Institute for Curriculum Development SLO/Freudenthal Institute, Utrecht University)
Dr. Fangchun Zhu
(Shanghai Jianqiao University)
TSG6: Equity in mathematics education
Chair: Prof. Junbin Fang
(Wenzhou University)
Dr. Haode Zuo
(Yangzhou University)
Location: Room 406, No. 2 Teaching Building</td></tr>
<tr><td>Presentation 1-13
Linking Mathematics Teachers' Student-Oriented Goals to Their Teaching Emotions: The Mediation of Personal Achievement Goals
Zheng Jiang[1], Fengjuan Hu[2]
(1. Shanghai Normal University; 2. Capital Normal University)</td><td>Presentation 2-6
Can Using AI to Solve Problems Alleviate Math Anxiety? Research Based on SOR Perspective
Jihe Chen[1], Yanying Xu[2]
(1. Dongguan Hanlin Experimental School; 2. Dongguan New Century School)</td><td>Presentation 3-11
A Case Study of High School Mathematics Teachers' Usage of Textbooks: Take 2019 People's Education Press Version as an Example
Runbing Yang[1]
(1. Zhejiang Normal University)</td></tr>
<tr><td>Presentation 1-14
A New Perspective on Mathematics Classroom Observation: A Comparative Study of Novice and Experienced Teachers' Noticing
Qiaoping Zhang[1], Xiaoping Wang[2], Hange Yun[3]
(1.The Education University of Hong Kong; 2.Wuhan City Polytechnic; 3.Xi'an Eurasia University)</td><td>Presentation 2-7
The Integration of Information Technology in Middle School Geometry Teaching
Yanan Xu[1], Dandan Sun[1]
(1. Shandong Normal University)</td><td>Presentation 3-12
Actualization of Legal Core Goals for Mathematics in the Netherlands
Marc van Zanten[1,2]
(1. Netherlands Institute for Curriculum Development SLO; 2. Freudenthal Institute, Utrecht University)</td></tr>
<tr><td>Presentation 1-15
Analysis of Digital Transformation Paths for Secondary School Mathematics Teachers in the Perspective of Artificial Intelligence
Maodong Tian[1], Zaiqiang Ku[1], Lei Ye[1]
(1. Huanggang Normal University)</td><td>Presentation 2-8
Information and Communication Technology in Mathematics Education in Africa: Motivations, Challenges, Initiatives and Implications
Huiling Zhu[1], Hengjun Tang[1]
(1. Zhejiang Normal University)</td><td>Presentation 6-1
The Impact of Learning Pressure on Disadvantaged Students' Mathematical Resilience: The Regulatory Role of Gender
Jiayao Wang[1], Yu Fu[2], Chunxia Qi[1]
(1. Beijing Normal University; 2. Nanjing University of Information Science and Technology)</td></tr>
<tr><td>Presentation 1-16
Reflections in Design Capacity of Mathematics Teacher Educators in a Cross-Cultural Practice of Community
Xingfeng Huang[1], Rongjin Huang[2], Liping Ding[3]
(1. Shanghai Normal University; 2. Middle TN State University; 3. Norwegian University of Science and Technology)</td><td rowspan="2">Presentation 2-9
Exploration of Rural Mathematics Teaching Practice Based on Netpad
Guannan Wu[1], Hengjun Tang[1]
(1. Zhejiang Normal University)</td><td rowspan="2">Presentation 6-2
Social Media as a Catalyst for Fostering Mathematical Identity among Undergraduate Ethnic Minority Students in China: A Path Analysis
Haode Zuo[1], Zhiwei Liu[1]
(1. Yangzhou University)</td></tr>
<tr><td>Presentation 1-17
Developing the Pedagogical Design Capacity of Mathematics Teachers from the Perspective of "Teacher-Resource"
Jiawen Zhu[1], Xingfeng Huang[1]
(1. Shanghai Normal University)</td></tr>
<tr><td>17:00-18:00</td><td colspan="3">Dinner
Location: Third floor, Xiayu Canteen</td></tr>
<tr><td>18:00-21:00</td><td colspan="3">Mathematical Drama
The Starry Sky of Pythagoras
Location: Concert Hall, East China Normal University Zizhu Education Park (350 Zifeng Road)</td></tr>
</table>

11 月 11 日 星期六 11 November Saturday				
	TSG4(5)：数学课堂教学和评价 主席：程靖博士 （华东师范大学） 徐伟民教授 （台湾屏东大学） *地点：二教 410*	**TSG4(6)：数学课堂教学和评价** 主席：程靖博士 （华东师范大学） 徐伟民教授 （台湾屏东大学） *地点：二教 414*	**TSG5(2)：比较和国际数学教育** 主席：Dyana Wijayanti 博士 (华东师范大学) 赵晓燕博士 （南京师范大学） *地点：二教 418*	**工作坊 2(2)** 主持人： 徐章韬教授 （华中师范大学） *地点：二教 431*
15:30-17:00	**报告 4-25** **六年级学生“图形的测量”知识结构特征的研究——以概念图为评估工具** 王艳玲[1]；闫锦涛[2]；冯小爽[1] (1. 东北师范大学；2.江苏省无锡市连元街小学)	**报告 4-30** **指向数学推理论证能力培养的教学模式对中学生数学推理能力的影响** 郑欣[1] (1. 集美大学)	**报告 5-6** **国际视野下的数学教师情绪研究——基于 44 项核心研究的范围综述** 韩粟[1]；姜浩哲[2]；雷沛瑶[3]；孔雯晴[1] (1. 华东师范大学；2. 浙江大学；3. 成都市教育科学研究院)	**卡西欧计算器助力数学教与学** 齐敏[1] (1. 原浦东教育发展研究院) *15:30-16:15*
	报告 4-26 **指向核心素养的数学课堂问题情境设计** 王智宇[1,2]；张维忠[2] (1. 浙江省台州市路桥中学；2. 浙江师范大学)	**报告 4-31** **在非正式学习空间一起“玩”数学项目** 金珉[1,2]；季鑫[1] (1. 上海市实验学校；2. 华东师范大学)	**报告 5-7** **US and Chinese Elementary Teachers’ Noticing of Cross-Cultural Mathematics Videos** Meixia Ding[1], Xiaobao Li[2], Monica L. Manfredonia[3], Wenda Luo[4] (1. 美国天普大学；2. 美国威得恩大学；3. 美国哥伦比亚大学；4. 上海光启书院)	
	报告 4-27 **探索听牌魔术在高中数学建模教学中的潜力：一种创新的教学设计** 简焕森[1,2] (1. 华东师范大学；2. 澳门新华学校)	**报告 4-32** **小学数学素养评价量表的编制——以几何直观能力评价量表为例** 唐黎明[1] (1. 深圳小学)	**报告 5-8** **The Relationship between Reading Literacy and Mathematics Performance: Insights from Multilevel Modeling Analysis of PISA Data** Xiangxiang Chen[1], 莫雅慈[2] (1. 新加坡国际学校（香港）；2. 香港大学)	
	报告 4-28 **关于加强初中数学尺规作图教学的思考** 邢成云[1] (1. 山东省滨州市教育科学研究院)	**报告 4-33** **一个新的效度验证框架：基于数学核心素养的测评工具研发** 周达[1] (1. 东北师范大学)	**报告 5-9** **中英在线教学视频数学任务认知需求的比较研究** 张运吉[1]；黄兴丰[1] (1. 上海师范大学)	
	报告 4-29 **国小数学教学中的问题类型、教师提问和数学言谈** 徐伟民[1] (1. 台湾屏东大学)	**报告 4-34** **问题类型、教师反馈对高中数学课堂跨学科问题解决的影响** 张棫彬[1]；蒋政[1]；钱梦凡[1] (1. 上海师范大学)	**报告 5-10** **跨文化背景下学生学习“图形运动”的挑战——一项基于坦桑尼亚 4 课时作业单学生完成情况的研究** 林徐励[1,2] (1. 上海市进才实验中学；2. 华东师范大学)	
17:00-18:00	**晚餐** *地点：夏雨厅（华闵食堂）三楼*			
18:00-21:00	**数学话剧** **开普勒先生如是说** *地点：华东师大紫竹教育园区音乐厅（紫风路 350 号）*			

11 月 11 日 星期六 11 November Saturday

15:30-17:00	**TSG4(5): Mathematics classroom teaching, learning and assessment** Chair: Dr. Jing Cheng (East China Normal University) Prof. Weimin Hsu (Pingdong University) *Location: Room 410, No. 2 Teaching Building*	**TSG4(6): Mathematics classroom teaching, learning and assessment** Chair: Dr. Jing Cheng (East China Normal University) Prof. Weimin Hsu (Pingdong University) *Location: Room 414, No. 2 Teaching Building*	**TSG5(2): Equity in mathematics education** Chair: Dr. Dyana Wijayanti (East China Normal University) Dr. Xiaoyan Zhao (Nanjing Normal University) *Location: Room 418, No. 2 Teaching Building*	**Workshop 2(2)** Chair: Prof. Zhangtao Xu (Central China Normal University) *Location: Room 431, No. 2 Teaching Building*
	Presentation 4-25 **The Characteristics of the Knowledge Structure of Year 6 Students on "Measurement of Graphs": Using Concept Map as an Evaluation Tool** Yanling Wang[1], Jintao Yan[2], Xiaoshuang Feng[1] (1. Northeast Normal University; 2. Lianyuan Street Primary School in Wuxi, Jiangsu Province)	**Presentation 4-30** **The Effect of Teaching Mode Focusing on the Cultivation Of Mathematical Reasoning on Middle School Students' Mathematical Reasoning Competency** Xin Zheng[1] (1. Jimei University)	**Presentation 5-6** **Research on Emotions of Mathematics Teachers from an International Perspective: Theoretical Basis, Research Design and Research Results: A Scoping Review of Forty-four Empirical Researches** Su Han[1], Haozhe Jiang[2], Peiyao Lei[3], Wenqing Kong[1] (1. East China Normal University; 2. Zhejiang University; 3. Chengdu Education Research Institute)	**The Active Role of Casio Calculators in Mathematics Teaching and Learning** Min Qi[1] (1. Shanghai Pudong Institute of Education Department (Retired from here)) *15:30-16:15*
	Presentation 4-26 **Design of Mathematics Classroom Problem Context Focusing on Core Competencies** Zhiyu Wang[1,2], Weizhong Zhang[1] (1. Taizhou Luqiao Middle School; 2. Zhejiang Normal University)	**Presentation 4-31** **Playing Math Projects Together in Informal Learning Spaces** Min Jin[1,2], Xing Ji[1] (1. Shanghai Experimental School; 2. East China Normal University)	**Presentation 5-7** **US and Chinese Elementary Teachers' Noticing of Cross-Cultural Mathematics Videos** Meixia Ding[1], Xiaobao Li[2], Monica L. Manfredonia[3], Wenda Luo[4] (1. Temple University; 2. Widener University; 3. Columbia University; 4. Shanghai Quangqi Academy)	
	Presentation 4-27 **Exploring the Effectiveness of Listening Card Trick in Enhancing Mathematical Modelling Competencies of Grade 11 Students: An Innovative Teaching Design and Implementation** Huansen Jian[1,2] (1. East China Normal University; 2. Escola Sun Wah)	**Presentation 4-32** **Drafting an Elementary Mathematics Literacy Evaluation Instrument: Taking the Evaluation Scale of Geometric Intuition Ability as an Example** Liming Tang[1] (1. Shenzhen Primary School)	**Presentation 5-8** **The Relationship between Reading Literacy and Mathematics Performance: Insights from Multilevel Modeling Analysis of PISA Data** Xiangxiang Chen[1], Ida Ah Chee Mok[2] (1. Singapore International School (Hong Kong); 2. The University of Hong Kong)	
	Presentation 4-28 **Reflections on Strengthening the Teaching of Ruler-and-compass construction in Junior High School Mathematics** Chengyun Xing[1] (1. The Institute of Education Sciences of Binzhou)	**Presentation 4-33** **A New Validation Framework of Developing Assessment Instruments Based on Mathematical Core Competencies** Da Zhou[1] (1. Northeast Normal University)	**Presentation 5-9** **A Comparative Study of Cognitive Demands of Mathematical Tasks in Online-Video Lessons Between China and England** Yunji Zhang[1], Xingfeng Huang[1] (1. Shanghai Normal University)	
	Presentation 4-29 **The Types of Mathematics Problems, Teachers' Questioning, and Mathematical Discourses** Wei-Min Hsu[1] (1. Pingtung University)	**Presentation 4-34** **The Effect of Problems and Feedback on Interdisciplinary Problem-Solving in High School Mathematics Classrooms** Yanbin Zhang[1], Zheng Jiang[1], Mengfan Qian[1] (1. Shanghai Normal University)	**Presentation 5-10** **Challenges of Learning Transformation of Figures in a Cross-Cultural Context: A Study Based on Students' Performance of 4-lesson Worksheets in Tanzania** Xumai Lin[1,2] (1. East China Normal University; 2. Shanghai Jincai Experimental Middle School)	
17:00-18:00	**Dinner** *Location: Third floor, Xiayu Canteen*			
18:00-21:00	**Mathematical Drama** **The Starry Sky of Pythagoras** *Location: Concert Hall, East China Normal University Zizhu Education Park (350 Zifeng Road)*			

11 月 12 日 星期日　12 November Sunday	
8:00-8:30	**注册 & 展览 Registration & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
08:30-09:30	**大会报告 6 Plenary Lecture 6** **Mathematics Education: Recent Work in Connecting Research and Classroom Practice Related to the Teaching and Learning of Mathematics in the United States** **数学教育：联系美国数学教学研究与课堂实践的最新工作** **报告人：Trena Wilkerson 教授**（美国贝勒大学） **Speaker: Prof. Trena Wilkerson** (Baylor University, USA) 报告主持人：李淑惠博士（华东师范大学）Chair: Dr. Shuhui Li (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
09:30-10:00	**休息 & 交流 & 展览 Break & Networking & Exhibition** *地点：学生之家 C 区 Location: Home of Students (Campus Centre) C*
10:00-11:00	**大会报告 7 Plenary Lecture 7** **What Mathematics Should Mathematics Teachers Know?** **数学教师应该了解什么数学？** **报告人：梁贯成教授**（香港大学） **Speaker: Prof. Frederick K. S. Leung** (The University of Hong Kong) 主持人：徐斌艳教授（华东师范大学） Chair: Prof. Binyan Xu (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
11:00-11:30	**闭幕式 Closing Ceremony** 领导、专家致辞 主持人：张凤华（华东师范大学） Chair: Ms. Fenghua Zhang (East China Normal University) *地点：学生之家 C 区报告厅 Location: Lecture Hall, Home of Students (Campus Centre) C*
11:30-12:30	**午餐 Lunch** *地点：夏雨厅（华闵食堂）三楼 Location: Third floor, Xiayu Canteen*

大会报告人简介

（Plenary Speakers）

郭玉峰教授
北京师范大学教授
第一届张奠宙数学教育奖获得者
Prof. Yufeng GUO
Professor, Beijing Normal University, China
Winner of the First ZHANG Dianzhou Award in Mathematics Education in 2021

郭玉峰，北京师范大学数学科学学院教授。现任中国数学会理事、中国统计教育学会基础教育分会常务理事、北京师范大学学位评定数学分委员会委员，是第 14 届国际数学教育大会国际组织委员会委员，第十二、十三届“苏步青数学教育奖”评审专家，曾任中国数学会基础教育工作委员会副主任等。

郭教授曾获首届“张奠宙数学教育奖”（2021 年）、北京师范大学通鼎青年教师奖（2017 年）、全国教育硕士优秀指导教师（2014 年）等。目前是人民教育出版社高中数学教材（A 版）分册主编，该分册教材获 2021 年首届全国教材建设奖（基础教育类）特等奖。她曾在 *Tsukuba journal of educational study in mathematics*、*ZDM – Mathematics Education*、*American Journal of Educational Research*、《教育学报》、《课程•教材•教法》、《中国教育学刊》、《北京大学学报哲学社会科学版》、《数学教育学报》、《教育科学研究》、《科技与出版》、《中国考试》等中外重要学术期刊发表学术论文 80 多篇，独立、合著、参编著作 13 部。

郭教授的研究兴趣主要涉及数学课程与教材、数学教育心理学。自 2007 年开始至今，她持续进行了十多年关于“学生数学基本活动经验”的研究，该工作的主要贡献是：从数学思维活动的经验入手，根据数学家的数学思维活动特点以及中学生的认知特点，在内涵界定基础上，定量和定性相结合建立数学基本活动经验的要素构成以及水平划分的理论框架，以及利用该框架指导中小学数学教学实践。该研究形成了相对完整的逻辑体系并具有一定实践指导意义。此

外，多年来一直参加初中和高中数学教材的研究和编写，积累了一定的教材编写和研究经验。

Yufeng Guo is a Professor at Beijing Normal University, China. She is currently a director of the Chinese Mathematical Society, a standing director of the Basic Education Branch of the Chinese Society of Statistical Education, a member of the Mathematics Subcommittee for Degree Evaluation at Beijing Normal University, a member of the International Organization Committee of the *14th International Congress on Mathematical Education*, a review expert of the 12th and 13th "Su Buqing Prize for Mathematics Education", and a former deputy director of the Basic Education Committee of the Chinese Mathematical Society. She was awarded the first ZAHNG Dianzhou Mathematics Education Award in 2021, the Tongding Young Teacher Award of Beijing Normal University in 2017, and the National Excellent Instructor of Education Master's degree in 2014. She is currently the Editor-in-Chief of the sub-volume textbook of the High School Mathematics Textbook (Version A) of the People's Education Press. She has published over 80 academic research papers in journals, such as *Tsukuba Journal of Math-education*, *ZDM-Mathematics Education*, *AJER*, *Journal of Educational Studies* (in Chinese), *Curriculum, Teaching Material and Method* (in Chinese), *Journal of the Chinese Society of Education* (in Chinese), *Journal of Peking University (Philosophy and Social Sciences)* (in Chinese), *Journal of Mathematics Education* (in Chinese), *Educational Science Research* (in Chinese), *Science-Technology & Publication* (in Chinese), *Journal of China Examinations* (in Chinese), and has independently authored, co-authored and co-edited 13 works. Her research interests cover mathematics courses and textbooks, and mathematics educational psychology. She has been conducting research on students' basic mathematical activity experience for more than ten years. In addition, she has accumulated a considerable amount of experience in the research and writing of middle and high school mathematics textbooks.

Jeremy HODGEN 教授
英国伦敦大学学院教育学院教授
英国数学教育学会（BSLM）前主席
Prof. Jeremy HODGEN
Professor, University College London, UK
Former Chair, British Society for the Learning of Mathematics

Jeremy Hodgen is a Professor of Mathematics Education at the IOE, UCL's Faculty of Education and Society, University College London, and Guest Professor at the Norwegian University of Science and Technology (NTNU). He has led numerous research projects include an investigation of low attainment in mathematics at Key Stage 3, effective ways of teaching algebra and multiplicative reasoning, how best to group students, the evaluation of several large-scale randomised controlled trials and several reviews of effective ways to teach mathematics. He has published widely on mathematics teaching and learning, teacher education, assessment, international comparisons and standards over time. His Nuffield Foundation funded reports examining participation in post-16 mathematics have been highly influential on UK government policy.

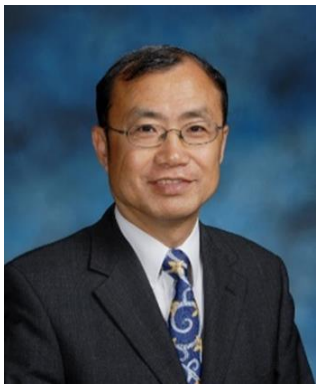
He has been a member of the Royal Society's Advisory Committee on Mathematics Education (ACME) and Chair of the British Society for the Learning of Mathematics (BSLM), is currently a member of ACME's Post-16 Contact Group and is a member of the Joint Mathematical Council of the UK's Working Group on Digital Technology. He edited the international journal, *Research in Mathematics Education*, from 2011 until 2018. He is currently a member of the Expert Advisory Group advising the UK Prime Minister on extending the study of mathematics to age 18. Prior to his academic career, he taught mathematics in primary and secondary schools in London.

中文对照：

Jeremy Hodgen 教授是伦敦大学学院教育与社会学院数学教育教授，也是挪威科技大学（NTNU）的客座教授。他主持了许多研究项目，包括 KS3 学生数学低成就的调查，代数和乘法推理的有效教学方法的探究，如何最好地对学生进行分组教学，对多项大规模随机对照试验的评估，多项关于有效数学教学

方法的审查。他在数学教学、教师教育、教育评估、国际比较和标准等方面发表了大量文章。他的由纳菲尔德基金会资助的报告调查了 16 岁后学生（Post-16）数学参与情况，该报告对英国政府的政策产生了很大影响。

Hodgen 教授是英国皇家学会数学教育顾问委员会（ACME）成员和英国数学教育学会（BSLM）主席，目前也担任 ACME 的 16 岁后教育联络小组成员和英国数字技术工作组联合数学理事会成员。他从 2011 年到 2018 年一直担任国际期刊 *Research in Mathematics Education* 的主编。他现在还担任将数学学习扩展到 18 岁项目的英国首相专家顾问组成员。他也曾在伦敦的中小学教授数学。



梁贯成 教授

香港大学讲座教授

国际数学教育委员会主席

Prof. Frederick K. S. LEUNG

Professor, The University of Hong Kong, China (Hong Kong)

President of the International Commission on Mathematical Instruction

Frederick K. S. Leung, BBS, Chair Professor and Kintoy Professor in Mathematics Education at the University of Hong Kong, is Chairman of the Board of the Faculty of Education in the University. He was Dean of the Faculty of Education from 1996 to 2002, and Dean of the Graduate School between 2019 and 2021. Professor Leung's major research interests are in the comparison of mathematics education in different countries, and in the influence of different cultures on teaching and learning. He is the national project manager for Hong Kong in OECD's P*rogramme for International Student Assessment* (PISA), and was principal investigator of the Hong Kong component of the *Trends in International Mathematics and Science Study* (TIMSS), *TIMSS Video Study*, and *Learner's Perspective Study* (LPS). Professor Leung publishes widely in the field of mathematics education, and was one of the editors for the *Second International Handbook on Mathematics Education* and the *Third International Handbook on Mathematics Education* published by Springer. He was also international consultant for a number of World Bank, UNESCO and United Nations Development Programme (UNDP) projects in education. Professor Leung was appointed a Senior

Fulbright Scholar in 2003, and was awarded the prestigious Hans Freudenthal Medal for 2013. He was named a Changjiang Scholar by the Ministry of Education, China in 2014, and he received the World Outstanding Chinese Award in 2015. Professor Leung was awarded a Bronze Bauhinia Star (BBS) by the Hong Kong SAR Government in 2017 for his contributions in mathematics education, and was conferred an Honorary membership by the International Association for the Evaluation of Academic Achievement (IEA) in 2019. Professor Leung is currently the President of the International Commission on Mathematical Instruction (ICMI).

中文对照：

梁贯成，铜紫荆星章（BBS），香港大学讲座教授、健泰基金教授（数学教育）、香港大学教育学院董事会主席，曾于 1996 年至 2002 年担任香港大学教育学院院长，2019 年至 2021 年担任香港大学研究生院院长。梁教授主要研究不同国家的数学教育比较，以及不同文化对教与学的影响。他既是经济合作与发展组织（OCED）发起的学生能力国际评价项目（PISA）在香港地区的负责人，也是国际数学和科学趋势研究（TIMSS）、TIMSS 视频研究和学习者视角研究（LPS）在香港地区的首席研究员。梁教授在数学教育领域发表了大量的文章，并先后主编 Springer 出版的《国际数学教育研究手册》第二版和第三版。他还在世界银行、联合国教科文组织和联合国开发计划署（UNDP）组织的一些教育项目中担任国际顾问。梁教授于 2003 年获福布莱特奖、2013 年获弗赖登塔尔奖、2014 年获国家教育部嘉许为长江学者讲座教授、2015 年获世界杰出华人奖、2017 年获香港特别行政区颁授铜紫荆星章（Bronze Bauhinia Star）。2019 年，梁教授被国际教育成就评价协会（IEA）评选为荣誉会员。目前，梁教授担任国际数学教育委员会（ICMI）主席。

Takeshi MIYAKAWA 教授
日本早稻田大学教授
Journal of Mathematics Teacher Education 副主编
Prof. Takeshi MIYAKAWA
Professor, Waseda University, Japan
Associate Editor, *Journal of Mathematics Teacher Education*

After his studies of mathematics and mathematics education at the University of Tsukuba in Japan, **Takeshi Miyakawa** earned his doctorate in didactics of mathematics from Université Joseph Fourier at Grenoble, France in 2005. He spent several years as a postdoctoral fellow in Japan (Tsukuba) and in US (Michigan), before serving as an associate professor of mathematics education at Joetsu University of Education in Japan. Since 2019, he hods the position of full professor at Waseda University in Tokyo.

Professor Miyakawa's research interest is twofold: on the one hand, teaching and learning of proof, which have been his research topic since his doctoral studies; on the other hand, mathematics teacher knowledge and its learning in teachers' collective work such as lesson studies in Japan. His research often adopts the international comparative perspective to elucidate cultural aspects of mathematics education.

Professor Miyakawa's contributions extend beyond the national context. He has been actively involved in a variety of international scientific activities of mathematics education research: The editorial or advisory board members of international journals such as *Educational Studies in Mathematics*, *For the Learning of Mathematics*, and *Journal of Mathematical Behavior*; the associate editors of *Journal of Mathematics Teacher Education* and *Hiroshima Journal of Mathematics Education*; and the members of the international program committee (IPC) for ICME-14 and ICMI Study 25.

中文对照：

Takeshi Miyakawa 教授在日本筑波大学学习数学和数学教育后，于 2005 年在法国格勒诺布尔的约瑟夫·富立尔大学获得数学教学的博士学位。他曾在日本（筑波）和美国（密歇根）担任博士后研究员数年，然后在日本上越教育大学担任数学教育副教授。自 2019 年起，他担任东京早稻田大学正教授职务。

Miyakawa 教授的研究兴趣有两个方面：一方面是证明的教和学，这是他自博士研究以来的研究主题；另一方面是数学教师知识及在教师集体工作中对教师知识的学习，如日本的课例研究。他的研究常常采用国际比较的视角，以阐明数学教育的文化因素。

Miyakawa 教授的贡献已然超越了国内范围。他积极参与各种国际数学教育研究的学术活动，担任国际期刊 *Educational Studies in Mathematics*、*For the Learning of Mathematics* 和 *Journal of Mathematical Behavior* 的编辑和顾问委员会成员；*Journal of Mathematics Teacher Education* 和 *Hiroshima Journal of Mathematics Education* 的副主编；以及 ICME-14 和 ICMI Study 25 的国际程序委员会（IPC）成员。

Susanne PREDIGER 教授
德国多特蒙德工业大学教授
Educational Studies in Mathematics 主编
Prof. Susanne PREDIGER
Professor, TU Dortmund University, Germany
Editor-in-Chief, *Educational Studies in Mathematics*

Susanne Prediger is full professor for Mathematics Education Research and PD Research at TU Dortmund University in Germany. She is director of the newly established DZLM, the German National Center for Mathematics Teacher Education at IPN Leibniz Institute for Science and Mathematics Education. Since 16 years, she investigates the role of language and has coined the term language-responsive mathematics classrooms. She has published over 100 papers in peer-reviewed journals, was involved in four international projects and leads several national research projects with various research approaches, design research, randomized controlled trials, and implementation studies. She was president of the European Society for Research in Mathematics Education, is member of the ICMI executive committee and Co-Editor-in-Chief of *Educational Studies in Mathematics*.

中文对照：

Susanne Prediger 教授是德国多特蒙德工业大学数学教育研究和教师职业发展研究的正教授。她是莱布尼茨大学科学与数学教育研究所新成立的德国国家数学教师教育中心（DZLM）的主任。16 年来，她一直在研究语言的作用，并创造了“语言回应性数学课堂”这一术语。她在同行评议期刊上发表了 100 多篇论文，参与了四个国际项目，并领导了多个国家级研究项目，这些项目中使用了多种研究方法、设计研究、随机对照试验和实施研究。她曾任欧洲数学教育研究学会（ERME）主席、国际数学教育委员会（ICMI）执行委员会成员和国际知名数学教育学术期刊 *Educational Studies of Mathematics* 的联合主编。

Trena WILKERSON 教授
美国贝勒大学教授
全美数学教师协会前主席
Prof. Trena WILKERSON
Professor, Baylor University, USA
Past-President, National Council of Teachers of Mathematics

Trena Wilkerson is the immediate Past-President of the National Council of Teachers of Mathematics (NCTM) during 2020-2022. She is also Professor of Mathematics Education in the Department of Curriculum and Instruction in the School of Education at Baylor University and is currently Interim Department Chair. She previously taught high school mathematics for 18 years.

Professor Wilkerson received the *Award for Excellence in Integrating Science and Mathematics* from the School Science Mathematics Association (SSMA) for her role as Director of the GEAR UP (Gaining Early Awareness and Readiness for Undergraduate Programs) Math Initiative funded by the U.S. Department of Education. In 2022 as President of NCTM she participated in the *14th International Congress on Mathematical Education -Shanghai, China* and accepted the International Commission on Mathematical Instruction Emma Castelnuovo Award for Excellence in the Practice of Mathematics Education given to NCTM for their work in mathematics education.

Professor Wilkerson's research interests include mathematics education, teacher education, algebra teacher efficacy, teaching and learning of mathematics, and professional development. She has published extensively in several NCTM journals, including *Mathematics Teaching in the Middle School (MTMS)*, *Mathematics Teacher*, *Teaching Children Mathematics*, *Mathematics Teacher: Learning and Teaching PK-12* and *Journal for Research in Mathematics Education*. She chaired the *MTMS* Editorial Panel and previously served a three-year term on the NCTM Board of Directors from 2014–17. She has also published in other mathematics education research journals such as *Investigations in Mathematics Learning*, *International Journal for Lesson and Learning Studies*, *School Science Mathematics Journal*, and *Electronic Journal of Research in Mathematics and Science Education*.

中文对照：

Trena Wilkerson 教授在 2020-2022 年期间担任美国数学教师委员会（NCTM）的主席。她是美国贝勒大学教育学院课程与教学系的数学教育教授，现任代理系主任。在此之前，她在高中教了 18 年数学课程。

Wilkerson 教授因担任美国教育部资助的"GEAR UP 数学倡议"的负责人而获得了中小学科学和数学协会（SSMA）颁发的科学与数学综合卓越奖。在 2022 年，作为 NCTM 主席，Wilkerson 教授出席了在中国上海举行的第十四届国际数学教育大会，并因 NCTM 在数学教育方面的工作，她被授予国际数学教学委员会艾玛·卡斯特尔诺沃数学教育实践卓越奖。

Wilkerson 教授的研究兴趣包括数学教育、教师教育、代数教师的效能感、数学教学和教师专业发展。她在 *Mathematics Teaching in the Middle School (MTMS)*，*Mathematics Teacher*，*Teaching Children Mathematics*，*Mathematics Teacher: Learning and Teaching PK-12* 和 *Journal for Research in Mathematics Education* 等 NCTM 期刊上发表了大量论文。她曾担任 MTMS 编委会主席，并于 2014-2017 年担任 NCTM 董事会成员，任期三年。她还在 *Investigations in Mathematics Learning*，*International Journal for Lesson and Learning Studies*，*School Science Mathematics Journal* 和 *Electronic Journal of Research in Mathematics and Science Education* 等数学教育研究期刊上发表过论文。

朱雁 副教授

华东师范大学副教授

第二届张奠宙数学教育奖获得者

Dr. Yan ZHU

Associate Professor, East China Normal University, China;

Winner of the Second ZHANG Dianzhou Award in Mathematics Education in 2023

朱雁，在新加坡南洋理工大学获得博士学位，曾在新加坡和香港工作多年，现为华东师范大学教师教育学院副教授。她曾获国家留学基金委资助赴美国伊利诺伊大学香槟分校访学，获德国“洪堡资深学者”研究基金资助赴汉堡大学合作研究。主要研究领域包括教育公平、国际比较研究、数学学科的测量与评价、数学建模、数学课程与教材研究等。参与上海初高中数学教材编写工作。曾受邀参与 *How Chinese Learn Mathematics* 和 *How Chinese Teach Mathematics* 等多本英文专著的写作，并在数学教育国内外重要研究期刊上发表多篇论文。

Yan Zhu, Ph.D. from Nanyang Technological University of Singapore, has worked in Singapore and Hong Kong for many years and is now an associate professor at the College of Teacher Education, East China Normal University. She was sponsored by the CSC to visit the University of Illinois at Urbana-Champaign, and the German “Humboldt Senior Scholar” research fund to visit the University of Hamburg for cooperative research. Her main research areas include educational equity, international comparative studies, measurement and evaluation of mathematics, mathematical modelling, and mathematics curriculum and textbook research. She participated in the writing of mathematics textbooks for middle and high schools in Shanghai. She has been invited to participate in the writing of *How Chinese Learn Mathematics*, *How Chinese Teach Mathematics*, etc. and she also published many papers in prestigious research journals in mathematics education at home and abroad.

摘要（Abstracts）

大会报告（Plenary Lectures）

大会报告 1/Plenary Lecture 1

Bridging Language for Developing Conceptual Understanding: A Research Journey

Susanne Prediger

TU Dortmund University, Germany

Since more than 40 years, researchers have discovered that language is crucial for mathematics learning. But what exactly is needed for developing conceptual understanding, and how can we develop students' language? The talk presents research approaches and findings from a 16 year-long journal of research on enhancing language that led to an empirically grounded theory for language-responsive mathematics classrooms.

中文对照：

连结语言以发展概念理解——一段研究的旅途

Susanne Prediger

德国多特蒙德工业大学

40 多年来，研究者发现语言对于数学学习至关重要。但是，发展概念理解具体需要什么，我们如何才能发展学生的语言呢？本次报告介绍了一段长达 16 年的关于增强语言的研究旅途记录，这些研究的结果也形成了语言回应性数学课堂的实证扎根理论。

大会报告 2/Plenary Lecture 2

Studying the Cultural Aspect of Japanese Mathematics Teaching and Learning from a Perspective of the Anthropological Theory of the Didactic

Takeshi Miyakawa

Waseda University, Japan

The aim of this talk is to advance understanding how we can characterize and analyze mathematics teaching and learning in a way to elucidate the cultural specificities

involved in a specific context of mathematics education. A theoretical reflection will be first developed to illustrate a framework and methodology to study the cultural aspect of mathematics teaching and learning by adopting a perspective developed within the Anthropological Theory of the Didactic. Specifically, the concepts of didactic paradigm and didactic model proposed within ATD will be discussed and further elaborated in the Japanese cases to characterize mathematics teaching including the cultural elements that are implicitly or explicitly taken into consideration when designing and implementing mathematics lessons. This theoretical reflection will be followed by a presentation of the international comparative study of mathematics lessons between Switzerland and Japan, which clearly exemplifies the existence of specific didactic paradigms and models (e.g., Japanese structured problem-solving lesson) behind the design and implementation of mathematics lessons and their effects on shaping the cultural specificities of mathematics lesson.

中文对照：

从教学理论的视角研究日本数学教与学的文化层面

Takeshi Miyakawa

日本早稻田大学

本次报告旨在进一步理解我们如何刻画和分析数学教与学，以揭示数学教育特定背景下文化特征。首先将进行理论反思，以阐明通过采用教学人类学理论（ATD）中发展的视角研究数学教与学中的文化因素的框架和方法论。具体而言，ATD 中提出的教学范式和教学模式的概念，将在日本案例中加以讨论和进一步阐述，以刻画数学教学的特点，包括其中设计和实施数学课程时隐含或明确考虑的文化要素。随后，将介绍瑞士和日本数学课例的国际比较研究，该研究清楚地展示了在数学课程的设计和实施背后存在特定的教学范式和模式（例如，日本结构化问题解决课程），以及这些范式和模式对塑造数学课程文化特征的影响。

大会报告 3/Plenary Lecture 3

数学整体性以及单元教学的研究与思考

郭玉峰

北京师范大学

数学是一个有机整体，是相互联系的。数学上分属不同分支、看来完全不相干的概念之间的联系被发现，或者不同数学分支的结合形成解决重大数学问题的突破，这些都极大推动了数学的进展。重视基础教育阶段数学的整体性，

包括中小学数学内容之间，以及与大学数学内容的联系，日益成为我国当前中小学数学教学关注的重点。报告将从中小学数学的某些具体内容出发，谈谈对这些内容联系与本质的理解，包括与大学数学相关内容的衔接。与此同时，结合当前中国单元教学的热点话题，提出落实单元教学，尤其需要把握数学的整体性。

Reflections on the Mathematics Integrity and Unit Teaching Research

Yufeng Guo

Beijing Normal University, China

Mathematics is an interconnected organic whole. The discovery of connections between seemingly irrelevant concepts that belong to different branches of mathematics, or the combination of different branches of mathematics to form breakthroughs in solving important mathematics problems, has greatly promoted the progress of mathematics. Emphasizing the integrity of mathematics in the basic education stage, including the connection between primary and secondary school mathematics content and university mathematics content, has increasingly become a focus of current primary and secondary school mathematics teaching in China. This talk will look at specific mathematics contents in primary and secondary schools and discuss the connections between these contents, including connections between primary and secondary school-level mathematics and university-level mathematics. In the end, it is proposed to implement unit teaching to enhance the integrity of mathematics.

大会报告 4/Plenary Lecture 4

Mathematics Reform in England: Lessons, and Challenges, for the Future

Jeremy Hodgen

University College London, UK

In England over the past 40 years there have been various large-scale national initiatives directed at improving teaching and raising attainment in mathematics. These include a National Curriculum, the introduction of national testing, the Primary and Secondary National Strategies and, most recently, the 'mastery' initiative. Drawing on analyses of policy and the impact of policy, this talk will consider these reforms, the extent to which they have been successful and the lessons, and challenges, for future reform in England and elsewhere.

中文对照：

英国数学改革：经验教训和未来的挑战

Jeremy Hodgen

英国伦敦大学学院

在过去的 40 年里，英国采取了各种大规模的国家举措，旨在改善数学教学和提高数学成绩。这些举措包括国家课程、国家测试的引入、中小学国家战略，以及最近的“掌握”倡议。基于对政策和政策影响的分析，本次演讲将聚焦于这些改革的成功之处和经验教训，以及英格兰和其他地方未来改革所面临的挑战。

大会报告 5/Plenary Lecture 5

中国数学教育中的性别平等

朱雁

华东师范大学

教育公平一直是几乎所有国家关注的问题，无论是发达国家、转型国家还是发展中国家. 在数学教育研究领域，性别是研究公平的初始维度，之后成为强调或结合公平的其他维度的跳板。本次报告主要介绍两项研究，第一项研究旨在通过对北京—上海—江苏—广东四地的 PISA 2015 数学数据的二次分析，从四个社会因素（即社会经济地位、学校水平、学校类型和学校位置）的角度研究性别对中国学生数学成绩的总体作用。第二项研究利用 2004 年至 2023 年所有中国数学奥林匹克决赛入围者的考试成绩，使用 Mann-Kendall 趋势测试和元分析等方法，考察我国中学最高水平数学考试中性别差异趋势的方向和幅度。 报告最后讨论将这些性别差异在我国学校体系中的社会和教育影响。

Gender Equity in Chinese Mathematics Education

Yan Zhu

East China Normal University, China

Equity in education has been a concern of almost all countries, whether developed, transitional, or in the progress of developing. Within the field of mathematics education research, gender was historically the initial dimension of equity researched widely, and later served as the springboard for emphases on, or in combination with, the other dimensions of equity. This presentation mainly introduces two studies. Study 1 aims to study an overall role of gender on Chinese students' mathematics attainment from a

perspective of four social factors (i.e., socioeconomic status, school level, school types, and school location) via a secondary analysis of PISA 2015 mathematics data from China B-S-J-G (represented by four regions/cities). Study 2 examines the direction and magnitude of the trend of gender differences in mathematics test of the highest level in Chinese secondary school using the test scores of all CMO finalists from 2004 to 2023, using Mann-Kendall trend test and meta-analysis etc. The presentation closes with discussions on societal and educational implications about these gender disparities in the current school system of China.

大会报告 6/Plenary Lecture 6

Mathematics Education: Recent Work in Connecting Research and Classroom Practice Related to the Teaching and Learning of Mathematics in the United States

Trena Wilkerson

Baylor University, USA

Considering trends of research conducted in mathematics education in the United States over the past 10 years, particularly related to teaching and learning of mathematics in the K-12 classroom, it is essential that we examine the connections or lack of connections, between research and practice, the impact of research on practice, the impact of practice on research, and future directions of research and practice. We will use the lens of the four recommendations related to needs in mathematics teaching and learning as identified by the National Council of Teachers of Mathematics in the Catalyzing Change Series (2018, 2020) to frame this session. These recommendations include 1) broadening the purposes of mathematics; 2) creating equitable structures in mathematics, 3) implementing equitable mathematics instruction, and 4) developing a deep understanding of mathematics.

中文对照：

数学教育：联系美国数学教学研究与课堂实践的最新工作

Trena Wilkerson

美国贝勒大学

考虑到过去 10 年来美国数学教育研究的趋势，特别是与 K-12 课堂中的数学教学有关的趋势，我们对研究与实践之间是否缺乏联系进行了调查，具体包括研究对实践的影响，实践对研究的影响，以及研究与实践的未来方向。我们以美国数学教师委员会在《催化变革系列》（2018、2020）中提出的与数学教

学需求有关的四项建议为研究框架。这些建议包括 1）拓宽数学的目的，2）在数学中建立平衡的结构，3）实施公平的数学教学，4）发展对数学的深度理解。

大会报告 7/Plenary Lecture 7

What Mathematics Should Mathematics Teachers Know?

Frederick K. S. Leung

The University of Hong Kong, China (Hong Kong)

What mathematics should mathematics teachers know is a question that has long been a concern for teacher educators and researchers in teacher education. Since Klein proposed the idea of Elementary Mathematics from an Advanced Standpoint in the early 20th Century, and Shulman's proposal of the concept of Pedagogical Content Knowledge (PCK) in the 1980s, this issue has been extensively studied, but there is still no consensus among scholars. Based on two research projects on teachers' mathematical knowledge, this report analyses what mathematics teachers know and what they should know by providing examples from different content domains and grade levels, and on the connections between different dimensions and levels of mathematical knowledge. The report identifies the critical importance of mathematical content knowledge in comparison to other forms of knowledge (e.g., pedagogical knowledge), supplementing past literature on this issue. The report concludes by stressing the importance of teachers' reflection on mathematical knowledge.

中文对照：

数学教师应该了解什么数学？

梁贯成

香港大学

在教师教育领域，“数学教师应该了解什么数学”是一个备受教师教育者和研究者关注的问题。自克莱因（Klein）在 20 世纪初提出高观点下的初等数学，以及舒尔曼（Shulman）在 20 世纪 80 年代提出教学内容知识（PCK）的概念以来，这一问题被广泛研究，然而目前仍未达成共识。基于两个关于教师数学知识的研究项目，本报告分析了不同学段的数学教师对于不同内容领域已经知道的知识和他们应该知道的知识，以及不同层面的数学知识在层次之间的联系。本报告指出，与其他形式的知识（如教学知识）相比，数学内容知识至关重要，这无疑是对已有研究的重要补充。最后，本报告强调了教师对数学知识进行反思的重要性。

大会圆桌讨论（Panel Discussion）

Issues and Challenges in Contemporary Mathematics Education Research and Development

Moderator: Prof. Lianghuo Fan (East China Normal University)

Discussants:

Prof. Jonei Cerqueira Barbosa (Federal University of Bahia, Brazil)
Prof. Martin Dyke (University of Southampton, UK)
Prof. Anjum Halai (Aga Khan University, Pakistan)
Prof. Wee Tiong Seah (The University of Melbourne, Australia)
Dr. Moneoang Leshota (University of Pretoria, South Africa)
Prof. Frederick K. S. Leung (The University of Hong Kong)
Prof. Trena Wilkerson (Baylor University, USA)

In this plenary session, the panel members will discuss with the audience about key issues and challenges concerning contemporary mathematics education research and development, nationally in different countries and internationally across different countries, from different perspectives and share their expertises and personal views.

中文对照：

当代数学教育研究与发展中的问题与挑战

主持人：范良火教授（华东师范大学）

讨论人：

Jonei Cerqueira Barbosa 教授（巴西巴伊亚联邦大学）
Martin Dyke 教授（英国南安普顿大学）
Anjum Halai 教授（巴基斯坦阿迦汗大学）
佘伟忠教授（澳大利亚墨尔本大学）
Moneoang Leshota 博士（南非比勒陀利亚大学）
梁贯成教授（香港大学）
Trena Wilkerson 教授（美国贝勒大学）

在本次大会圆桌讨论中，参与讨论专家将从不同的角度，包括从各自国家（地区）的角度和超越单个国家的国际角度，和与会者一起讨论当代数学教育研究与发展中的关键问题和挑战，分享有关经验和认识。

口头报告（Oral Communications）

TSG1: 数学教师教育与专业发展（Mathematics teacher education and professional development）

报告 1-1/Presentation 1-1

A Visual-Dialogic Approach: Professional Development for Preservice Mathematics Teachers in China

Ying Zhang[1], Jieting Xin[1], Zixiang Yu[2], Yu Liu[3], Wenjun Zhao[4],

Na Li[5], Gaowei Chen[1]

1. The University of Hong Kong

2. The University of Edinburgh

3. Southwest University

4. Sichuan Normal University

5. Central China Normal University

Student learning in mathematics lessons is significantly impacted by effective classroom interactions. However, many preservice teachers (PSTs) tend to communicate with students using monologic patterns because of the limited classroom experience. The term "dynamic visualization" (DV), which describes a sequence of interactions involving various visual representations, is another educational method frequently employed in mathematics classes. Nevertheless, mathematics PSTs frequently encounter technological or pedagogical challenges when incorporating dynamic visualizations into their instruction. In response to the pressing need for improving dialogic teaching and effective use of dynamic visualizations among mathematics PSTs, this study proposed a video-based visual-dialogic professional development (PD) approach. The academically productive talk (APT) framework-based dialogic teaching, and GeoGebra-based dynamic visualizations form this approach's two key elements. The purpose of this study was to examine the effectiveness of this PD approach. One PST was selected as a representative case from the ongoing large-scale research project. Data were collected from the teacher's lesson plans, slides, in-class used DV, video recordings of dialogic teaching, coding tests, pre-post surveys, formative self-reflection diary, and individual semi-structured interviews with the teacher and her four students. The data were analyzed with a mixed method, where qualitative content analysis took the lead. The findings demonstrated that the PD approach effectively enhanced PSTs' understanding of APT and capabilities for dialogic teaching in mathematics lessons. The teacher's self-reflection helped close the

gap between knowing and doing; thus informing her future practices. Additionally, the PST could selectively use DV backed by GeoGebra in her instruction to shift from teacher-knowing to student-self-creating. A democratic teaching and learning maker space built on this constructivist PD approach was made available to teachers and students because of increased opportunities for participation. This study also yields implications for future PD programs for mathematics PSTs.

Keywords: Visual-dialogic approach; Professional development; Mathematics preservice teachers; Dialogic teaching; Dynamic visualization

报告 1-2/Presentation 1-2：

职前数学教师学习机会与专业知识的关系研究

邓钧[1]；杨新荣[1]

1. 西南大学

如何有效培养职前数学教师的专业素养是当前国内外数学教育研究者关注的热点之一。作为教师专业发展的核心要素，数学教师专业知识对教学质量的改善和学业成就的提升有着重要作用。前期实证研究表明,职前数学教师专业知识的获取主要受到他们在大学学习期间学习机会的影响。鉴于此，本研究利用改良后的数学师资跨国比较研究（TEDS-M）设计的问卷和测试工具，以我国三所师范院校2020年、2021年毕业的584名职前数学教师为研究样本，探究学习机会与数学内容知识（MCK）和数学教学内容知识（MPCK）之间的关联。结果表明，高等数学和中学数学的学习机会能显著影响MCK和MPCK的获取，但数学教育、教学方法和校本经验等学习机会对教师专业知识的影响不明显。

关键词：学习机会；教师专业知识；职前数学教师

The Relationship between Pre-Service Mathematics Teachers' Opportunities to Learn and Professional Knowledge

Jun Deng[1], Xinrong Yang[1]

1. Southwest University

How to effectively improve mathematics teachers' professional competence has been one of the hotspots attracted researchers' interest in mathematics education research community. As a key component of teacher professional competence, mathematics

teachers' professional knowledge plays a significant role in enhancing teaching quality and improving students' mathematics learning outcomes. Previous empirical studies have indicated the significance of opportunities to learn (OTL) in shaping preservice mathematics teachers' (PSMTs') professional knowledge during their preparation. Based on this, with the use of slightly modified instruments developed in TEDS-M, the relationship between OTL and PSMTs' Mathematical Content Knowledge (MCK) and Mathematical Content Knowledge (MPCK) was investigated using a sample of 584 PSMTs graduated in 2020 and 2021 from three preservice teacher training institutions in China. The results suggest that OTL in tertiary-level mathematics and school-level mathematics significantly impacts the development of MCK and MPCK. However, OTL in mathematics education pedagogy, teaching methods, and school-based experiences has less significant associations with teachers' professional knowledge.

Keywords: OTL; Teachers' professional knowledge; Preservice mathematics teacher

报告 1-3/Presentation 1-3：

小学教师数学教学知识水平与课堂提问行为的关系研究

玉婧宝[1]；费亚欣[2]；董连春[2]

1. 普洱市第一中学

2. 中央民族大学

为探究小学数学教师教学知识与课堂提问行为的关系，选择西部地区34名小学数学教师为研究对象，基于Ball等人提出的数学教学知识（MKT）框架和曹一鸣等研究者开发的测评工具，考察研究对象的教学知识水平。基于课堂教学录像，使用IRF框架（教师发起——学生回应——教师跟进），对研究对象的课堂提问行为进行编码分析。研究发现：（1）MKT整体水平及其两个子维度（内容与学生知识（KCS）、内容与教学知识（KCT））均与简单问答呈显著负相关；（2）MKT整体水平及其四个子维度均与单一问答序列无显著相关关系；（3）MKT整体水平及其四个子维度均与多重问答序列显著正相关；（4）多重问答序列中，MKT整体水平及其四个子维度均与主导型多重问答序列占比无显著相关性，MKT整体水平及其四个子维度均与引导型多重问答序列占比存在显著正相关关系，而仅有子维度一般内容知识（CCK）与调动型多重问答序列占比呈显著负相关。本研究为促进小学数学教师专业发展和教师教育培训提供了借鉴与启示。

关键词：教师知识；数学教学知识；课堂提问；师生交流；IRF

A Study on the Relationship between Primary School Teachers' Mathematics Teaching Knowledge Levels and Classroom Questioning Behaviors

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1. Pu'er No.1 Middle School

2. Minzu University of China

In order to explore the relationship between the teaching knowledge of primary school mathematics teachers and the questioning behaviors in the classroom, 34 primary school mathematics teachers in western China were selected as the research subjects, and based on the mathematical knowledge for teaching (MKT) framework proposed by Ball et al. and the assessment tools developed by Cao Yiming et al., the teaching knowledge level of the research subjects was investigated. Based on classroom teaching videos, the IRF framework (Initiation – Response – Follow-up) was used to encode and analyze the classroom questioning behaviors of the research subjects. The results found that: (1) The overall level of MKT and its two subdimensions (knowledge of content and student (KCS), knowledge of content and teaching (KCT)) were significantly negatively correlated with QA; (2) The overall level of MKT and its four subdimensions were not significantly correlated with IRF-Single; (3) The overall level of MKT and its four subdimensions were significantly positively correlated with IRF-Multiple; (4) In the IRF-Multiple, the overall level of MKT and its four subdimensions were not significantly correlated with the proportion of the Dominant, the overall level of MKT and its four subdimensions were significantly positively correlated with the proportion of the Guided, while only the subdimension common content knowledge (CCK) was significantly negatively correlated with the proportion of the Mobilized. This study provides reference and enlightenment for promoting the professional development of primary mathematics teachers and teacher education and training.

Keywords: Teacher knowledge; MKT; Classroom questioning; Teacher-student communication; IRF

报告 1-4/Presentation 1-4：

数学建模背景下职前教师关注力的培养——一项基于录像的干预研究

左思宇[1]；綦春霞[1]

1. 北京师范大学

教师教育课程中应培养教师教授数学建模的能力，因为这是一项高要求的任务。数学建模的过程是即时性的，这与教师的核心能力之一——教师关注有关。本研究设计了一项基于录像的教师教育课程，在数学建模的背景下培养职前教师的这一能力。利用25位职前教师观看两段数学建模录像后完成的任务手稿，根据本研究构建理论框架对文本进行双独立编码，Wilcoxon符号秩检验的结果表明：在参加了为期十二周的课程后，职前教师的教师关注得到了显著提升。具体而言，在关注内容上，职前教师关注重点转向了学生的建模思维；在关注立场上，职前教师更多地使用解释性的话语来阐释他们所关注到的事件并运用数学建模任务知识来进行推理。这些结果有效地支持了将录像用于数学建模背景下培养职前教师关注力的可行性。

关键词：数学建模；职前教师；教师教育；教师关注；基于录像的课程

Developing Preservice Teacher Noticing within the Context of Mathematical Modelling—A Video-Based Intervention Study

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1. Beijing Normal University

Teacher education should foster teachers' competencies in teaching mathematical modelling since it is a demanding task. Mathematical modelling requires spontaneous reactions, which are related to the core of teachers' competencies — teacher noticing. The study designed a video-based course to develop these competencies in the context of mathematical modelling. The study analysed written responses from the preservice teachers, collected at the beginning and end of the course, to investigate their noticing of mathematics modelling. A Wilcoxon signed-rank test of the pre-test and post-test results revealed a noticeable improvement in their noticing competencies after participating in the semester-long course. In particular, the preservice teachers' topical foci shifted towards modelling thinking and pedagogy. They made significantly more interpretive comments and used significantly more task-dimensional knowledge for teaching mathematical modelling to make inference about events. These results appear to support the viability of using video for this purpose.

Keywords: Mathematical modelling; Preservice teachers; Teacher education; Teacher noticing; Video-based course

报告 1-5/Presentation 1-5：

课例研究视角下数学教师学科教学知识的生成路径

张浩羽[1]；于露露[1]

1. 南京师范大学

教师专业化发展研究的深入引起人们对学科教学知识的重新审视，作为衡量教师专业化的标志，学科教学知识的生成对于教师成长来说具有重要意义。根据教师专业发展所必须具备的知识、行为、动机等因素可以分别构建三条学科教学知识生成路径帮助数学教师成长：基于学科知识本身的生成路径旨在通过知识的累积以实现量变向质变的转化来生成学科教学知识；以教学实践为情境的生成路径旨在通过实际的教学锻炼来动态构建学科教学知识；以发展动机为中介的生成路径旨在通过刺激教师发现差距激发动力来完善学科教学知识。在此基础上结合课例研究中的具体环节对三条生成路径进行再加工，发现三条生成路径又分别具有筛选性、试错性、合作性等特点，由此形成更具有实践意义的学科教学知识生成路径帮助数学教师成长。

*关键词：*PCK；生成路径；课例研究

The Generation Path of Pedagogical Content Knowledge for Mathematics Teachers from the Perspective of Lesson Study

Haoyu Zhang[1], Lulu Yu[1]

1. Nanjing Normal University

The deepening of research on the development of teacher professionalization has led to a re-examination of Pedagogical Content Knowledge. As a symbol of measuring teacher professionalization, the generation of Pedagogical Content Knowledge is of great significance for teacher growth. According to factors such as knowledge, behavior, and motivation that teachers must possess in the process of professional development, three paths for generating Pedagogical Content Knowledge can be constructed to help mathematics teachers grow: The generation path based on subject knowledge itself aims to generate Pedagogical Content Knowledge through the accumulation of knowledge to achieve the transformation from quantitative to qualitative change; The generation path based on teaching practice aims to

dynamically construct Pedagogical Content Knowledge through practical teaching exercises; The generative path mediated by developmental motivation aims to improve Pedagogical Content Knowledge by stimulating teachers to discover gaps and stimulate motivation. On this basis, combined with the specific links in the lesson study, the three generation paths were reprocessed, and it was found that the three generation paths have the characteristics of screening, trial and error, and cooperation, respectively. This formed a more practical path for generating Pedagogical Content Knowledge to help mathematics teachers grow.

Keywords: PCK; Generation path; Lesson study

报告 1-6/Presentation 1-6：

数学史对小学数学教师的内容与教学知识（KCT）的影响

李卓忱[1]

1. 扬州大学

教师知识的发展是教师专业发展中的重要部分。作为一个研究领域，数学史与数学教育（HPM）十分关注教师的专业发展。HPM课例研究是实现教师专业发展的可能途径，其中数学史扮演了重要的角色。MKT理论框架剖析了数学教学所需的知识，其中内容与教学知识（KCT）是MKT中的重要组成部分。本研究以个案研究的方法，跟踪了3名小学数学教师开展HPM课例研究的过程，经过课堂观察、访谈，以及对教学材料的文本分析，探究在HPM课例研究中数学史料内容对数学教师的内容与教学知识（KCT）有怎样的影响。研究发现，数学史对个案教师KCT的发展在不同的阶段中产生了不同的影响，都是先有消极影响，而后转为了积极影响。将数学史融入教学对个案教师来说是困难的，一方面是阅读有难度，另一方面是不知如何使用史料内容。在克服难点之后，史料不仅成为了教学素材，也是一种参照，对教师KCT的发展产生了积极的影响。

关键词：数学史；教师知识；MKT；内容与教学知识

The Influence of the History of Mathematics on the Knowledge of Content and Teaching (KCT) of Primary School Mathematics Teachers

Zhuochen Li[1]

1. Yangzhou University

The development of teachers' knowledge is an important part of teachers' professional development. As a field of study, History and Pedagogy of Mathematics (HPM) is concerned with the professional development of teachers. HPM Lesson Study (HPM-LS) is a possible way to achieve teacher professional development, in which the history of mathematics plays an important role. Mathematical Knowledge for Teaching (MKT) framework analyzes the knowledge required for mathematical teaching, in which Knowledge of Content and Teaching (KCT) is an important part of MKT. Using the method of case study, this study followed the process of three primary school mathematics teachers in carrying out HPM-LS. Through classroom observation, interview, and analysis of teaching text materials, it explored how the contents of mathematical historical materials in HPM-LS affected the KCT of teachers. It is found that the history of mathematics has different influences on the development of case teachers' KCT in different stages, with negative influences first and then turn positive ones. It is difficult for teachers to integrate the history of mathematics into teaching. On the one hand, it is difficult to read. On the other hand, they do not know how to use historical materials. After overcoming the difficulties, historical materials not only become teaching materials, but also a reference, which has a positive impact on the development of teachers' KCT.

Keywords: History of mathematics; Knowledge of teachers; MKT; Knowledge of content and teaching

报告 1-7/Presentation 1-7：

专家教师和新手教师课堂中以素养为导向的学生活动差异——基于认知网络分析（ENA）视角

梁海丽[1]，杜剑南[1]

1. 北京师范大学

本文旨在探究数学新手与专家在课堂上组织素养导向数学活动方面的差异，为此，本研究收集了一位专家和一位新手教师连续三节课的数据。基于Wang等人（2022年）和 Qi & He（2019年）的框架，采用认知网络分析（ENA）来识

别每节课中学生活动的共现和结构关系。结果表明，在专家教师的三节课中，学生与数学素养相关的活动类型存在显著差异，而在新手教师的三节课中则不存在显著差异。在ENA特征上，新手教师倾向于通过将低级（回忆、计算、解释）和中级思维技能（如分析、推理、解决简单问题）联系起来以组织学生素养活动。相反，专家型教师更倾向于优先培养学生的高阶思维，如批判性思维和创造性思维技能。此外，专家教师按照“理解-应用-迁移与创新”的顺序组织三节课，从而更好地促进数学内容和课程之间的联系。相比之下，新手教师在三节课中组织了更多关于“理解”和“应用”的数学活动，没有与“迁移与创新”活动建立联系。

关键词：认知网络分析；素养导向的学生活动；专家型教师；新手教师

Comparing Competency-Oriented Student Activities between Expert and Novice Teachers in China: Insights from an Epistemic Network Analysis (ENA)

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Competency-oriented student activities are an important means of reflecting teachers' transformation from teaching fundamental knowledge to developing students' subject competencies in class. To examine mathematics novice–expert differences in organizing competency-oriented activities, this study collected data from three consecutive lessons of an expert and a novice teacher. Based on Wang et al.'s (2022) and Qi & He's (2019) framework, epistemic network analysis (ENA) was used to identify the co-occurrence and structure of such students' activities in each lesson. The results showed statistically significant differences in the types of students' activities related to mathematics competency across the three lessons of the expert teacher but not in those of the novice teacher. Students' activities demonstrated by novice teachers were more focused on Applying in the first lesson, Understanding in the second lesson, and not on Transferring & Innovating in the third lesson, which is inconsistent with the learning objectives and contradicts the cognitive developmental pattern (from lower to higher) of Understanding-Applying-Transferring and innovating of the students. The overall differences in ENA characteristics between these two teachers indicated that novice teachers tended to organize competency-oriented student activities by making connections between lower (recalling, calculating, explaining) and moderate thinking skills (e.g., analyzing, reasoning, solving simple problems). Expert teachers, conversely, preferred to establish connections between lower and higher cognitive skills, showing

that they prioritize fostering students' higher thinking skills, such as critical thinking and creative thinking skills, based on students' competency in Understanding and Applying. Moreover, the epistemic analysis of the consecutive lessons revealed that the expert teacher facilitated better mathematical content and lesson connectedness by establishing connections between competency-oriented activities following the sequence of Understanding-Applying-Transferring and innovating. In contrast, the novice teacher organized more mathematics activities on Understanding and Applying without building connections with Transferring and innovating across three lessons. Finally, the implications, limitations, and future research were discussed.

Keywords: Epistemic network analysis; Competency-oriented student activity; Expert teacher; Novice teacher

报告 1-8/Presentation 1-8：

职前数学教师的信息技术教学技能提升实证研究——基于交互式电子白板课程实施

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2. 华东师范大学

交互式电子白板作为现代电化教育技术的一部分在国内外课堂教学中正在日益普及，受到了研究者的广泛关注。不同于现有的研究，大多关注在职教师面向学生实际教学过程中使用交互式电子白板的研究。本文报告了一项针对职前数学教师对交互式电子白板的教学需求所完成的关于教学目标、教学重难点以及教学过程的设计并实施的实证研究。本研究通过问卷调查和访谈收集数据，使用质性研究方法，发现在职前教师教育课程中融入交互式电子白板既具有必要性，也具有可行性。最后研究也总结了数学职前教师的教学技能提升路径，并讨论了在职前教师教育中融入交互式电子白板可能带来的优点、问题和挑战。

关键词：格式交互式电子白板课程；职前数学教师；实证研究；教学技能提升路径

An Empirical Study on the Development of Pre-Service Mathematics Teachers' Competency in Using Information and Communication Technology: The Case of Use of Interactive Whiteboard

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As part of modern audio-visual educational technology, interactive electronic whiteboards have been increasingly available in domestic and international classroom teaching and received close attention from researchers. Different from previous studies which most focused on in-service teachers' use of interactive electronic whiteboards in actual instructional practice, this paper reports an empirical study which focuses on the instructional needs of pre-service mathematics teachers about the use of interactive electronic whiteboards by carrying out the designing and implementing of a pre-service teacher training program including instructional objectives, key curricular points and difficulties, and teaching processes. This study collected the data through questionnaire surveys and interviews, using qualitative research methods for data analysis. The results revealed that it is not only necessary but also feasible to integrate interactive electronic whiteboards into pre-service teacher education. Finally, this study also summarizes the teaching skills improvement path of pre-service mathematics teachers and discusses the possible advantages, problems and challenges of integrating interactive whiteboards into pre-service teacher education.

Keywords: Interactive whiteboard curriculum; Pre-service mathematics teacher; Empirical research; Teaching skills improvement path

报告 1-9/Presentation 1-9：

Reconstruction of Mathematics Teacher Identity in Education Reforms in China: A Mixed Method Study

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Education reforms, often formulated at upper administrative levels, are implemented by teachers with limited involvement in the policy-making process. This gap between policy formulation and implementation can lead to a passive attitude among teachers, hindering the realization of educational goals. This study explores how mathematics

teachers in China reconstruct their teacher identity in response to education reforms, shedding light on their perspectives on new policies that necessitate changes in their daily teaching practices. The study is grounded in the concept of teacher identity, which posits that the development of teacher identity is influenced by personal beliefs, social interactions, and cultural context. To explore identity reconstruction and its influencing factors, a mixed-method approach was employed. Quantitative data were collected through questionnaires completed by over 100 mathematics teachers in Guangdong, China. The quantitative data were analyzed using exploratory factor analysis (EFA), T-tests, correlation analysis, and regression analysis. Qualitative data were gathered through individual semi-structured interviews with eight mathematics teachers in the same area. The findings highlighted the complex nature of teacher identity formation, emphasizing the roles of external factors (e.g., work environment) and internal factors (e.g., professional development) in shaping teacher identity. The grounded theory method enhanced the credibility of the study by providing a comprehensive exploration of the underlying mechanisms that reshape teacher identity, identifying four key factors: society, environment, professionalism, and cognition. "Society" encompasses factors such as educational policies, curriculum standards, examination systems, and sociocultural background. "Environment" involves the routine conditions and interactions that teachers experience within their schools and classrooms. "Society" contains the macro-level factors that operate at the level of policy, culture, and society, while "environment" includes the micro-level factors that operate at the level of school, classroom, and community. "Professionalism" encompasses teachers' commitment to ethical standards, continuous learning, and excellence in teaching. Then, "cognition" consists of teachers' beliefs about the nature of mathematics, their knowledge of mathematics content and pedagogy, and their cognitive strategies for planning, implementing, and reflecting on their teaching practices. In conclusion, this study illuminates the reconstruction of mathematics teacher identity in the context of education reforms in China. By examining teachers' responses to new policies, the study offers insights for education stakeholders and lays the foundation for future research on the multifaceted influences on teachers' decisions to embrace new policies.

Keywords: Mathematics teacher identity; Education reforms; Mixed-Method study

报告 1-10/Presentation 1-10：

HPM 课例研究如何影响教师的数学教学观？

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数学教学观是教师对数学教学持有的信念、观点、规则、偏好等，直接影响教师的教学实践。本文结合数学教学观分类框架及教师专业发展互联模型，通过案例研究法，基于问卷、访谈、课堂录像等数据，深入刻画了三位在职教师在长期HPM课例研究场景中数学教学观的变化及缘由。研究发现，HPM课例研究强化了三位个案教师的学生中心教学观，这种倾向变化与“讲解来龙去脉”、“给学生探究机会”、“理解学生”这些可激发学生学习积极性的支撑性观念关联密切，HPM课例研究通过影响教师数学观和影响教师教学实践两方面推动教师数学教学观的发展，教学效果在教师观念转变过程扮演关键角色。

关键词：HPM；课例研究；数学教师；数学教学观；观念发展

How does HPM Lesson Study Affect Teachers' Conceptions of Mathematics Teaching?

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The conception of mathematics teaching means the beliefs, views, rules, and preferences held by teachers in mathematics teaching, which directly affects teachers' teaching practice. Based on two theoretical perspectives named three conceptions of mathematics teaching and the interconnected model of professional growth, this paper describes the changes and the reasons of three in-service teachers' conceptions of mathematics teaching in the process of HPM lesson study by case study. Various data were collected, including questionnaires, interviews, and videos of teaching. It is found that HPM lesson study is helpful to strengthen three teachers' learner-focused view, and this change is closely related to supportive conceptions as explaining the context, giving students opportunities to explore, and understanding students, which can stimulate students' learning enthusiasm. HPM lesson study promotes the development of teachers' conceptions of mathematics teaching by influencing teachers' conceptions of mathematics and teachers' teaching practice. Outcome plays a key role in the process of belief changing.

Keywords: HPM; Lesson study; Mathematics teacher; The conception of mathematics teaching; The development of conception

报告 1-11/Presentation 1-11：

通过课例研究促进数学师范生和数学教师教育者的专业学习

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作为一种基于课堂教学实践的、建立在合作学习共同体之上的有效教师专业发展模式，课例研究被广泛用于世界各地在职教师的专业学习中。然而，课例研究较少被用在职前教师的学习中。借鉴Zaslavsky促进者-学习者通过学习任务建构知识的理论框架，本文提出将课例研究活动作为促进数学师范生和数学教师教育者专业成长的方式。通过对师范生课例研究报告和教师教育者自我反思报告的质性分析发现，这些数学师范生在开展由数学教师教育者精心设计和组织的课例研究活动的过程中发展了数学教学知识和教学实践能力，而数学教师教育者则在数轮课例研究活动的设计、实施、反思和改进的循环过程中逐步实现自身的专业学习和发展。

关键词：课例研究；数学师范生；数学教师教育者；专业学习

Promoting Preservice Mathematics Teachers and Teacher Educator's Professional Learning through Lesson Study

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Lesson study is recognized as an effective teacher professional development mode based on classroom teaching practice and collaborative learning communities. It has been widely used in the professional learning of in-service teachers. However, it is relatively seldom used for preservice teachers. In light of the Facilitator-Learner mechanism of construction of knowledge through dealing with tasks proposed by Zaslavsky, this paper shows that lesson study is an approach to promote preservice mathematics teachers and mathematics teacher educator's professional learning. Based on qualitative analysis on the reports of lesson study by the preservice teachers and the self-reflection report by the teacher educator, it was found that, on one hand, the preservice mathematics teachers could improve their knowledge and practice of mathematics teaching by enacting the lesson study activities carefully designed and organized by the mathematics teacher educator (MTE), and on the other hand, the MTE

could gradually achieve her own professional growth through iterative cycles involving design, implementation, reflect and improvement of the lesson study activities.

Keywords: Lesson study; Preservice mathematics teachers; Mathematics teacher educator; Professional learning

报告 1-12/Presentation 1-12：

高中数学教师空间向量学科教学知识（PCK）的评价指标构建

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学科教学知识（PCK）作为教师知识的重要组成部分，是教师专业发展水平与教师素养的重要体现，也是教育研究的重要对象。本研究立足教师空间向量PCK水平的评价指标构建，综合运用文献研究法、案例分析法，根据PCK的内涵与构成，结合对空间向量学科教学知识的成分分析，从数学学科知识、一般教学法知识、关于学生的知识三个维度，确定数学教师空间向量PCK的评价内容范畴，构建用于评价数学教师空间向量PCK水平的指标体系，并在各个维度内将评价指标外显为指标描述，以便评价操作。最后将评价指标体系运用于“点到平面的距离”这一具体实例，阐释利用这一体系实施评价数学教师空间向量PCK水平的过程，以期推而广之，既为评价PCK水平的实证研究提供研究方法上的参考，也为在实践中提升教师的PCK水平指引方向。

关键词：PCK；空间向量；评价指标

Construction of Evaluation Index of Pedagogical Content Knowledge (PCK) in Spatial Vector of Senior Mathematics Teachers

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As an integral component of teachers' knowledge, Pedagogical Content Knowledge (PCK) serves as a crucial reflection of their professional development and

accomplishments, while also representing a significant focus in educational research. Based on the evaluation index construction of teachers' PCK level in spatial vector, this study comprehensively uses literature research method and case analysis method to determine the evaluation content of PCK in spatial vector, construct an index system for evaluating PCK level in spatial vector of mathematics teachers and describe the evaluation index of each dimension in detail for evaluation operation from three dimensions of Mathematics Knowledge, Pedagogical Knowledge and Content Knowledge, according to the connotation and composition of PCK and combined with the component analysis of PCK in spatial vector. Finally, the evaluation index system is applied to the specific example of "distance from the point to the plane" to explain the process of implementing the evaluation of PCK level in the spatial vector of mathematics teachers by using this system, with a view to extending it, which not only provides research methodical reference for the empirical research on PCK level evaluation but also provides guidance for improving teachers' PCK level in practice.

Keywords: PCK; Space vector; Evaluation index

报告 1-13/Presentation 1-13：

数学教师学生导向目标与教学情感的关系：个人成就目标的中介作用

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情感评价理论和已有研究都表明了情感与目标之间的关系。然而，很少有研究调查教师的学生导向目标对其情感的作用。本研究考察了数学教师的教学情感如何通过个人成就目标直接或间接地与学生导向目标相关联。676名高中数学教师自愿完成在线问卷调查，验证性因子分析和结构方程模型用于数据分析。结果表明，数学教师的学生导向掌握目标正向预测教师的享受和满意，负向预测教师的愤怒和焦虑。教师的学生导向表现目标对教师的享受有负向预测作用，对教师的愤怒和焦虑有正向预测作用。学生导向目标也通过个人成就目标对情感产生显著的间接影响。本研究明确了数学教师目标与情感关系的机制，证实并推进了现有理论和教师情感互动模型。

关键词：数学教师情感；学生导向目标；成就目标；评价理论

Linking Mathematics Teachers' Student-Oriented Goals to Their Teaching Emotions: The Mediation of Personal Achievement Goals

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The appraisal theories of emotions and existing studies have indicated the relationships between emotions and goals. However, little research has investigated the role of teachers' student-oriented goals for their emotions. This study examined how mathematics teachers' teaching-related emotions relate to their student-oriented goals directly or indirectly through personal achievement goals. A sample of 676 senior secondary mathematics teachers in China voluntarily completed an online questionnaire, and confirmatory factor analysis and structural equation modeling were performed to analyze the data. The results showed that mathematics teachers' student-oriented mastery goals were positive predictors of their enjoyment/satisfaction and negative predictors of anger/anxiety. By contrast, teachers' student-oriented performance goals predicted their enjoyment negatively and anger/anxiety positively. The indirect effects of student-oriented goals on emotions through personal achievement goals were also significant. This study specifies the mechanisms underlying the relationships between mathematics teachers' goals and emotions, substantiating and advancing the existing theories and the reciprocal model of teacher emotions.

Keywords: Mathematics teachers' emotions; Student-oriented goals; Achievement goals; Appraisal theories

报告 1-14/Presentation 1-14：

数学课堂观察的新视角：新手教师与经验教师的教师关注比较

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教师关注力是教学能力的核心要素之一。提高教师关注力能使教师更加敏锐地观察课堂，及时发现教学中的问题，从而提升教学效果。借助开放性课堂观察框架，本研究对同一学校的两位经验教师和一位新手教师观看小学数学优质课视频进行深入分析。选取的三节授课视频为“数与代数”领域的教学内容，分别是《两位数乘两位数》、《笔算两位数乘两位数》和《认识平均数》。每个视频时长为40分钟。基于教师关注的分析视角，研究对比了新手教师和经验教师在观课时的内容和水平差异。结果发现：新手教师和经验教师在不同焦点所呈现的关注力水平不同，经验教师整体水平高于新手教师。在关注内容方面，经验教师更多关注学生的学习过程、数学思维发展和善于提出创造性的教学改进策略；新手教师倾向关注教师的教学效果、教学内容，缺乏对课堂教学延展性思考。借助教师关注的研究视角，有助于我们了解不同教师群体在观课过程中的思维方式和行为特点，为教师专业成长和数学教师教育提供可参考的方向。

关键词：教师关注；小学数学教师；课堂观察

A New Perspective on Mathematics Classroom Observation: A Comparative Study of Novice and Experienced Teachers' Noticing

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3. Xi'an Eurasia University

Teacher noticing, a critical aspect of teaching competence, enhances classroom observation, problem identification, thereby improving teaching effectiveness. This study utilized an open classroom observation framework to analyse the noticing skills of two experienced teachers and one novice teacher in the same school. Each teacher observed three exemplary primary mathematics lesson videos in the strand of Number and Algebra. The lessons covered were Multiplying Two-Digit Numbers by Two-Digit Numbers, Written Calculations of Two-Digit Multiplication, and Recognizing Averages, with each video lasting 40 minutes. The findings revealed that novice and experienced teachers demonstrated different levels of noticing, with experienced teachers achieving a higher overall level. Experienced teachers focused more on students' learning processes and the development of mathematical thinking and demonstrated proficiency in proposing innovative improvement strategies. Conversely, novice teachers primarily focused on the effectiveness and content of teaching, showing a lack of extended thinking about classroom teaching. By examining in-service teachers' noticing, we gain

insights into the thinking styles and behavioural patterns of different teacher groups during lesson observation. This study provides a valuable direction for professional development and mathematics teacher education.

Keywords: Teacher noticing; Primary mathematics teacher; Classroom observation

报告 1-15/Presentation 1-15：

人工智能视域下中学数学教师数字化转型路径分析

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教师是教育高质量发展的第一资源，教师的数字化转型是技术赋能教育的关键路径。针对当前中学数学教师人机协同能力弱、教师数字素养水平低的问题，有必要从主客观两个层面对教师的数字化转型路径进行分析，以培养一批高素质的智能教师，促进我国数学教育的发展。根据UTAUT模型、AI-TPACK理论和人工智能伦理相关研究理论，选取绩效期望、努力期望等10个因素作为中学数学教师数字素养发展的主客观因素，采用结构方程模型对其数字化转型进行路径分析。研究发现：绩效期望、社会影响、行为意向、教师AI-TPACK水平和人工智能伦理是影响中学数学教师数字化转型的核心影响要素，进而提出人工智能视域下中学数学教师数字化转型主要路径有：强化数字信念、凝聚社会合力、制定师培计划、提升专业技能、明确伦理界限。

关键词：人工智能；中学数学教师；数字化转型；结构方程模型

Analysis of Digital Transformation Paths for Secondary School Mathematics Teachers in the Perspective of Artificial Intelligence

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Teachers are the first resource for the high-quality development of education, and the digital transformation of teachers is the key path for technology to empower education. Aiming at the current problems of weak human-machine collaboration ability and low digital literacy level of middle school mathematics teachers, it is necessary to analyze

the digital transformation paths of teachers from two perspectives: subjective and objective, in order to cultivate a group of high-quality intelligent teachers and promote the development of mathematics education in our country. According to the UTAUT model, AI-TPACK theory, and research theories related to AI ethics, 10 factors such as performance expectation, effort expectation, etc. are selected as the subjective and objective factors for the development of digital literacy of middle school mathematics teachers, and structural equation model is used to conduct path analysis on their digital transformation. The study finds that performance expectation, social influence, behavioral intention, teacher AI-TPACK level, and AI ethics are the core influencing factors for the digital transformation of middle school mathematics teachers, then it proposes that the main paths for the digital transformation of middle school mathematics teachers under the vision of artificial intelligence are strengthening digital belief, gathering social force, formulating teacher training plan, improving professional skills, and clarifying ethical boundaries.

Keywords: Artificial intelligence; Secondary mathematics teachers; Digital transformation; Structural equation modelling

报告 1-16/Presentation 1-16：

在跨文化实践共同体中数学教师教育工作者教学设计反思能力的发展

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2021年以来，上海和坦桑尼亚的数学教育工作者（包括中小学数学教师、数学教师教育工作者）通过线上线下的的方式，建立跨文化实践共同体，实施数学教育工作者专业发展项目。本研究探讨了两位数学教师教育者在中国与坦桑尼亚的跨文化在线专业发展项目中的学习。该项目旨在培养坦桑尼亚数学教师教育者对中学生和未来数学教师的设计能力，包括设计目的、原则和反思。我们选择了两个具有代表性的数学教师教育者作为案例，收集并分析了多个访谈数据。通过对多层次反思的关注，揭示和比较了数学教育工作者的学习收获和面临的挑战。最后，讨论了教师教育工作者专业发展的理论和实践。

关键词：数学教师教育工作者； 教学设计反思能力；跨文化实践共同体

Reflections in Design Capacity of Mathematics Teacher Educators in a Cross-Cultural Practice of Community

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In 2021, school mathematics teachers and mathematics teacher educators in Shanghai and Tanzania established a cross-cultural community of practice and delivered hybrid professional development programs. This study examined what two mathematics teacher educators (MTEs) had learned from participating in an online cross-cultural professional learning program in China and Tanzania. The project was designed to develop Tanzanian MTEs' design capacity for school students and prospective mathematics teachers, which includes design orientations, principles, and reflections. Multiple interview data were collected and analyzed to harness the two cases. By focusing on the multilayers of reflection, what the MTEs learned and what challenges they faced are revealed and compared in detail. Finally, the implications for the theory and practice for MTE professional development are discussed.

Keywords: MTE; Reflection in design capacity; Cross-cultural practice of community

报告 1-17/Presentation 1-17：

基于“教师与资源”视角的数学教师教学设计能力发展

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数学教学资源的蓬勃发展为数学教师的设计提供了动力，然而，教师需要具备教学设计能力来检索、选择和调整教学资源。本文旨在帮助读者探索资源对新手数学教师教学设计能力和专业发展的影响。为此，本文基于3位新手数学教师在国际数学课程开发项目中的案例，从教学的编档法（DAD）的视角出发，对三位教师的资源系统结构进行了调查，包括物质性的课程资源（教科书、教参）和社会性的资源（与同行的对话与合作）。通过深入访谈和对过程性文档的分析绘制出教师的编档轨迹。初步的研究发现，教科书、教参、空中课堂等

官方的资源对新手教师的教学设计起到了重要作用；而专家教师以及数学教育专家的意见促进了教师对资源的反思。

关键词：资源；文献教学法；教学设计能力；编档轨迹

Developing the Pedagogical Design Capacity of Mathematics Teachers from the Perspective of "Teacher-Resource"

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The flourishing development of mathematical teaching resources provides motivation for the teaching design of mathematics teachers. However, teachers need to possess the pedagogical design capacity to search for, select, and modify resources. This article aims to explore the impact of resources on novice mathematics teachers' pedagogical design capacity and professional development. Based on the perspective of Documentational Approach to Didactics (DAD), we investigate the resource system of three novice mathematics teachers who participated in an international mathematics curriculum development program including material curriculum resources (textbooks and teacher manuals) and social resources (conversations and collaborations with peers). Through in-depth interviews and the analysis of process documents, the documentational trajectories of the three teachers are mapped. Preliminary research findings suggest that official resources such as textbooks, teacher manuals, and "Air Classroom" (online lesson videos developed by the Shanghai Municipal Education Commission during pandemic) play a significant role in the lesson design of novice teachers. Moreover, the suggestions from expert teachers and mathematics education specialists promote teachers' reflection on resources.

Keywords: Resource; Documentational approach to didactics; Pedagogical design capacity; Documentational trajectory

TSG2: 技术与数学教育的融合（ICT and mathematics education）

报告 2-1/Presentation 2-1：

关于数学电子教材功能的研究综述

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电子教材，更广泛一点，数字课程资源，是促进教学改革的工具，是支持教学改革的杠杆，对教师、学生及教学都能产生重要的影响。本文通过文献综述的方式，综述了近十年来国内外关于数学电子教材功能的研究，介绍了这些研究中的电子教材具有的功能，以及这些功能对学生学习和教师教学产生的影响，发现体现数学电子教材特征的许多功能并没有在现实中得以实现，开发体现数学电子教材互动性和合作性的功能仍然是开发数学电子教材的关键。同时，为了评价电子教材特有功能的效果，需要在完整的学习环境中考察它与学生、教师之间的互动关系.

关键词：教材，数学电子教材，数学电子教材功能

A Review of the Research on the Functions of Digital Mathematics Textbooks

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Digital textbooks, more broadly, digital curriculum resources, are tools for promoting teaching reform and levers to support teaching reform. They can have an important impact on teachers, students, and instruction. This article reviews the research on the functions of digital mathematics textbooks both domestically and internationally in the past decade through a literature review, introduces the functions of digital mathematics textbooks in these studies, and the impact of these functions on students' learning and teachers' teaching, it was found that many functions that reflect the characteristics of digital mathematics textbooks have not been realized in reality. Developing functions that reflect the interactivity and cooperation of digital mathematics textbooks remains the key to developing digital mathematics textbooks. At the same time, in order to evaluate the effectiveness of the unique functions of digital mathematics textbooks, it is necessary to examine their interaction with students and teachers in a complete learning environment.

Keywords: Textbooks, Digital mathematics textbook, Functions of digital mathematic s textbook

报告 2-2/Presentation 2-2：

通过人工智能生成内容（AIGC）促进数学教学

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在快速发展的技术领域中，人工智能生成内容（AIGC）崭露头角，作为创新的灯塔，重新定义了数学教育。这一先进工具为教育者和学生提供了一个焕然一新的视角，助力他们更深入、更清晰地理解和阐述复杂的数学原理。本研究对象为重庆巴蜀常春藤学校活跃的学生社区，涵盖了7至12年级。我们对AIGC在多个数学学科（常规数学、微积分、线性代数、统计学和数学建模）上的深远影响进行了详尽的研究。本研究采用了混合研究的方法，将标准化测试中得出的、显示学生在融入AIGC后成绩显著提高的量化结果，与焦点小组、深入的课堂观察和教育者对话中获得的丰富的定性见解相结合。初步结果揭示了AIGC的多方面优势：常规数学经历了一个向动态适应个体化学习轨迹的内容转变；微积分通过生动的视觉辅助工具被赋予了生命，简化了概念；传统上抽象的线性代数通过AIGC对向量空间和矩阵操作的清晰描绘变得更加易于接近；在统计学中，AIGC催生了一场转变，为实时数据解释创造了一个空间，反映了现代的、适用的情境。然而，AIGC最大的影响体现在数学建模中，它连接了抽象的数学理论和实际的挑战，强调了数学在跨学科、基于项目的学习努力中的关键作用。除了纯粹的学术进步，AIGC的深层教育学意义不容忽视。老师们从传统的内容传递的束缚中解放出来，开始转向更加互动、以学生为中心的教学方法，而学生们的兴趣也得到了放大，重申了他们与数学研究的联系。AIGC的融入教育框架不仅代表了学术卓越，还标志着一个创新的教育学章节的开始，强调了其在全球制定未来数学课程中的关键影响，这些课程坚实地植根于数学处于中心位置的跨学科研究中。

关键词：人工智能生成内容（AIGC）；数学教育；跨学科研究

Facilitating Math Teaching through Artificial Intelligence Generated Content (AIGC)

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In the rapidly evolving technological landscape, Artificial Intelligence Generated Content (AIGC) emerges as a beacon of innovation, redefining mathematics education. This advanced tool offers educators and students a revitalized perspective, facilitating a deeper understanding and clearer articulation of complex mathematical principles. Positioned within Chongqing BI Academy's vibrant student community, encompassing Grades 7 to 12, this research study meticulously investigates AIGC's far-reaching implications across diverse mathematical domains: General Math, Calculus, Linear Algebra, Statistics, and Math Modeling. The study leverages a comprehensive mixed-methods approach, intertwining robust quantitative findings from standardized tests, which pinpoint a marked improvement in student achievement post-AIGC assimilation, with rich qualitative insights gleaned from focus groups, thorough classroom observations, and insightful educator dialogues. Preliminary results illuminate the multifaceted advantages of AIGC: General Math experienced a shift towards content that dynamically caters to individualized learning trajectories; Calculus was brought to life with vibrant visual aids simplifying concepts; Linear Algebra, traditionally abstract, was made more accessible through AIGC's lucid portrayals of vector spaces and matrix operations; and in Statistics, AIGC catalyzed a transformation, fostering a space for real-time data interpretation that mirrors modern, applicable situations. However, AIGC's most significant impact manifested in Math Modeling, forging connections between abstract mathematical theories and practical challenges, emphasizing mathematics' pivotal role in interdisciplinary project-based learning endeavors. Beyond mere academic progression, the deeper pedagogical implications of AIGC cannot be overstated. Teachers, freed from the traditional confines of content delivery, now navigate towards more interactive, student-focused methodologies, while students display amplified interest, reaffirming their connection to mathematical studies. In essence, the integration of AIGC in educational frameworks not only champions scholastic excellence but signifies the advent of an innovative pedagogical chapter, underlining its critical influence in crafting future mathematics curricula worldwide, rooted firmly in interdisciplinary studies where mathematics takes a center position.

Keywords: Artificial Intelligence Generated Content (AIGC); Mathematics education; Interdisciplinary studies

报告 2-3/Presentation 2-3：

利用 Excel 进行高中数学仿真模拟实验——一种技术与数学教育的融合策略

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本文探讨了利用Excel进行高中数学模拟实验的教学策略，为信息技术与数学教材融合提供了一种新颖有效、有趣生动的教学模式，旨在提升学生对数学概念的理解、掌握和应用的水平。本文针对高中数学选择性必修第三册《随机变量及其分布》一章，用Excel设计了两个数学模拟实验：伯努利试验与最佳投资策略的数学实验，以及条件概率与三门问题的数学实验。这两个数学实验均以互动活动的形式展现，引导学生主动参与和深入探索数学问题。本文采用了教学实践，通过访谈、录像等方式收集了30名学生的反馈数据，并采用了描述性统计、假设检验等量化和质化相结合的分析方法。结果表明，利用Excel进行数学模拟实验能够提升学生对数学概念的理解、掌握和应用的水平。

关键词： Excel；数学仿真实验和模拟；游戏化教学；行动研究；高中数学教育

Leveraging Excel for High School Mathematics: A Novel Approach to Integrating Technology and Mathematics Education

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2. Escola Sun Wah

This paper investigates a pedagogical method that utilizes Excel to perform mathematical modelling experiments in high school mathematics. This method introduces a novel and effective, captivating and dynamic teaching mode for the integration of information technology and mathematics syllabus. The aim is to foster students' understanding, mastery, and application of mathematical concepts. The paper focuses on the chapter "Random Variables and Their Distributions" in the third elective compulsory textbook of high school mathematics. It devises two mathematical modelling experiments using Excel: Bernoulli Experiment and Optimal Investment Strategy Mathematical Experiment; Conditional Probability and Three-Door Problem Mathematical Experiment. These experiments are delivered in the form of interactive

activities that facilitate students to explore mathematics. The paper implements a teaching intervention, collecting and analyzing the feedback data of 30 students through interviews, videos, and other qualitative methods. It also employs descriptive statistics, hypothesis testing, and other quantitative methods. The results demonstrate that using Excel to perform mathematical modelling experiments enhanced students' understanding, mastery, and application of mathematical concepts.

Keywords: Excel; Mathematical simulation and modelling; Gamified teaching; Action research; High school mathematics education

报告 2-4/Presentation 2-4：

使用 PLS-SEM 方法预测中学数学教师的数字化教学行为

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数字技术在教育数字化转型中发挥着关键作用。数学教师适当地使用数字技术，对于提高教学效果和效率有很大的作用。然而，部分中学数学教师对整合技术的学科教学知识（TPACK）掌握不充分，学校内部也没有形成良好的使用氛围。本研究旨在探讨中学数学教师数字化教学行为的影响因素。采用拓展的技术接受与使用统一理论模型（UTAUT）中学数学教师的数字化教学行为进行解释和预测。对中国中部某省的一个国家级新区初中数学教师进行问卷调查，共收集有效问卷385份。采用偏最小二乘结构方程建模（PLS-SEM）方法对数据进行分析，分析后发现：TPACK是中学数学教师数字化教学行为的最大预测因素。态度、行为意愿、绩效期望、努力期望和社会影响也会以直接或间接的方式影响中学数学教师的数字化教学行为。研究结果对于提高中学数学教师的数字化教学行为，促进中学数学教育的数字化转型具有重要的现实意义。

关键词：中学数学教师；数字化教学行为；技术接受与使用统一理论；整合技术的学科教学知识；态度；偏最小二乘结构方程建模

Predicting Secondary School Mathematics Teachers' Digital Teaching Behavior Using Partial Least Squares Structural Equation Modeling

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Digital technologies play a key role in digital transformation of education. In order to improve teaching effectiveness and efficiency, teachers should use digital technologies appropriately. However, some secondary school mathematics teachers have little confidence in their digital teaching behavior. This study aimed to explore the predictors of secondary school mathematics teachers' digital teaching behavior. An extended unified theory of acceptance and use of technology (UTAUT) model was adopted to predict secondary school mathematics teachers' digital teaching behavior. A questionnaire survey was conducted facing all junior high school mathematics teachers in a state-level new area, which is located in a central province of China. Three hundred and eighty-five valid data were collected. The partial least squares structural equation modeling (PLS-SEM) method was used to analyze the data. It was found that technological pedagogical content knowledge (TPACK) was the biggest predictor of secondary school mathematics teachers' digital teaching behavior. Attitude, behavioral intention, performance expectancy, effort expectancy, and social influence can also affect teachers' digital teaching behavior in direct and/or indirect ways. The findings have noteworthy realistic implications for enhancing digital teaching behavior of secondary school mathematics teachers and promoting digital transformation of secondary school mathematics education.

Keywords: Secondary school mathematics teacher; Digital teaching behavior; UTAUT; TPACK; Attitude; PLS-SEM

报告 2-5/Presentation 2-5：

小学数学教师使用人工智能辅助教学意愿的影响因素

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近年来，人工智能在数学教育领域的应用日益广泛。在教育现代化的背景下，教师是推动人工智能教育深化发展的关键节点。本研究旨在探究小学数学教师使用人工智能辅助教学的意愿及其影响因素。本研究基于技术-组织-环境

（TOE）模型和技术接受模型（TAM）的理论框架，对984名广东省数学教师进行了问卷调查，并访谈了3名教师。结果显示：（1）使用人工智能的意愿与教龄、教师职称、学校地理位置无显著相关；（2）个人因素（自我效能感和过往经验）、技术因素（便利性和易用性）及学校因素（学校支持和氛围）与使用意愿呈正相关。因此，提高教师对技术的自我效能感，增强工具的实用性，并提供合理的培训，将有助于提高教师采用人工智能的意愿。

关键词：人工智能；教师意愿；小学数学；问卷调查；访谈

Factors Influencing Elementary Mathematics Teachers' AI Adoption

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In recent years, the application of artificial intelligence in mathematics education has proliferated. Teachers are pivotal in furthering the integration of artificial intelligence in education. This study aims to explore elementary mathematics teachers' willingness to adopt AI-enhanced teaching and its influencing factors. Drawing upon the theoretical framework of the Technology-Organization-Environment (TOE) model and the Technology Acceptance Model (TAM), we conducted a survey with 984 mathematics teachers in Guangdong Province and followed up with interviews of 3 participants. The results show: (1) Willingness to adopt artificial intelligence is not significantly correlated with years of teaching experience, professional title, or geographic setting; (2) Personal factors (self-efficacy and prior experience), technological factors (usefulness and ease of use), and institutional factors (school support and culture) positively correlate with their willingness to integrate artificial intelligence. Therefore, enhancing teachers' technology self-efficacy, improving tools' functionality, and providing needs-based training may increase teachers' receptivity to integrating artificial intelligence into their practice.

Keywords: Artificial intelligence; Teacher willingness; Elementary mathematics; Survey; Interview

报告 2-6/Presentation 2-6：

使用人工智能解题能否缓解数学焦虑？基于 SOR 视角的研究

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为探究高中生数学焦虑与使用人工智能解题的关系，本文以“刺激—有机体—反应”（SOR）模型为基础，采用数学焦虑量表（AMAS）、领悟社会支持量表（PSSS）和使用人工智能解题行为量表（BI）测量 391 名高中生。分析结果表明（1）当前学生的数学焦虑程度较高，并倾向于使用人工智能手段来解决数学问题（2）社会支持、家庭支持和朋友支持均能缓解数学焦虑，其中朋友支持的作用最明显（3）中介结果显示，高水平的朋友支持是缓解数学焦虑的有效方式，而社会支持和家庭支持没有对数学焦虑起到中介作用。因此，应重视使用人工智能解题与数学焦虑的关系，规范人工智能在数学教育中的应用，引导学生正确使用人工智能；关注同学关系对数学焦虑的作用，从心理健康和情感支持等方面缓解数学焦虑。

关键词：数学焦虑；人工智能解题；领悟社会支持；SOR 模型

Can Using AI to Solve Problems Alleviate Math Anxiety? Research Based on SOR Perspective

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To explore the relationship between mathematics anxiety and the use of artificial intelligence (AI) in solving problems among high school students, this article adopts the "Stimulus-Organism-Response" (SOR) model and measures 391 high school students using the Abbreviated Math Anxiety Scale (AMAS), Perceived Social Support Scale (PSSS), and Behavioral intention of Using AI to Solve Mathematical Problems Scale (BI). The analysis results indicate that: (1) Students have a high level of mathematics anxiety and tend to use AI methods to solve mathematical problems (2) Social support, family support, and friend support can all alleviate mathematics anxiety, with friend support having the most significant effect (3) The mediating results show that high-level friend support is an effective way to alleviate mathematics anxiety, while social support and family support do not play a mediating role in mathematics anxiety.

Therefore, attention should be paid to the relationship between using AI to solve mathematical problems and mathematics anxiety, standardizing the application of AI in mathematics education, and guiding students to use AI correctly. Additionally, we should attach importance to peer relationships in mathematics anxiety, and efforts should be made to alleviate mathematics anxiety from the aspects of mental health and emotional support.

***Keywords*:** Mathematics anxiety; Artificial intelligence problem-solving; Perceived Social Support; SOR model

报告 2-7/Presentation 2-7：

信息技术在中学几何教学中的融合现状——基于 21 世纪中国大陆已有研究

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促进信息技术与课程的融合是《义务教育数学课程标准（2022年版）》的基本课程理念之一。本研究基于21世纪以来中国大陆相关文献分析数学专用技术与中学几何教学的融合现状，以“中国知网”为数据库，聚焦关注信息技术与数学教育融合的5种期刊，从中筛选得到探讨信息技术与中学几何教学实践的文献共121篇，进一步筛选得到199个案例，每个案例关注信息技术与一个几何主题教学的融合。本文通过内容分析法分析案例，自下而上地归纳式建构类目。研究发现， GeoGebra软件使用呈增长趋势，信息技术应用最多的场景是问题解决教学，高中平面解析几何是融合信息技术教学最多的主题。教学过程中使用最多的技术操作类型是绘制图形，大部分案例中教师操作信息技术。信息技术与中学几何教学的融合方式主要包括附加式、复刻式、重构式。

关键词：信息技术；中学几何；数学教学；融合

The Integration of Information Technology in Middle School Geometry Teaching

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Promoting the integration of information technology and mathematics curriculum is one of the basic curriculum ideas of Mathematics Curriculum Standards for Compulsory Education (2022-Year-Edition). Based on the existing research in Mainland China in the 21st century, the present situation of the integration of information technology and geometry teaching in middle school was analyzed. Five journals focusing on the integration of information technology and mathematics education were selected from the database of China National Knowledge Internet. Among them, a total of 121 papers related to the integration of information technology and geometry teaching practice in middle schools were selected, and 199 cases were further chosen, each focusing on the integration of information technology and a geometry topic teaching. The content analysis method was used to analyze these cases, and the categories were constructed from the bottom up. The study found that the use of GeoGebra showed an increasing trend; information technology was mainly used in problem-solving teaching scenes; plane analytic geometry in senior high school was the most integrated topic of information technology teaching. The most used type of technical operation in the teaching process is drawing graphics, and in most cases, teachers operate information technology. The integration methods of information technology and geometry teaching in middle school mainly include addition, reproduction, and reconstruction.

Keywords: Information technology; Middle school geometry; Mathematics teaching; Integration

报告 2-8/Presentation 2-8：

非洲数学教育中的信息和通信技术：动因、挑战、举措和启示

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第四次工业革命促使全球各领域发生了翻天覆地的变化。对于非洲而言，第四次工业革命的到来既是挑战又是机遇。结合全球数学教育信息化改革趋势，信息通信技术在非洲数学教育中的作用，非洲人口年青化等因素，非洲应着力促进信息通信技术与数学教育深度融合，推进教育信息化，以应对挑战和转型。目前非洲存在信息通信技术覆盖率较低且分布不均衡，数学教育与信息通信技术融合有效性不高，数学教师的数字化能力还较薄弱的挑战。对此，非洲做出了如下努力：其一，加强国际合作，缩小数字鸿沟；其二，促进技术融合，赋能数学教育；其三，完善可持续数学教师专业发展，着力培养数字化教学人才。

在此基础上，总结非洲经验，为中国乃至全球进一步推进数学教育信息化带来启示。

关键词：非洲数学教育；信息和通信技术；动因；实践挑战；应用举措

Information and Communication Technology in Mathematics Education in Africa: Motivations, Challenges, Initiatives and Implications

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1. Zhejiang Normal University

The Fourth Industrial Revolution has brought about seismic changes in all areas of the world. For Africa, the arrival of the Fourth Industrial Revolution is both a challenge and an opportunity. Combined with the global trend of mathematics education informatization reform, the role of ICT in mathematics education in Africa, the youth of Africa's population and other factors, Africa should focus on promoting the deep integration of ICT and mathematics education and promote education informatization to cope with challenges and transformation. At present, there are challenges in Africa that the coverage of ICT is low and unevenly distributed, the integration of mathematics education and ICT is not effective, and the digital ability of mathematics teachers is still weak. In this regard, Africa has made the following efforts: first, strengthen international cooperation and narrow the digital divide; Second, promote the integration of ICT and mathematics education to empower mathematics education; Third, improve the professional development of sustainable mathematics teachers and focus on cultivating digital teaching talents. On this basis, summarizing Africa's experience will bring some enlightenment to China and even the world to further promote the informatization of mathematics education.

Keywords: Mathematics education in Africa; ICT; Motivation; Practical challenge; Application initiative

报告 2-9/Presentation 2-9：

基于网络画板的农村数学教学实践探索

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在新课改背景下，学校积极探索“互联网+教育”，努力实现数字校园的环境建设，持续提升校园信息化水平，以信息化支撑引领教育现代化。桐星学校作为一所乡村学校，借助网络画板平台，稳步推动数学实验室的建设，学生在数学实验室里通过操作、观察、交流等活动，让抽象的数学概念以及复杂的几何图形在屏幕上直观、形象地展示出来，将难懂的问题变得容易理解，让枯燥的图形变得有趣生动。在数学实验室里，学生作的是数学图形、用的是数学知识、玩的是数学问题、比的是数学水平、提的是数学素养；扎实推进课堂教学方式的改革，着眼未来，桐星学校还需继续探索数字化在教育教学中的作用，构建具有桐星特色的乡村数字化教学体系。

关键词：网络画板；数学教学；乡村教育

Exploration of Rural Mathematics Teaching Practice Based on Netpad

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In the context of the new curriculum reform, School is actively exploring "Internet + Education", striving to achieve the construction of a digital campus environment, continuously improving the level of campus informatization, and leading the of education with the support of informatization. Tongxing School as a rural school, with the help of Netpad, steadily promotes the construction of the mathematics laboratory. There, students can visually and graphically learn abstract mathematical concepts and complex geometric figures on the screen through operation, observation, communication, and other activities, making difficult problems easier to understand and boring graphics more interesting and vivid. In the mathematics laboratory, students create mathematical graphics, apply mathematical knowledge, solve mathematical problems, compare mathematical skills with other students, and improve their mathematical literacy. The reform of classroom teaching methods has been steadily promoted. Focusing on the future, Tongxing School needs to continue to explore the role of digitalization in education and teaching and build a rural digital teaching system with Tongxing characteristics.

Keywords: Netpad; Mathematics teaching; Rural education

TSG3: 数学课程改革和教材研究（Mathematics curriculum and textbooks）

报告 3-1/Presentation 3-1：

Opportunities and Constraints in Digital Textbook Tasks

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In the past decade, digital versions of textbooks have been widely produced and developed. Digital textbook tasks, like other digital curriculum materials, provide new features such as interaction, transformability, customization, etc. These new features may bring a new dynamic to mathematics education, and to investigate this, a framework for analysis of digital tasks was developed and applied to tasks in Croatian digital textbooks for elementary grades. The results of this previous research showed that the examined e-tasks did not contain these new features. These findings imply that the tasks in digital textbooks are still closer to the "traditional" tasks found in printed textbooks than they are to the new potentials of digital curriculum resources.

The lack of these new features in digital textbook tasks may relate to: a) the textbook authors' intentions and knowledge, or b) the limited capability of the platforms. The study presented in this paper examines the relationship between the platform and task features in digital mathematics textbooks. The research refers to a case study of one digital textbook included in the previous research. First, its platform was analyzed regarding the dimensions of the developed framework for analysis of digital tasks. Second, an interview with the author of the digital textbook was conducted. The results revealed some of the opportunities and constraints in composing tasks for the textbook. Regarding the framework dimensions, the author complained that the platform lacked many of the expected features (e.g., dynamics for students' exploration of mathematics, flexibility in changing parameters). However, the analysis showed that the platform does provide some of the new features, but they were not utilized by the author. These results indicate the complex nature of digital textbook structure and content and highlight some of the challenges for the further development of digital textbooks and their research.

Keywords: Digital textbooks; Textbook tasks; Textbook author, Platform

报告 3-2/Presentation 3-2：

小学数学数的概念一致性与运算一致性研究

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1. 长春师范大学

2. 东北师范大学

《义务教育数学课程标准（2022年版）》中首次提出“一致性”，即数的概念本质的一致性和数的运算本质的一致性。研究主要分析提出“一致性”的必要性与合理性。通过文本分析和比较的方法，比较国内外小学数学教科书中数与运算内容的差异，发现国内外小学数学“数与运算”教学内容是零散的，整数、分数与小数内容都各讲各的道理；通过测验调查当前中国小学数学课堂教学实际，发现国内小学生对于数学理解是碎片化的，没有形成数学是系统的、结构化、一致性的认识。研究认为对于“数与运算”内容结构与教学流程进行改造是必要的，需要建立一个科学合理的“数与运算”教学流程，即实现数学化，提出“数概念一致性”“数运算一致性”是数学课程结构化、数学化的路径，实施“一致性”是必要的。通过理论研究明确整数、分数和小数“数概念一致性”“数运算一致性”内涵，分析“一致性”合理性。

关键词：小学数学；数的概念与数的运算；一致性；数学化

The Study of the Consistency of Concept of Numbers and the Consistency of Operation of Numbers in Primary Schools Mathematics

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2. Northeast Normal University

The “consistency” was first proposed in the Mathematics Curriculum Standards for Compulsory Education (2022 Edition) which essentially refers to the consistency of the number concept and the consistency of the number operation. This study mainly focuses on the necessity of proposing “the consistency” and the rationality of “the consistency”. Through the text analysis and comparison of primary school mathematics textbooks at home and abroad in various countries, it is found that the number and operation content of courses of integers, decimals, and fractions in various countries are scattered, and

the truth of number and the algorithm of operation of integers, decimals, and fractions shows its own meanings. And through the test investigation of teaching practice in mathematics classrooms in Chinese primary schools, it is found that the students' understanding of math is fragmented without a systematic, mathematical, and consistent understanding of math. This study proposes that it is necessary to reform the content structure and teaching process which means to establish a reasonable teaching process to realize mathematization, so it is necessary to put forward "the consistency of number concept" and "the consistency of number operation" in primary school mathematics. The theoretical research of this study clarifies the connotation of "the consistency of number concept" and "the consistency of number operation" of integers, fractions, and decimals, it is reasonable to put forward "the consistency of number concept" and "the consistency of number operation" of integers, fractions and decimals in primary school mathematics.

Keywords: Primary mathematics; Number concept and number operation; Consistency; Mathematicalization

报告 3-3/Presentation 3-3：

中国初中数学教科书中的非文本元素是如何呈现的

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数学教材，尤其是教材比较，在国内外越来越受到重视。然而，现有的研究主要集中在文本分析上，很少关注非文本元素（NTEs）。在本研究中，我们探讨了中国初中数学教科书中的非文本元素是如何呈现的。基于此，我们选择了三套教材，即北师大版、人教版和沪教版，并分别建立了非文本元素类型和功能的框架，最后对每个非文本元素进行了编码。结果表明，三套数学教材的非文本元素的总体分布不存在一致性；但在数学领域中，它们的分布是一致的，即每套教材的非文本元素大都属于“图形与几何”，其次属于“数与代数”，最后是“统计与概率”。此外，就位置而言，北师大版和人教版的非文本元素主要出现在练习题中。关于非文本元素的类型与功能，研究发现60%以上的非文本元素属于数学类型，以几何图形为主；约79%的非文本元素用于解释性功能，具体以替代或补充文本为主。研究的最后讨论了这些结论对数学教科书发展的影响。

关键词：非文本元素；插图；初中数学教材；类型；功能

How are Non-Textual Elements (NTEs) Designed in Chinese Secondary Mathematics Textbooks

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Mathematics textbooks, especially textbooks comparison, have received increasing attention worldwide. However, the existing studies mainly focus on text analysis, with little attention paid to non-textual elements (NTEs). In this study, we investigate how NTEs are designed in Chinese secondary mathematics textbooks. So, we selected three series of textbooks (i.e., the BNUP, PEP, and SEP series) and established conceptual frameworks for types and functions of NTEs, finally each NTE was coded one by one. The results show that there is no consistency in the distribution of NTEs across the three series of mathematics textbooks, while in mathematics domains, the distribution of NTEs among the BNUP, PEP, and SEP series is consistent, i.e., NTEs in each series of textbooks are mainly located in "shape and geometry", followed by "number and algebra" and then "statistics and probability". In addition, in terms of locations, most NTEs in the BNUP and PEP series are presented in exercises. Concerning types and functions of NTEs, more than 60% of NTEs belong to the mathematical type and are used by shapes; approximately 79% of NTEs are used for explanatory functions and mainly focus on substitute or supplement text. The implications of the findings for the development of mathematics textbooks are discussed at the end of the study.

Keywords: Non-textual elements (NTEs); Illustration; Chinese secondary mathematics textbooks; Type; Function

报告 3-4/Presentation 3-4：

素养导向的课程改革及其启示——基于中、澳、加、爱四国最新颁布的数学课程标准

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加拿大、澳大利亚、中国和爱尔兰自 2020 年开始颁布了义务教育数学课程标准。本研究通过对四国数学课程标准课程内容、学业评价质量两部分的分析，

发现四国在课程内容呈现出以课程内容结构化来彰显学科知识内在联系，重构课程内容呈现方式以促进核心素养教学实施，以大概念为主线实现提供学习的进阶三个特点。四国从围绕数学内容构建学业质量评价框架，聚焦数学过程以保障评价有效实施，依托学习进阶来刻画核心素养水平的三个角度研制学业评价质量。为了推进课程改革，我国应注重以大单元教学实现核心素养的培育；编写与新数学课程标准配套的教材；细化评价框架和表现水平，促进核心素养落地。

关键词：义务教育数学课程标准；学业质量；内容结构化；学习进阶；核心素养评价

Competencies Oriented Curriculum Reform and Its Enlightenment: Based on the Latest Mathematics Curriculum Standards Issued by China, Australia, Canada, and Ireland

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Canada, Australia, China, and Ireland have issued compulsory education mathematics curriculum standards since 2020. This research analyzes the curriculum content and academic evaluation quality of the mathematics curriculum standards in the four countries and finds that the curriculum content in the four countries presents three characteristics: demonstrating the internal connection of subject knowledge through structured curriculum content, reconstructing the presentation method of curriculum content to promote the implementation of core literacy teaching, and providing advanced learning through the main line of big concepts. Four countries develop academic evaluation quality from three perspectives: building a framework for evaluating academic quality around mathematical content, focusing on mathematical processes to ensure effective implementation of evaluations, and relying on advanced learning to characterize core literacy levels. In order to promote curriculum reform, China should focus on cultivating core competencies through large unit teaching; compile textbooks that are compatible with new mathematics curriculum standards; and refine the evaluation framework and performance level to promote the implementation of core competencies.

Keywords: Compulsory education mathematics curriculum standards; Academic achievement; Content structuring; Learning progressions; Core competencies assessment

报告 3-5/Presentation 3-5：

上海高中数学新教材例习题的评价研究

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本文是上海高中数学教材实验与评价研究的一部分。例习题作为数学教材中的重要组成部分，影响着教师的教学成效和学生的学习表现。目前，关于数学教材的研究主要集中在教材的设计、开发和使用等方面，针对高中阶段的数学教材评价研究比较少，尤其缺乏对数学教材例习题的评价研究。本研究聚焦于上海新版高中数学教材，通过严格的随机抽样方式，使用问卷和访谈，调查分析了数学教材的两大使用群体（173名教师和4687名学生）对于教材中例习题部分的评价。结果发现，上海高中教师和学生总体上对新教材中例习题感到满意；不同年级、教龄和学校的教师对教材中例习题的评价均不存在显著差异；高三年级和高二年级学生以及高三年级和高一年级学生之间对教材中的例习题评价存在显著差异；市实验性示范性高中学生和其他高中学生之间对教材中的例习题评价存在显著差异。基于研究结果，本研究提出了相应的教材编写建议。

关键词：数学教材评价；例习题；上海高中数学教材

Evaluation of the Tasks in Shanghai High School New Mathematics Textbook

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This research is a part of the project about the evaluation of high school mathematics textbooks in Shanghai. Task, as an important component of mathematics textbooks, affects mathematics teaching and learning. Previous research on mathematics textbooks mainly focuses on the design, development, and use of textbooks. Only a few of them are about mathematics textbook evaluation on tasks. This study chose to analyze how high school mathematics teachers and students evaluate tasks in the new version of high school mathematics textbooks in Shanghai. The results showed that 1, teachers and students were generally satisfied with the tasks; 2, there is no significant difference in the evaluation among teachers of different grades, teaching years, and schools; 3, there is a significant difference in students' evaluation between Grade 11 and Grade 12, as well as between Grade 10 and Grade 12; 4, there is also a significant difference in the evaluation between students from high-level schools and others. Based on these results, this study also proposes some suggestions for textbook design.

Keywords: Mathematics textbook evaluation; Task; Shanghai high school mathematics textbook

报告 3-6/Presentation 3-6：

A Systematic Review of Research on Mathematics Textbooks in Indonesia

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Over thousands of articles in mathematics education published by universities/private publishing companies in Indonesia. With this number of journals/articles, literature reviews gain importance as they help researchers more easily orient themselves in problem areas. The purpose of this paper is to review the research literature on textbooks and teaching materials in mathematics education published between 2016-2022 and accredited by Science and Technology Index (https://sinta.kemdikbud.go.id/journals). It is a web-based research information system offering fast access, easy and comprehensive to measure the performance of researchers, institutions, and journals in Indonesia. We use 'Pendidikan Matematika' to gather 61 journals which contain 141 articles related to mathematics textbooks research. Framework for classifying the literature on textbook research in mathematics adapted from Fan et al. (2013), namely role of textbooks, textbooks analysis and

comparison, textbooks use, and other areas. We found that 'role of textbook' did not gain attention of Indonesian researchers. However, there is a giant number of new classifications which we called "textbooks need, design and evaluation". Additionally, we noticed that international textbooks comparison research needs to be developed. In general, we can say that even though mathematics textbooks as a research theme have continued to receive rapidly growing attention, the development of research on mathematics textbooks has been unbalanced in different areas. More than that, the chapter concluded by pointing out visible directions and urgent need of future research of mathematics education in Indonesia.

Keywords: Systematic review; Mathematics textbook; Indonesia

报告 3-7/Presentation 3-7：

项目学习的本土化：初中数学单元项目学习的开发与实施

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传统的数学教学遵循数学知识特有的学科逻辑和教学体系，往往难以融入真实问题情境以提升学生的综合能力，而项目学习的出现恰恰弥补了这一缺陷，能够适应时代发展的新要求。借助任务序列的设计方式，通过单元项目学习的方式实现数学项目学习的中国化。在“知识线与任务线相互融合”双线原则的指导下，开发了一系列基于单元项目学习的初中数学教学设计并指导教师完成实施。经过两年多的研究实践，总结出了单元项目学习的三个关键点：1）知识优先，各种活动或情境要素最终要服务于学科知识；2）把握情境的合理性，不断添加假设以简化复杂的现实情境；3）尽量减少学习任务中的主体，明晰整体设计中不同主体的关系，增强学生代入感并降低学习理解负担。

关键词：数学项目学习；单元项目学习；任务序列；真实情境

The Localization of Project-based Learning: Design and Implementation of Math Project-based Learning Unit in Junior High School in China

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Traditional mathematics teaching follows the unique disciplinary logic and teaching system of mathematics, often difficult to integrate into realistic situations to enhance students' comprehensive abilities. However, the emergence of Project-based Learning (PBL) has just made up for this deficiency, adapted to the new requirements of the times. By utilizing the design of task sequences, PBL unit can achieve the localization of math PBL. Based on the dual line principle of "integration of knowledge line and task line", a series of math PBL unit instructional design for junior high school have been developed and teachers have been guided to complete the implementation. After two years of research and practice, three key points of PBL unit have been summarized: 1) put subject knowledge and ability in priority, making various elements in activities and contexts ultimately serve the subject knowledge; 2) focus more on the rationality of the situation but not the authenticity, which means constantly adding assumptions to simplify realistic context under complex conditions; 3) minimize the number of subjects in learning tasks (try to maintain a single learning perspective if possible), and clarify the relationships between different subjects in the overall design, so as to enhance students' experience as well as reducing the burden of learning and comprehension.

Keywords: Math PBL; PBL unit; Task sequence; Authentic context

报告 3-8/Presentation 3-8：

核心素养视域下数学教材中数学史和数学文化设置研究

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数学教育应落实立德树人的根本任务，核心素养也要求数学教育应当体现科学精神和人文价值，二者在数学教材中通过数学史和数学文化进行渗透。数学史和数学文化两个领域相互独立又相互交织，赋予数学丰富的内涵。本文基于文献研究，对初中浙教版数学教材进行内容分析，从数学史和数学文化在教材中的分布特点、呈现形式、在实际教学中的可利用性和人文科学精神的迁移性四个角度展开研究。通过量化和质性相结合的研究方法，发现初中浙教版数学教材在数学史和数学文化有以下特点：集中在“数与代数”领域，且多分布在章节末；主要以阅读材料和习题的形式呈现；与知识割裂，高评价，低利用；蕴含的科学精神难以迁移到知识的学习中。进而提出建议：深挖各个知识领域蕴含的历史背景，增添人文韵味；呈现形式多样化；数学史和数学文化与知识有机结合，搭建贯通的桥梁；培养数学教师的人文精神和科学精神，增加教师

数学史和数学文化知识储备。由此，为核心素养文化基础目标的达成提供参考。

关键词：教材研究；核心素养；数学史；数学文化

Research on the Setting of Mathematics History and Mathematics Culture in Mathematics Textbooks from the Perspective of Core Literacy

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Mathematics education should carry out the fundamental task of fostering virtue through education, and the core literacy also requires that mathematics education should embody scientific spirit and humanistic value, which are infiltrated in mathematics textbooks through mathematics history and mathematics culture. Mathematics history and mathematics culture are independent and intertwined, which endows mathematics with rich connotations. Based on literature research, this paper analyzes the contents of mathematics textbooks published by Zhejiang Education Publishing Group for junior high school, and studies them from four aspects: the distribution characteristics, presentation forms, availability in practical teaching, and mobility of humanistic spirit of mathematics history and mathematics culture in textbooks. Through a combination of quantitative and qualitative research methods, it is found that the mathematics textbooks of Zhejiang Education Publishing Group for junior high school have the following characteristics in mathematics history and mathematics culture: they are concentrated in the field of "number and algebra" and mostly distributed at the end of chapters; Mainly presented in the form of reading materials and exercises; Separated from knowledge, with high evaluation, low utilization; the scientific spirit contained in it is difficult to transfer to knowledge learning. Then this paper puts forward some suggestions: dig deep into the historical background contained in various knowledge fields and add humanistic charm; Diversified presentation forms; Mathematics history, mathematics culture and knowledge are organically combined to build a bridge; Cultivate mathematics teachers' knowledge reserves of mathematics history and mathematics culture. Therefore, it provides reference for achieving the goal of cultural basis in core literacy.

Keywords: Textbook research; Core literacy; Mathematics history; Mathematics culture

报告 3-9/Presentation 3-9：

数学教材中例习题的整体性——基于浙教版初中教材中“函数”内容的分析

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例习题是数学教材的关键组成部分。本文通过分析例习题四个方面的整体性作用（引导学生挖掘数学知识的内在联系；培养学生看待问题的整体意识；启发学生数学学习的思维迁移；诊断学生数学学习的效果），并从知识类型和数学基本思想这两个维度对浙教版初中教材“函数”内容的例习题进行统计分析，剖析出其在编撰中的三个整体性特征：均衡“信息”和“智能”意义，偏重程序性知识的联系；重视数学基本思想的渗透，匹配学生的数学认知发展；加强数学内容的内在联系，搭建“横向关联”的内容结构。以期为数学教材编撰和课堂教学提供一些建议。

关键词：整体性；教材例习题；函数；数学基本思想；知识类型

Integration of Examples and Exercises in Mathematics Textbooks: Analysis of the Content of "Function" in the Junior High School Textbook Based on the Zhejiang Education Publishing House

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1. Capital Normal University

Examples and exercises are key components of mathematics textbooks. This paper analyzes the integrity role of example problems in four aspects (guiding students to explore the intrinsic connection of mathematical knowledge; cultivating students' overall awareness of the problem; inspiring students' transfer of thinking in mathematical learning; and diagnosing the effect of students' mathematical learning) and statistically analyzes examples and exercises of the content of "Function" in the Junior High School textbook based on the Zhejiang Education publishing house in two dimensions of knowledge types and mathematical basic ideas. There are three integrity features in its compilation: balancing the significance of "information" and "intelligence" and emphasizing the linkage of procedural knowledge; emphasizing the penetration of basic mathematical ideas to match students' cognitive development in

mathematics and strengthening the intrinsic connection of mathematical contents to build a "horizontally related" content structure. We hope to provide some suggestions for the compilation of mathematics teaching materials and classroom teaching.

Keywords: Integrity; Textbook examples and exercises; Function; Basic mathematical ideas; Types of knowledge

报告 3-10/Presentation 3-10：

中国小学数学教材分数和小数内容编写比较研究及对未来教材编写的启示

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1. 东北师范大学

分数和小数的内容是小学数学教学的重点和难点，包括数的认识和运算方法的掌握。与小学数学其他内容比较，这些内容的教学更加依赖教材的编写，为了寻求更加合理的教学方法，针对这些内容的教材比较研究是必要的。我国的小学数学教育已有百余年的历程，产生了200多套小学数学教材，从中甄选12套进行比较研究，侧重分析分数和小数内容的编排顺序、概念表述、运算导入，特别关注如何与整数的认识和运算建立关联、如何处理算法与算理之间的逻辑关系，纵向研究分析百余年这些内容呈现方式的变化和变化的缘由。在比较研究的基础上得到一些结论，希望这些结论能够对基于《义务教育数学课程标准（2022年版）》的教材编写和教学实践提供借鉴。

关键词：分数；小数；四则运算；教材比较研究

Compilation of Fraction and Decimal Content in Primary School Mathematics Teaching Material: Comparison and Enlightenment

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Fractions and decimals are key and difficult parts of primary school mathematics teaching, including numbers and operation methods. Compared with other contents, their teaching is more dependent on the compilation of teaching materials so it is necessary to make a comparative study of these contents. China's primary school mathematics education has a history of more than a century and more than 200 sets of textbooks. This article selects 12 of them for comparative study, focusing on the arrangement order, concept expression, and operation introduction of fractions and decimals, paying special attention to the relationship with the cognition and operation of integers, dealing with the logical relationship between algorithm and calculation, and exploring changes and their reason in the past century, so as to enlighten the compilation of teaching materials and teaching practice based on new compulsory education curriculum standards.

Key words: Fraction; Decimal; Four fundamental rules; Comparative study of teaching materials

报告 3-11/Presentation 3-11：

高中数学教师教科书使用水平个案研究——以 2019 人教 A 版为例

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文章以“教师使用教科书的水平模型”为基础框架，在系统分析了我国《普通高中数学课程标准（2017版）》及2019年人民教育出版社编写的《普通高中教科书·数学》（A版）的基础上，构建了高中数学教师教科书使用水平测评工具。以新疆乌鲁木齐市3位高中数学教师为个案研究对象，基于37节课例的观察并结合深度访谈开展研究。文章研究了以下问题：高中数学教师关于2019人教A版数学教科书使用水平如何？影响高中数学教师教科书使用水平的主要因素有哪些？研究发现，整体而言，3位教师对新版教科书的使用水平平均处于“机械使用”和“常规使用”之间。影响高中教师使用教科书水平的主要因素有教师因素、学生因素、课程标准与教科书因素、社会和环境因素。

关键词：教科书使用水平；高中数学教师；影响因素

A Case Study of High School Mathematics Teachers' Usage of Textbooks: Take 2019 People's Education Press Version as an Example

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Based on the framework of "the level model of teachers' usage of textbooks" and a systematic analysis of China's "General High School Mathematics Curriculum Standards (2017 Edition)" and the "General High School Textbook - Mathematics" (People's Education Press, A Edition), this study constructs a framework for evaluating the usage of high school mathematics teachers' textbooks. Three high school mathematics teachers in Urumqi, Xinjiang are taken as cases. This study is based on 37 lessons and in-depth interviews and studies the following questions: What is the level of high school mathematics teachers' textbook usage? What are the main factors affecting the usage level of high school mathematics teachers' textbooks? The study found that the average usage level of the new textbooks by three teachers was between "mechanical use" and "conventional use" on average. The main influencing factors of high school teachers' use of textbooks include teacher factors, student factors, curriculum standards and textbooks factors, and social and environmental factors.

Keywords: Textbook usage level; High school mathematics teacher; Influencing factor

报告 3-12/Presentation 3-12：

Actualization of Legal Core Goals for Mathematics in the Netherlands

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In the Netherlands, the government has commissioned the actualization of the legal core goals for the end of primary and lower secondary education (age range from 4 to 15 years). In the academic year 2022-2023, a team consisting of teachers, math experts, and curriculum experts developed draft actualized core goals for mathematics. The overall question the team addressed was: what mathematical knowledge and skills do students need to be well prepared for their future in a rapidly changing society?

A problem analysis identified three societal developments that had to be taken into account, including the increasing role of ICT and big data, the use of mathematical

language in communication and the spreading of (mis)information, and concerns regarding the mathematical abilities of Dutch students.

In order to address all of this, mathematical curricula of other, comparable countries were studied, as well as current frameworks for mathematics from PISA and TIMSS. Furthermore, relevant literature was studied, for example regarding mathematics for citizenship and digital literacy.

All the findings were considered in formulating the first and subsequent drafts of the actualized core goals. Regarding these drafts, advice was collected from math practitioners, teachers and teacher unions, educators, school advisors, and scientists in math education. In an iterative process, the drafts were further developed and refined.

In the final draft actualized core goals, a balance has been found between existing learning content within the Dutch educational system, and new learning content. The latter includes critical mathematical thinking, algorithmic thinking, and mathematical modeling. Furthermore, compared to the current statutory goals, the draft actualized goals put more emphasis on mathematical reasoning and mathematical language.

Keywords: Legal core goals; Primary education; Lower secondary education

TSG4: 数学课堂教学和评价（Mathematics classroom teaching, learning and assessment）

报告 4-1/Presentation 4-1：

小学数学跨学科综合教学设计与实践 ——以“日影的故事”为例

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1. 东北师范大学

2. 东北师范大学附属小学

跨学科主题学习是《义务教育数学课程标准（2022年版）》中“综合与实践”这一学习领域的基本学习方式，是本次课程修订所强调的实践性、综合性等素养导向育人理念的具体行动。本文以中国古代“土圭之法”为蓝本，设计了跨学科综合教学活动“日影的故事”。对小学数学跨学科主题学习如何确立教学理念，如何规划教学过程，如何引导学生探究，如何进行数学表达等一系列重要教学环节进行了思考与实践；并且在这样的教学活动中，引导学生自主查阅资料，帮助学生在独立思考或与他人交流的过程中积累思维的经验，丰富

学习途径。使得学生在掌握跨学科的知识技能的同时，感悟中华文明的魅力，形成和发展数学核心素养，即逐渐会用数学的眼光观察现实世界、会用数学的思维思考现实世界、会用数学的语言表达现实世界。

关键词：小学数学；跨学科综合教学；教学实践；教学要点

Design and Practice of Interdisciplinary Comprehensive Teaching for Primary School Mathematics: Taking "The Story of Sunshadow" as an Example

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Interdisciplinary thematic learning is the basic learning method in the "Comprehensive and Practical" learning field of the "Compulsory Education Mathematics Curriculum Standards (2022 Edition)", and is specific actions that emphasize the practical, comprehensive, and other literacy-oriented education concepts in this curriculum revision. This article is based on the ancient Chinese "Tugui Method" and designs an interdisciplinary comprehensive teaching activity called "The Story of Sunshadow". We have considered and practiced a series of important teaching links such as how to establish teaching concepts, how to plan teaching processes, how to guide students to explore, and how to carry out mathematical expressions in interdisciplinary thematic learning of primary school mathematics; And in such teaching activities, teachers guide students to independently consult materials and help students accumulate thinking experience in the process of independent thinking or communication with others, which enrich learning paths. Such teaching activities enable students to grasp interdisciplinary knowledge and skills while also appreciating the charm of Chinese civilization, forming and developing core mathematical literacy, that is, students can gradually observe the real world with a mathematical perspective, consider the real world with mathematical thinking, and express the real world with mathematical language.

Keywords: Primary school mathematics; Interdisciplinary comprehensive teaching; Teaching practice; Key points of teaching

报告 4-2/Presentation 4-2：

逆向教学设计视野下基于“教、学、评”一致性的课堂实践路径

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《义务教育数学课程标准（2022 版）》提出注重实现“教-学-评”一致性，发挥评价的育人导向作用。本文从帮助教师实现“以评促学、以评促教”的角度，结合逆向设计教学理论。以浙教版七年级上册《有理数的乘法》教学设计为例，通过结合已有研究成果、课堂实践经验，基于“教-学-评”一致性，试图提出课堂中可操作性的实践路径：基于学生本位和指向素养设计评价、依据评价确定教学目标、设计体现评价有效性和价值性的学习任务和活动、结合目标评定教学完成度。

关键词：逆向教学；“教、学、评”；教学设计

Classroom Practice Based on the Consistency of “Teaching, Learning, and Evaluation” from the Perspective of Reverse Instructional Design

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“Compulsory Education Mathematics Curriculum Standards (2022 edition)” put forward to pay attention to the realization of "teaching-learning-evaluation" consistency, and play the role of evaluation in educating people. From the Angle of helping teachers to realize “promoting learning and teaching by evaluation”, this paper combines the teaching theory of reverse design. Taking the teaching design of “Multiplication of Rational Numbers” in the first volume of the seventh grade of Zhejiang Teaching Edition as an example, by combining the existing research results and classroom practical experience, based on the consistency of “teaching-learning-evaluation”, this study tries to put forward an operable practice path in the classroom: Design evaluation based on student-oriented and oriented literacy, determine teaching

objectives according to evaluation, design learning tasks and activities that reflect the effectiveness and value of evaluation, and evaluate teaching completion degree combined with goals.

Keywords: Reverse teaching; "Teach-learning-evaluation"; Instructional design

报告 4-3/Presentation 4-3：

立足市域·走向全国：章起始课为抓手的初中数学大单元教学实践探索

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以曾经获得国家级教学成果奖的"整体化教学"为研究基地，历经"个人探索·校内推广·市域辐射·团队引领"四个阶段，通过初中数学"单元-课时"设计的迭代探索，形成了以章起始课为抓手的初中数学大单元教学。当下大单元教学炙手可热，但如何落实是一个老大难的现实问题，以章起始课为抓手基于系统大概念顶层设计大单元，让大单元有了落地的依托，便于老师们的操作、执行。主要创新点：形成了以章起始课为抓手的大单元教学实践模型：m个"1+n"结构；建构了章起始课教学设计的基本范式；创立了大单元统摄下的章起始课分类体系（大单元起始：种子课；大单元中程起始：顺承课；大单元终端起始：收口课）。立足市域，成果远播，14篇实践成果在《数学通报》等7类专业期刊发表，理论成果在《课程·教材·教法》发表，并被中国人民大学书报资料中心全文转载，今年又在《中国教师报》以市域经验得以推介，产生了良好的学术效益和社会影响。

关键词：初中数学；章起始课；大单元教学；实践探索

Based on the City, towards the Country: Exploration on the Practice of Teaching Large Units of Mathematics in Junior Middle School by Using Chapter Beginning Class

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2. Xindian Middle School

Based on the "Integrated Teaching" which has won the National Teaching Achievement Award, it has gone through four stages of "personal exploration, school promotion, city radiation, and team leadership". Through the iterative exploration of the design of "unit-lesson" in junior high school mathematics, a large-unit teaching method of junior high school mathematics is formed. The teaching of large units is popular at the moment, but how to implement it is a difficult practical problem. Taking the chapter beginning class as the starting point, based on the big concept of the system, large units are designed at the top level, so that large units have a basis for implementation and are convenient for the operation of teachers. The main innovations are as follows: the formation of a large-unit teaching practice model with the chapter-beginning class as the grasp: M "1 + N" structure; a classification system of chapter beginning classes (large unit beginning: seed class; large unit middle course beginning: follow-up class; large unit terminal beginning: Closing Class) was established. Based on the city, the achievements are widely broadcast. 14 practical achievements were published in 7 kinds of professional journals such as the Journal of Mathematics (China), and the theoretical achievements were published in Curriculum, Teaching Material, and Method. It was reprinted by the Book and Newspaper Information Center of Renmin University of China and was introduced to China Teacher this year by the experience of the city, which has a good academic and social impact.

Keywords: Junior high math; Chapter beginning class; Large unit teaching; Practice exploration

报告 4-4/Presentation 4-4：

上海小学数学专家教师视野中发展学生主体性的课堂特征

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与长期以来被认为是“教师为中心”的传统课堂教学相比，“学生为中心”的教学更具吸引力，近年来也备受关注。然而，这两种教育理念其实都不符合中国教育改革的实际目标。国际经合组织提出的“student agency（学生主体性）”概念，强调了教师和学生在教育过程中共同创造知识的重要性，其内涵与中国倡导的“教师为主导，学生为主体”教学理念存在共通之处。由于对“student agency(学生主体性)”的理解在一定程度上受到文化的影响，因此研究者选择直接从21位上海小学数学专家教师的访谈文本中提取代码以进行定性

内容分析，总结出发展“student agency（学生主体性）”的小学数学课堂的四个主要特征：学生全身心参与教师设计的活动、教师不剥夺学生在课堂的自主权、学生获得充分探究问题的时空、学生享受学习过程并达到满意的学习效果。

关键词：小学数学；课堂教学；学生主体性

The Elementary School Mathematics Classroom Teaching for Developing Student Agency: Perspectives from Expert Teachers

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Compared to the long-standing perception of traditional classroom teaching as teacher-centered, student-centered teaching has become more attractive and garnered significant attention in recent years. Nevertheless, neither of these educational approaches entirely aligns with the actual objectives of educational reform in China. Student agency, proposed by OECD, emphasizes the importance of both teachers and students collaboratively creating knowledge in the educational process. Its essence shares commonalities with China's advocated teaching philosophy of "teacher-led, student-centered". As the understanding of "student agency" is, to some extent, influenced by culture, researchers chose to directly extract codes from interviews with 21 Shanghai expert mathematics teachers and conducted qualitative content analysis. This study has identified four main characteristics that define elementary school mathematics classrooms developing student agency: wholehearted student engagement in activities designed by teachers, teachers refraining from infringing upon students' autonomy within the classroom, students being afforded ample opportunities for thorough exploration of questions, and students enjoying the learning process while achieving satisfactory learning outcomes.

Keywords: Elementary mathematics; Classroom teaching; Student agency

报告 4-5/Presentation 4-5：

基于聚类分析的小学生函数思维发展阶段的研究

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很多研究都证实函数思维比方程更适合作为发展小学生早期代数思维的切入点，但是国际上还缺乏小学生函数思维发展阶段的循证研究。为探索小学生函数思维的发展阶段，本研究基于对相关文献的梳理，构建了小学生函数思维的概念框架，包括递归思维、协变思维和对应思维三种函数思维模式，以及特殊化和一般化两个子水平。依据该概念框架，编制了一个由24个题目组成的测评工具，并对649名三至六年级小学生实施测评。使用Rasch模型对工具的质量进行检验，并利用R语言软件对学生的表现进行聚类分析。研究结果表明：自编的函数思维测评工具具有较好的信度和效度；三至六年级小学生的函数思维发展从低到高依次包括如下五个阶段：无函数思维（16.64%）、前函数思维（20.49%）、萌芽的函数思维（10.94%）、具体的函数思维（20.18%）和抽象的函数思维（31.74%）。最后，基于学生表现分析了每个函数思维发展阶段的具体特征，并探讨了如何在教材编写、教师教学以及学生评价中应用上述研究结果。

关键词：函数思维；小学生；聚类分析；Rasch模型

Research on the Development Stages of Elementary Students' Functional Thinking Based on Cluster Analysis

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Many studies verified that functional thinking could serve as a better entry point into early algebraic thinking, compared with equations. However, few evidence-based studies explored the development stages of elementary students' functional thinking internationally. This study aimed to explore the development stages of elementary students' functional thinking. Based on a systematic review of related literature, a conceptual framework, consisting of three functional thinking modes (recursive thinking, correspondence relations, and covariational thinking) with particular and general sublevels within each mode, was conceptualized to develop an assessment instrument. There are twenty-four items in the self-developed instrument. Then, the instrument was utilized to measure the functional thinking of 649 elementary students in grades 3-6. The Rasch model was used to analyze the quality of the assessment instrument. Using R programming for cluster analysis, elementary students were categorized into significantly different groups based on their performance in various modes of functional thinking. The results showed that the newly developed functional thinking assessment instrument had good reliability and validity. Besides, there were

five development stages of functional thinking for grades 3-6 students: no-functional thinking (16.64%), pre-functional thinking (20.49%), emergent functional thinking (10.94%), specific functional thinking (20.18%), and abstract functional thinking (31.74%). Finally, researchers analyzed the characteristics of each development stage of functional thinking based on students' performance and discussed the implications of the results on the development of textbooks, instruction, and assessment.

Keywords: Functional thinking; Elementary student; Cluster analysis; Rasch model

报告 4-6/Presentation 4-6：

指向深度学习的二次函数单元整体教学设计与实践

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为响应信息社会对人才培养提出的新要求，我国积极改革，制定学生发展核心素养，修订各科课程标准，探索先进高效的教学方法。由此出现的深度学习理念以培养学生核心素养为宗旨，关注学习的情境、意义、过程与情感，是对发展性教学的有效回应。同时, 为改善分课时教学导致的碎片化学习现象, 研究者们提出整体性理念，提倡实施单元整体教学，促进学生认知结构的系统化。基于此，本研究选择初中数学重要知识点——二次函数，旨在采用文献研究法、问卷调查法、案例研究法、课堂观察法分析已有研究现状并调查二次函数学与教现状, 以单元整体教学设计为载体，与深度学习实践模型相融合，设计出指向深度学习的二次函数单元整体教学设计，并在实验班级进行授课。最后，利用指向深度学习的知识深度模型和课堂观察维度，对学生进行书面测试卷考察及课堂观察，检验设计出的单元整体教学设计是否促进了学生深度学习行为的发生。

关键词：单元整体教学；深度学习；二次函数教学

Overall Teaching Design and Practice of Quadratic Function Unit for Deep Learning

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In response to the new requirements of the information society for personnel training, China has actively reformed, formulated the core competencies of students' development, revised the curriculum standards of each subject, and explored advanced and efficient teaching methods. The emerging concept of deep learning aims at cultivating students' core competencies and focuses on the context, meaning, process, and emotion of learning, which is an effective response to developmental teaching. At the same time, in order to improve the fragmented learning phenomenon caused by divided period teaching, researchers put forward the holistic concept, advocate the implementation of unit integrated teaching, and promote the systematization of students' cognitive structure. Based on this, this study selects quadratic function, an important content of secondary school mathematics, aiming to analyze existing studies and investigate the current situation of teaching and learning of quadratic functions by using literature research, questionnaire survey, case study, and classroom observation. The overall teaching design of quadratic function units is designed by integrating the unit's overall teaching design with the deep learning practice model as the carrier, then choosing to teach in the experimental class. Finally, students are investigated in written test papers and observed in class by using the knowledge depth model and classroom observation dimension oriented to deep learning, so whether the designed unit overall teaching design promotes the occurrence of students' deep learning behavior is tested.

Keywords: Unit integrated teaching; Deep learning; Quadratic function

报告 4-7/Presentation 4-7：

思维导图助力传统教学思想融入小学数学教学

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关注学生认知结构的发展与完善是达成培养学生核心素养目标的关键要点之一。中华优秀传统教学思想作为支持和赋能新时代实现继承教育传统文化教学改革的精神力量。在数学教学中需探索两者融合的有效途径，使其成为助力核心素养落地课堂的有效力量。基于认知结构的内涵借助思维导图工具，通过“由博返约，把握单元教学设计主线”、“长善救失，构建协作意义复习”等形式在小学数学教学中对传统教学思想进行传承、转化与创生。通过对55名四年级小学生为期两年的实验结果表明，思维导图“协作式”意义建构复习模式在完整性、系统性、层次性及简洁性等方面能够促进小学生数学认知结构的发展。

关键词：认知结构；核心素养；传统教学思想；思维导图

Mind Mapping Assists Integrate Traditional Teaching Ideas into Primary School Mathematics Teaching

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1. Huangshan University

Paying attention to the development and improvement of student's cognitive structure is one of the key points in achieving the goal of cultivating students' core literacy. The excellent traditional teaching ideology of China serves as a spiritual force to support and empower the realization of inheriting the traditional culture of education and teaching reform in the new era. In mathematics teaching, it is necessary to explore effective ways to integrate the two, making it an effective force to assist the implementation of core competencies in the classroom. Based on the connotation of cognitive structure, with the help of mind mapping tools, traditional teaching ideas are inherited, transformed, and created in primary school mathematics teaching through forms such as "returning from extensive knowledge, grasping the main line of unit teaching design", "good at saving losses, and constructing collaborative review". The results of a two-year experiment on 55 fourth-grade elementary school students show that the "collaborative" meaning construction review mode of mind mapping can promote the development of elementary school students' mathematical cognitive structure in terms of completeness, systematicity, hierarchy, and conciseness.

Keywords: Cognitive structure; Core competencies; Traditional teaching ideas; Mind mapping

报告 4-8/Presentation 4-8：

小学数学微项目学习设计与实践研究

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随着《义务教育课程方案（2022年版）》及各学科课程标准的发布，项目学习越来越成为中小学课程教学改革的一大亮点。为了助力项目学习在常规课堂真正落地，笔者于2020年3月开启了微项目学习研究，基于3年多的课堂实践与聚焦研究形成了对微项目学习设计与实践范式的基本认识。本文阐述了对小学数学微项目学习理解，并基于教学认识的三体结构，通过教师、学生、教材

三者间的互动方式呈现微项目学习的设计思路，该互动主要包含三个内容：主体活动的构建、教学内容的展开、学习过程的引导。在此基础上，通过案例《用方向与距离确定位置》呈现了微项目学习的设计与实践的基本范式，以期为教师开展微项目学习提供实践借鉴，为项目学习的本土化发展提供小学样板。

关键词：小学数学；微项目学习；设计范式；实践范式

Study on Design and Practice of Micro-project Leaning of Mathematics of Primary School

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With the release of the Compulsory Education Curriculum (2022 Edition) and the curriculum standards of various subjects, Project-based Learning (PBL) has increasingly become a highlight of the teaching reform of primary and secondary school curricula. In order to help PBL to be carried out in the regular classroom, the author started a research on the Micro-project Learning (ML) in March 2020. Based on more than three years of classroom practice and focused study, the author has formed a basic understanding of the ML design and a practice paradigm. This paper describes the understanding of the ML of elementary school mathematics. Based on a three-body structure of teaching understanding, the design ideas of the ML are presented through the interaction among teachers, students, and teaching materials, which mainly contains three elements: the construction of the main activity, the learning of teaching content, and the guidance of the learning process. On this basis, the basic paradigm of the design and practice of the ML is presented through the case study Determining Position by Direction and Distance, hoping to provide a practical reference for teachers to carry out the ML, and a sample of PBL in elementary school for the localization development of PBL.

Keywords: Elementary mathematics; Microproject learning; Design paradigm; Practice paradigm

报告 4-9/Presentation 4-9：

聚焦学生问题提出的高中数学教学实践研究

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“问题提出”对于学生创新发展有着重要的意义。笔者利用行动研究方法开展了研究，总结了“问题提出”的一般流程，明确了基本素养提升是关键，具有独立人格是基础，具有自信、质疑、乐思善问的习惯是核心，善于内化新知识、善于迁移新工具是条件，具有阅读能力，能广泛涉猎汲取营养是催化剂。提炼了培养学生“问题提出”的教学策略的关键要素：创设情境，引发学生主动思考，给学生发现问题创造机会；教学情境要有“问题”，追问是孵化器；精心设计问题串，激发好奇心和探知欲；创设游戏情境，让理解性、探究性的数学自然发生；提高学生从获取信息到应用信息的迁移能力；开展数学实践活动，在实践中引发问题提出；设置任务驱动引发问题提出。

关键词：问题提出；独立人格；质疑；教学情境；信息技术

Research on the Practice of High School Mathematics Teaching Focusing on Students' Questions

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"Problem posing" is of great significance to students' innovative development. The author conducted research using action research methods, summarized the general process of "problem posing", and made it clear that improving basic literacy is the key, having an independent personality is the foundation, having the habit of self-confidence, questioning, and being willing to ask questions is the core, and being good at internalization New knowledge and being good at transferring new tools are the prerequisites, and having the ability to read and being able to learn from a wide range of topics is the catalyst. The key elements of the teaching strategy for cultivating students' "problem posing" are extracted: create situations to trigger students' active thinking and create opportunities for students to discover problems; teaching situations must have "questions", and questioning is an incubator; carefully design question strings to stimulate curiosity and the desire to explore; create game situations to allow understanding and exploratory mathematics to occur naturally; improve students' ability to transfer from obtaining information to applying information; carry out mathematical practice activities to trigger question raising in practice; and set task-driven triggers to raise questions.

Keywords: Problem posing; Independent personality; Questioning; Teaching situation; Information technology

报告 4-10/Presentation 4-10：

探析数学专业本科生的证明阅读理解能力——以柯西微分中值定理为例

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1. 东北师范大学

数学专业的本科生，尤其是一年级新生，在理解数学证明时经常会遇到困难。监测与保障本科生关于数学证明的阅读理解能力有利于为师生双方分别提供教学改进和学习改进信息。本研究基于Mejía Ramos等人的多维评价模型，生成了利用柯西微分中值定理证明阅读理解能力的测试题。采取方便抽样法，对数学专业本科一年级新生进行了测试，并运用扎根理论，对学生的答案进行编码和打分。同时，对所有参与的学生实施了访谈。测试结果表明这种新型试题能够有效分析学生在理解证明的过程中存在的困难和不足，并且学生在此测试的得分与他们的数学分析期末考试成绩具有一致性。访谈结果反映学生普遍认为这一形式的测试能够启发他们更深入地思考，加深他们对定理的理解。因此该测试具有复制和推广的价值。

关键词：证明阅读；证明理解；评价模型；扎根理论

Exploring Math Major Students' Reading Comprehension Ability of Proofs: Taking the Cauchy Generalized Mean Value Theorem as an Example

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1. Northeast Normal University

Undergraduate students majoring in mathematics often have difficulty understanding mathematical proofs, especially at the freshman level. Monitoring and securing undergraduate students' reading comprehension of mathematical proofs facilitates the provision of information on teaching improvement and learning improvement for both teachers and students respectively. In this study, a Cauchy Generalized Mean Value Theorem reading comprehension test was generated based on the multidimensional evaluation model of Mejía Ramos et al. A convenience sampling method was used to

test first-year undergraduate mathematics majors, and students' responses were coded and scored using grounded theory. Meanwhile, all participating students were interviewed. Test results indicate that this new type of test can effectively analyze students' difficulties and deficiencies in the process of understanding proofs and that students' scores on this test are consistent with their scores on the Mathematical Analysis Final Exam. The results of the interviews reflect that students generally felt that this form of testing inspired them to think more deeply and deepen their understanding of the theorem. Therefore, the test is valuable for replication and generalization.

Keywords: Proof reading; Proof comprehension; Assessment model; Grounded theory

报告 4-11/Presentation 4-11：

中国小学数学课堂中的师生话语：对三个年代的 8 节示范课的研究

赵冬臣[1]；向坤[2]；范良火[2,3]

1. 哈尔滨师范大学

2. 英国南安普顿大学

3. 华东师范大学

本文呈现的是一项对中国小学数学课堂师生话语的纵向比较研究。数据源自20世纪90年代到21世纪10年代期间的8节主题同为“认识几分之一”的小学数学课。这些示范课在全国层面获得最高荣誉或奖项，被视为优质课的样例。从师生话语的字数、次数、长度和形式4方面对数据进行分析，结果显示：教师话语字数多于学生话语字数；教师话语次数略多于学生话语次数；教师有更多讲长话语的机会，而学生的大部分话语都较为简短；少于5字的学生齐言话语非常普遍；师生话语最常见的形式是以“IR”（Initiation Response）模式或多重“IR”模式进行的师问生答。本研究表明中国数学示范课中的课堂话语是由教师主导的，同时也显示纵向比较有助于揭示不同时期课堂实践的共同特征。

关键词：数学教学；师生话语；课堂互动；中国小学数学教育

Teacher-Student Discourse in Chinese Primary Mathematics Classrooms: A Study of Eight Exemplary Lessons across Three Decades

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1. Harbin Normal University

2. University of Southampton

3. East China Normal University

This paper presents a study on teacher-student discourse in Chinese primary mathematics classrooms from a comparative perspective across time. The data were from eight exemplary lessons on the same topic of "introduction to fractions" collected from the 1990s to the 2010s. All these lessons were formally recognised as a model of excellent teaching, indicated by receiving the highest award at the national level of China. Classroom discourse was analysed in 4 aspects: the total number of spoken words, the frequency of utterance, the length of utterance, and the form of discourse. The analysis results show that: in each lesson, the teacher consistently spoke more words than the students; the frequency of the teacher's utterance was slightly more than the students'; the teacher had more opportunities to talk long utterances while most of the student's utterances were short; the students' chorus responses of fewer than five words were very common; and the most common form of teacher-student discourse was the teacher's questioning and student's answering carried out in an "Initiation Response (IR)" or "multiple IRs" model. The findings of the study indicate that exemplary Chinese mathematics lessons embody teacher-dominant discourse and suggest that the longitudinal comparison helps reveal the common characteristics of classroom practice over different periods of time.

***Keywords**:* Mathematics teaching and learning; Teacher-student discourse; Classroom interaction; Chinese primary mathematics education

报告 4-12/Presentation 4-12：

在探究课堂中培养学生的数学创造性思维能力

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本文论述了“一题多解”和提出新问题对培养学生数学创造性思维的作用。基于探究式数学课堂中“一题多解、一题多变、一题多用”的培养学生数学创造力的模型。本研究以一位中国数学专家型教师讲解一道简单的平面几何题为例，引导学生如何在探究式课堂中找到不同的解法和提出新的问题。研究发现，这些活动可以培养学生的数学创造性思维能力。

关键词：平面几何问题；不同的解答方法；提出问题；创造性思维能力；探究课堂；数学问题；数学专家教师

Cultivating Students' Mathematical Creative Thinking Ability in Inquiry-Based Classrooms

Yanhui Xu[1]

1. Wenzhou University

This paper highlights the role of multiple solutions to a problem and posing new problems in cultivating students' creative thinking in mathematics. Based on a model of cultivating students' creativity by one problem with several solutions, changes, and applications in an inquiry-based mathematics classroom, the study analyzes one expert Chinese mathematics teacher who takes a simple plane geometry problem as an example to guide students how to find different solutions and pose new problems in inquiry-based classroom. These activities can be used to cultivate students' creative thinking ability in mathematics.

Keywords: Plane geometry problem; Different solutions; Problem-posing; Creative thinking ability; Inquiry-based classroom; Mathematics problem; Expert mathematics teacher

报告 4-13/Presentation 4-13：

运用“否定假设法”培养初中生问题提出能力的探索研究

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为了提高初中生的问题提出能力，本研究基于“否定假设法”设计了一个短期项目。六名成绩不同的青岛初二学生参加了该项目。该项目首先通过“一张A4纸的故事”让学生们了解“确定属性、否定属性、提出疑问”的过程，随后学生们被要求根据教科书上的一道例题及其答案提出一个新的问题。本研究收集的数据包括学生提问的过程及其所提的问题，学生对“否定假设法”的认识，以及对学生的访谈信息。研究结果表明：实物情境下的A4纸示例有利于学生掌握“否定假设法”并数学情境中提出问题。学生在掌握策略后提问的数量变多，提问的过程也更具条理性，但A4纸示例也导致部分学生过于强调个体属性。本研究建议在实物情境后增加纯数学背景的例题来进一步说明“否定假设法”是如何应用的。

关键词：问题提出；否定假设法；初中数学

An Explorative Study of Improving the Problem-posing Ability of Junior High School Students by Applying the “What-If-Not” Strategy

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1. Nanjing Normal University

This study aimed to enhance the problem-posing ability of junior high school students using a short program based on the “What-If-Not” strategy. Six Grade 8 students with different mathematics achievement levels from Qingdao participated in the program. This program used “The Story of One Piece of A4 Paper” to help students understand the process of “determining attributes, negating attributes, and raising questions”. Subsequently, students were asked to pose a new problem based on an example and its solution in the textbook. The data collected in this study included the process of students asking questions and the questions they asked, students' understanding of “What-If-Not”, and interviews with the students. The findings indicate that “The Story of One Piece of A4 Paper” in the physical context is helpful for students to grasp the concept of “What-If-Not” and pose new problems in mathematical contexts. After mastering the strategy, students tend to pose more problems and the process becomes more organized. However, the A4 paper example also leads to some students overemphasizing individual attributes. The study suggests that adding examples with purely mathematical backgrounds after the physical context is a good way to further illustrate how “What-If-Not” is applied.

Keywords: Problem posing; What-If-Not; Middle school mathematics

报告 4-14/Presentation 4-14：

指向数学创造力的高中 DoPBL 课程设计与实施——以“函数世界的达芬奇”为例

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发展学生的创造性思维是数学教育的本质属性。已有研究指出，面向设计的产生式学习（DoPBL）可以有效促进学生数学创造力的发展。本研究以高中学段函数模块的知识内容为背景，围绕“教师”、“学生”和“教学任务”三个关键要素，设计并实施了一项“函数世界的达芬奇”DoPBL活动课程。教师通过布置具有一定挑战性的任务“利用函数曲线绘制一个图案”，同时提供成果示例“小船”作为进一步的阐释说明，引导学生灵活运用相关知识，通过小组协作设计得出新颖、独特的成果作品。在学生上台展示、交流成果图案的同时，教师从“拟合优度”、“语言表述”等维度，组织开展教师点评、组间互评、组内自评。最后，本研究结合学生提供的活动反馈，探讨DoPBL培育学生数学创造力的优势，及其面临的问题与挑战。

关键词：数学创造力；DoPBL；函数图像

Instructional Design and Implementation of DoPBL Lessons Aimed at Mathematical Creativity in High School: Taking “Leonardo Da Vinci in the Function World” for Instance

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Developing students’ creative thinking is the core of mathematical education. It was shown that Design-oriented Production Based Learning (DoPBL) can promote the development of students’ creativity. Centering around three key elements “teacher”, “student”, and “instructional task”, this study designed and implemented a DoPBL lesson “Leonardo da Vinci in the Function World” in the context of function in high school. The teacher was supposed to provide the example “Boat” as a further comprehensive explanation of the challenging task, whose content was “drawing a pattern with the tool of function curve” with the purpose of leading students to create

innovative and unique works through group collaboration and flexible application of relevant knowledge. Students were asked to present and communicate their creations on stage, when assessments were made by their teacher, classmates, and group members, from the perspectives like "goodness of fit", "verbal expression", etc. Finally, taking the feedback provided by students into account, this study discussed the advantages of DoPBL in developing students' mathematical creativity, together with the problems and challenges it faces.

Keywords: Mathematical creativity; DoPBL; Function image

报告 4-15/Presentation 4-15：

数学学案导学模式的现状和策略研究

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1. 西北师范大学

随着基础教育课程改革的纵深推进，然而，由于传统观念的因素和学生数学学习的重担，和教育的宏观气候变革缓慢，他们的课堂教学改革在实施过程中逐步暴露出很多问题。数学学案导学模式作为符合新课改理念的一种尝试，概莫能外。本文研究的对象为数学学案导学模式。该模式坚持以学生的长远发展为本，培养学生自主学习，主动探究，主动创新的能力。近年的教学实践证明，学案导学模式的实施符合课程改革的要求，顺应学生成长的需要，也有利于促进教师的专业成长。但是，随着教学改革 的逐步深入，很多问题也随之浮出水面。本文针对学案导学模式运用中存在的问题，应用调查法，访谈法，文献分析法，分析导致问题的原因，并提出优化策略。

关键词：学案导学；教学模式；优化策略

Research on the Current Situation and Strategies of The Mathematical Learning Plan Guidance Model

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1. Northwest Normal University

With the deepening of the reform of basic education curriculum, however, due to the traditional concepts and the heavy burden of students' mathematical learning, as well

as the slow macro climate change in education, many problems have gradually been exposed in the implementation process of their classroom teaching reform. As an attempt to conform to the concept of the new curriculum reform, the mathematics learning plan guidance model is no exception. The object of this article is the mathematical learning plan guidance model. This model adheres to the long-term development of students, cultivating their ability to learn independently, explore actively, and innovate proactively. In recent years, teaching practice has proven that the implementation of the learning plan guidance model meets the requirements of curriculum reform, conforms to the needs of students' growth, and is also conducive to promoting teachers' professional growth. However, with the gradual deepening of teaching reform, many problems have also emerged. In view of the problems existing in the application of the study case guidance model, this paper applies investigation method, interview method, and literature analysis method, analyzes the causes of the problem, and proposes optimization strategies.

Keywords: Learning plan guidance; Teaching mode; Optimization strategy

报告 4-16/Presentation 4-16：

基于学习路径的数学学习支架设计特征与表现研究

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支架式教学符合新课程改革的发展诉求，是突破课堂教学困境的有益探索。但是，作为教学隐喻的学习支架概念具有一定的抽象性和模糊性，对实践的指导作用有限。学习路径能够帮助教师根据对学生学习过程的预测做出更优的设计决策，为教师设计和实施学习支架提供依据。本研究以基于学习路径的数学学习支架分析框架作为分析工具，结合教学设计和课堂教学实录，对数学课中教师的支架行为进行编码，采用描述性统计和卡方检验分析教师支架行为的特征与表现。研究发现，教师会根据不同的数学学习过程层次和支架意图设计和实施相应的学习支架。学习支架通过为学生指明思考方向、提升思维水平以及提供克服认知障碍的多元表征，激活学生的中介活动，促进学生的反思性抽象。

关键词：学习路径；数学学习支架；支架设计

Research on the Design Features and Performance of Mathematics Scaffolding Based on Learning Trajectory

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Scaffolding teaching meets the development demands of the new curriculum reform and is a beneficial exploration to break through the dilemma of classroom teaching. However, as teaching metaphors, the concept of scaffolding is abstract and fuzzy, and their guiding role in practice is limited. Learning trajectory can help teachers make better design decisions according to the prediction of students' learning process, and provide basis for teachers to design and implement scaffolding. The study uses the analysis framework for mathematical scaffolding based on learning trajectories as the theoretical constructs, combined with instructional design and teaching records, the teachers' scaffolding behavior in math lessons is coded, and descriptive statistics and chi-square test are used to analyze the characteristics and performance of teachers' scaffolding behavior. Research has found that teachers design and implement corresponding scaffolding according to different mathematical learning process levels and scaffolding intentions. scaffolding can activate students' intermediary activity and promote students' reflective abstraction by pointing out the thinking direction, improving the thinking level, and providing multiple representations to overcome cognitive obstacles.

Keywords: Learning trajectory; Mathematical scaffolding; Scaffolding design

报告 4-17/Presentation 4-17：

中学数学教师对数学建模的感知

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数学建模是中学阶段常见的教育活动。本研究旨在研究中学数学教师对数学建模的感知。研究问题是：（1）教师如何看待中学数学建模活动？（2）教师对数学建模教学的实践感知如何？(3)影响教师对数学建模认知的潜在因素有哪些？理论考虑是在文献综述的基础上构建的C-A-B模型：教师认知，教师态度，以及教师行为。本研究采用量化驱动的混合研究设计，包括问卷调查和访谈。通过在线招募等方式选取中国6所中学的60名教师作为研究对象。结果表明，

中级教师在行为维度上的表现优于初级和高级教师且有显著性差异，可能原因是中级教师的教学内容知识较为丰富且受到晋升驱动的影响较大。教师自身的认知、态度和行为会影响其对数学建模教学实施的感知。

关键词：中学教师；数学建模；感知；C-A-B模型

Teacher Perceptions of Mathematical Modelling in Junior High Schools

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Mathematical modelling is a popular educational activity in junior high schools. This study aims to find out mathematics junior high school teacher perceptions of mathematical modelling. The research questions are: (1) How do teachers perceive mathematical modelling activities in junior high schools? (2) What are teachers' practice-based perceptions of teaching mathematical modelling? (3) What are the potential factors that influence teacher perceptions of mathematical modelling? The theoretical consideration of this study is C-A-B model which is composed of three dimensions based on literature review: (1) teachers' cognition, i.e., teachers' process of acquiring their own understanding through working experience; (2) attitude, i.e., teachers' predisposed state of mind regarding a value; (3) behaviour, i.e., teachers' act that demonstrates teachers' perception that something is true or false. The present research utilizes a quantitatively-driven, mixed research design, including survey and interview. 60 teachers were recruited from 6 junior high schools in China. 10 participants from these 60 teachers volunteered to participate in a follow-up interview via online recruitment. The results show that intermediate teachers have a significant performance in behaviour dimension than junior teachers and senior teachers, with the possible reason that intermediate teachers have gained more PCK and are more drived by title promotion. Teachers' cognition, attitude, and behaviour can influence their perceptions of the implementation of mathematical modelling teaching.

Keywords: Junior high school teacher; Mathematical modelling; Perception; C-A-B model

报告 4-18/Presentation 4-18：

初中生代数推理能力的培养

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推理能力是《义务教育数学课程标准（2022年版）》提出的初中数学核心素养之一，《义务教育数学课程标准（2022年版）》在数与代数领域加强了对代数推理的培养，代数推理在教学中理应受到重视，代数推理能力的培养应贯穿在整个数学学习过程中，以此提高学生的推理能力，提高学生发现数学美、理解数学美、欣赏数学美的能力，推动学生数学核心素养的发展。本文通过文本分析法分析了人教版教科书中有关代数推理的编排情况和近5年安徽中考题中有关代数推理的考查情况，旨在探索在教学实践中，以数学核心素养为导向，基于课程标准实现“教—学—评”一致性，最后提出培养代数推理的几点策略：一、养成认真观察的习惯，提高代数推理的感知力；二、引导学生大胆猜想演绎证明，提高代数推理的体验力；三、传授数学思想方法，提高代数推理的运用力；四、呈现代数推理的过程，提高代数推理的探索力。

关键词：代数推理；推理能力；核心素养

Developing Algebraic Reasoning Ability for Junior High School Students

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Reasoning ability is one of the core competencies in junior high school mathematics proposed in the Compulsory Education Mathematics Curriculum Standards (2022 Edition). The 2022 Curriculum Standards strengthen the cultivation of algebraic reasoning in the fields of numbers and algebra, and algebraic reasoning should be given attention in teaching. The cultivation of algebraic reasoning ability should run through the entire process of mathematics learning, in order to improve students' reasoning ability, enhance their ability to discover, understand, and appreciate mathematical beauty, and promote the development of students' core mathematical literacy. This article analyzes the arrangement of algebraic reasoning in the People's Education Press textbooks and the examination of algebraic reasoning in Anhui Middle School Entrance Examination questions in the past 5 years through text analysis. The aim is to explore the consistency of "teaching learning evaluation" in teaching practice, guided by mathematical core literacy and based on curriculum standards. Finally,

several strategies for cultivating algebraic reasoning are proposed: 1. Develop the habit of careful observation and improve the perception of algebraic reasoning; 2. Guide students to boldly guess, deduce, and prove, and improve their experience of algebraic reasoning; 3. Teach mathematical thinking methods and improve the application of algebraic reasoning; 4. Present the process of algebraic reasoning and improve the exploratory power of algebraic reasoning.

Keywords: Algebraic reasoning; Reasoning ability; Core competencies

报告 4-19/Presentation 4-19：

“三新”背景下高中数学问题链教学的落地研究

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问题是数学的心脏，能引导学生带着问题去学习数学的有效途径之一是问题链教学， 一系列有序又有层次的问题链可上通知识下达思维。教材设置的“观察”、“思考”、“探究”、“小贴士”等栏目中不同类型的问题，都是问题链的设计源泉。教师在课堂实践“双曲线的简单几何性质”时进行了数学问题链教学，将教材文本中安排的问题全盘考虑后整合设计成问题链，产生了逻辑思维自然连贯的课堂效果，并由此得出若干教学反思：问题何处来、问题促思维、问题链设计原则。本文系 2022 年浙江省教育科学规划课题《高中数学主题式“意义学习”策略研究》（立项编号：2022SC271）深化研究成果、2023 年嘉兴市高中“创新拔尖人才”专项课题《基于高中数学拔尖人才培育的深度学习策略研究 》（立项编号：JZ23140）研究成果。

关键词：问题链；双曲线性质；渐近线

The Research of Question Chain Teaching in High School Mathematics under the Background of the “Three New”

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As the heart of mathematics, questioning is one of the effective ways to guide students to learn mathematics with question chain teaching. A series of orderly and hierarchical question chain can be connected to knowledge and thinking. Different types of questions

in the columns of "observation", "thinking", "exploration" and "tips" in the textbook are the learning sources of the question chain. In the classroom practice of "the simple geometric nature of hyperbola", the teacher carried out the mathematics question chain teaching, integrated and designed the question chain after considering all the questions arranged in the textbook text, and produced the classroom effect of natural coherence of logical thinking. From this, several teaching reflections were obtained: the place where the problem comes from, the problem which promotes thinking, and the principle of question chain designing. *This paper is based on the deepening research results of the 2022 Zhejiang Education Science Planning project "Thematic Meaning Learning Strategy Research in High School Mathematics "(2022SC271), and the 2023 Jiaxing High School Special Project for Innovative Top Talent Fostering "Deep Learning Strategy Research Based on the Cultivation of Top Talent in High School Mathematics"(JZ23140).*

Keywords: Question chain; Hyperbolic property; Asymptotic line

报告 4-20/Presentation 4-20：

STEAM 教育理念下数学拓展课教学实践探索

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随着时代发展对综合型创新人才的培养提出了日益迫切的需求，跨学科已成为了当下数学课程改革的关键词。数学拓展课作为落实跨学科教学的重要载体，却在实际的设计与实施过程中遭遇综合性偏弱、极易异化为“培优”、“拔高”类的基础性课程等阻碍，无法承担起培育学生实际问题解决能力的重任。而STEAM教育理念以跨学科作为其核心特征，能为优化数学拓展课提供有效思路和价值引领。因此，以达成提升面向数学课堂的真实情境问题解决能力的目标导向，对STEAM教育理念下数学拓展课展开教学实践探索就显得尤为紧要。为了解决“STEAM教育理念下数学拓展课教学实践的有效性如何”这一研究问题，依托STEAM教育理念下数学拓展课教学理论框架，在浙江省N中学针对被选取的82名九年级学生，开展了为期9天（跨度16天）的实地调研、课例开发及教学实践活动。结合前后测试、课堂观察、半结构化访谈和开放性问卷调查等研究方法，从知识基础、情境理解、问题解决、沟通交互、态度倾向5个维度要素考量学生学习过程中面向数学课堂的真实情境问题解决能力的发展情况。

研究发现，STEAM教育理念下的数学拓展课对提高学生的真实情境问题解决能力具有积极的促进作用，尤其对“情境理解、沟通交互、态度倾向”这3个维度的推进最为显著，“问题解决”维度次之，在“知识基础”维度的提升相对微弱，但学生对跨学科知识的关注程度有所上升。基于此，提出3点教学建议：利用体现结构化特征的整体设计为不同年级STEAM教育理念下的数学拓展课的开展提供动力保障；利用学习任务单增强不同层次学生与STEAM教育理念下的数学拓展课的自适应性；借助跨学科数学拓展课平台树立教师的课堂角色意识。

关键词：STEAM；数学拓展课；数学教学；问题解决能力；真实情境

Exploration of Mathematics Extension Courses on Teaching Practice under the STEAM Education Concept

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2. Zhejiang Normal University

With the development of The Times, there is an increasingly urgent demand for the cultivation of comprehensive and innovative talents, and interdisciplinary has become a keyword in the current mathematics curriculum reform. Mathematics expansion courses, as an important carrier for implementing interdisciplinary teaching, have encountered obstacles in the actual design and implementation process, such as weak comprehensiveness and being easily alienated into basic courses such as "excellent" and "advanced", and cannot bear the heavy responsibility of cultivating students' practical problem-solving abilities. The STEAM education concept, with interdisciplinary as its core feature, can provide effective ideas and value guidance for optimizing mathematics expansion courses. Therefore, in order to achieve the goal of improving the ability to solve real-life situational problems in mathematics classrooms, it is particularly important to explore the teaching practice of mathematics expansion courses under the STEAM education concept. In order to address the research question of "How effective is the teaching practice of mathematics expansion courses under the STEAM education concept", based on the theoretical framework of mathematics expansion course teaching under the STEAM education concept, a 9-day (spanning 16 days) field survey, lesson development, and teaching practice activities were conducted in N Middle School in Zhejiang Province, targeting 82 ninth grade students. Combining research methods such as pre- and post- testing, classroom observation, semi-structured interview, and open questionnaire survey, this study examines the development of students' problem-solving ability in real situations oriented to mathematics classroom in the learning process from five dimensions: knowledge foundation, situational understanding, problem-solving, communication and

interaction, and attitude tendency. The research has found that mathematics expansion courses under the STEAM education concept have a positive promoting effect on improving students' ability to solve real-world situational problems, especially in the three dimensions of "situational understanding, communication and interaction, and attitude tendency", which are the most significant, followed by the "problem-solving" dimension. The improvement in the "knowledge foundation" dimension is relatively weak, but students' attention to interdisciplinary knowledge has increased. Based on this, three teaching suggestions are proposed: using an overall design that reflects structured features to provide driving force for the development of mathematics expansion courses under the STEAM education concept in different grades; Utilizing learning task sheets to enhance the adaptability of students at different levels to mathematics expansion courses under the STEAM education concept; Utilizing the interdisciplinary mathematics expansion course platform to establish teachers' classroom role awareness.

Keywords: STEAM; Mathematics extension course; Mathematics teaching; Problem-solving ability; Real-life context

备注：赵千惠目前于华东师范大学攻读博士学位，本文部分内容属于赵千惠（与合作者）于浙江师范大学攻读硕士学位期间的研究成果，特此说明。

报告 4-21/Presentation 4-21：

基于 PISA 测试和数学核心素养评价框架的测评研究

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我国教育从“三维目标”到“核心素养”的转变映证着当代教育是让学生全面、个性发展的教育。其中，数学教育承载着落实立德树人根本任务、发展素质教育的功能，要引导学生掌握“四基”、形成“四能”并发展“三会”。同时，由于数学学科核心素养具有可测性，具有内涵的可分解性，具有能力的综合性，具有水平的进阶性。本文基于喻平教授提出的数学核心素养评价框架，结合 PISA2021 模型，给出更适宜中国学生数学核心素养教学与评价研究的评价表和测评框架。维度包括：数学六大核心素养、数学核心素养三级水平（知识理解、知识迁移和知识创新）、数学推理、问题解决（数学抽象、数学应用和数学评估）、变化与关系（增长现象）、空间与形状（几何近似）、数量（计算机模拟）和不确定性和数据（条件决策）。以期为基于试卷的核心素养测评研究提供一定的参考。

关键词：核心素养；PISA；测评框架

Assessment Research Based on PISA Test and Mathematics Core Literacy Assessment Framework

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The transformation of Chinese education from "three-dimensional goal" to "core accomplishment" shows that contemporary education is an education that enables students to develop comprehensively and individually. Among them, mathematics education carries the function of carrying out the fundamental task of cultivating morality, cultivating people, and developing quality education. It should guide students to master the "four basics", form the "four ability" and develop the "three use". At the same time, because the core literacy of mathematics subject is measurable, has the connotation of decomposability, has the ability of comprehensiveness, and has the level of advanced. Based on the evaluation framework of mathematics core literacy proposed by Professor Yu Ping and combined with the PISA2021 model, this paper presents an evaluation table and evaluation framework that is more suitable for the teaching and evaluation of Chinese students' mathematics core literacy. Dimensions include six core competencies in Mathematics, three levels of core competencies in mathematics (knowledge understanding, knowledge transfer, and knowledge innovation), mathematical reasoning, problem-solving (mathematical abstraction, mathematical application, and mathematical evaluation), change and relationships (growth phenomena), space and shape (geometric approximation), quantity (computer simulation) and uncertainty and data (conditional decision making). In order to provide a certain reference for the core literacy assessment research based on the test paper.

Keywords: Core literacy; PISA; Evaluation framework

报告 4-22/Presentation 4-22：

提升初中生数学学习积极情感的四然教学模型构建与实践

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一些学生数学学习积极性渐降，态度焦虑、惧怕以至于放弃，这已成为较为普遍的现象。本研究从积极心理学的视角，首先对浙江省宁波市江北区8127名初中生数学学习情感现状、以及该区161名初中数学教师教学中对学生情感关

注度现状等进行调查。并循此构建提升初中生数学学习积极情感的四然（安然、自然、欣然、超然）教学模型。继而通过6位教师和8个九年级班级的学生对此进行实验与实践。最后通过学生情感量表（PANAS）前后测、学业质量前后测，教师教学报告等进行分析与验证。研究结果表明：积极情绪理论是构建四然教学模型的坚实基础，并为教学策略的探索提供了线索与方向。同时四然教学能够有效提升学生数学学习的积极情感和学业成绩，并有效改良教师教学方法和教学状态。

关键词：初中生；数学学习；积极情感；教学模型

Construction and Practice of the SNAS Teaching Model to Promote the Positive Emotion of Middle School Students in Mathematics Learning

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2. Zhejiang Normal University

Some students' enthusiasm for learning mathematics gradually declines, and their attitudes become anxious, fearful, and even lead to giving up, which has become a relatively common phenomenon. This study starts from the perspective of positive psychology. First investigates the current emotional status of 8127 junior middle school students in Jiangbei District, Ningbo City, Zhejiang Province regarding their mathematics learning, as well as the current level of emotional attention from 161 junior middle school mathematics teachers in the district in their teaching. Based on this, an SNAS (Secure Natural Appreciatory Selfless) teaching model is constructed to enhance the positive emotions of middle school students in mathematics learning. Subsequently, experiments and practices were conducted with 6 teachers and Ninth-grade students from 8 classes. Finally, the study is analyzed and validated through pre- and post-tests using the Positive and Negative Affect Schedule (PANAS), pre-and post-academic quality assessments, and teacher teaching reports. The research results indicate that the Theory of Positive Emotions forms a solid foundation for constructing SNAS teaching model and provides clues and directions for exploring teaching strategies. Meanwhile, the SNAS teaching model can effectively enhance students' positive emotions and academic performance in mathematics learning and effectively improve teachers' teaching methods and teaching status.

Keywords: Middle school student; Mathematics learning; Positive emotion; Teaching model

报告 4-23/Presentation 4-23：

基于学习轨迹的数学教学：理论基础、概念分析与框架设计

杨雪[1]；缪佳怡[1]；张春莉[1]

1. 北京师范大学

基于学习轨迹的数学教学是将学生的学习轨迹作为教学决策的教学，是围绕学生数学学习研究组织和扎根的教学范式。本文以概念“学习轨迹”为基础，在回顾教育学、心理学、社会学等关于学生学习研究的基础上，通过专家评定与焦点小组讨论等方法，探索构建了以学习活动和数学对话的相互作用为核心的基于学习轨迹的数学教学分析框架。其中，学习活动是学生学习的载体，所蕴含的是教师对知识的理解、设计与规划，数学对话是师生交往的中介，体现的是课堂中教师和学生如何交换思想、共同学习。学习活动与数学对话的交互作用正体现了教学中教师兼顾学生个性与共性，有效对接教与学的现实样态。

关键词：学习轨迹；框架设计；学习活动；数学对话

Mathematics Teaching Based on Learning Trajectory: Theoretical Foundations, Conceptual Analysis, and Framework Design

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1. Beijing Normal University

Mathematics teaching based on learning trajectory takes students' learning trajectory as a teaching decision, is a teaching paradigm that revolves around the organization and rooted research of students' mathematical learning. This study focuses on the concept of "learning trajectory", based on a review of research on student learning in education, psychology, and sociology, explores and constructs a mathematical teaching analysis framework based on learning trajectory, with the interaction between learning activities and mathematical conversation as the core. Among them, learning activities are the carriers of students' learning, which contains teachers' understanding, design, and planning of knowledge. Mathematical conversation is the intermediary of teacher-student communication, reflecting how teachers and students exchange ideas and learn

together in the classroom. The interaction between learning activities and mathematical conversation reflects the fact that teachers balance students' personalities and commonalities in teaching, effectively connecting with the reality of teaching and learning.

Keywords: Learning trajectory; Framework design; Learning activity; Mathematical conversation

报告 4-24/Presentation 4-24：

智慧学习体系下的数学教学

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我们倡导的智慧学习体系是以“是什么？为什么？还有什么？”为指导思想。“是什么”是指关注概念的形成过程和历史沿革，渗透学科文化。“为什么”是指揭示现象背后的逻辑关系，阐述学科的思想、观点和方法。“还有什么”是指如何探索？培养创新思维、发散性思维和批判性思维。智慧学习体系下的数学教学的特征：1. 教师在课堂教学中以问题驱动统揽全局，按照难易程度和逻辑关系形成问题串展开学习活动，传播数学的思想、观点和方法，并对学生的回答和探索予以恰如其分的评价和引导，对学生的深度学习有精心的设计。2. 学生在课堂活动中积极主动，有独立思考，有小组讨论，有相互评价，初步形成用数学思想看待问题、解决问题的意识。不拘泥于一题一解，而是要把握解决一类问题的策略。3. 数学与美学交融的拓展性活动是激发学生创造性思维的重大举措。全体初中学生都参与此项活动，学生们把理性的数学与感性的美学完美地结合，创造出五彩缤纷的精美作品。作品具有独特性、奇异性和不可替代性，每一份优秀作品在学生的生命中都会留下美好、深刻的痕迹。

关键词：是什么；为什么；还有什么；数学与美学的交融

Mathematics Teaching under the Intelligent Learning System

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The smart learning system we advocate is guided by the concept of “What is it? Why?

What else?" "What is it" refers to paying attention to the formation process and historical evolution of concepts, and adding subject culture. "Why" refers to revealing the logical relationships behind phenomena and elaborating on the ideas, viewpoints, and methods. "What else" refers to how to explore and cultivate innovative thinking, divergent thinking, and critical thinking. The characteristics of mathematics teaching under the intelligent learning system: 1. While teaching, teachers use problem-driven strategy to motivate students, and manage the learning activities based on difficulty and logical relationships. They spread mathematical ideas, viewpoints, and methods, and provide appropriate evaluation and guidance for students' answers and explorations. They have carefully designed deep learning for students. 2. Students are proactive in classroom activities, have independent thinking, group discussions, and mutual evaluations, and have initially developed a sense of using mathematical thinking to approach and solve problems. Not limited to solving one problem at a time, but to grasp strategies for solving a type of problem. 3. The extra-curricular activity of the integration of mathematics and aesthetics is a significant measure to stimulate students' creative thinking. All junior high school students participate in this activity, perfectly combining rational mathematics with emotional aesthetics to create colorful and exquisite works. The works combine uniqueness, singularity, and irreplaceability, and every excellent work will leave beautiful and profound marks in the lives of students.

Keywords: What is it; Why; What else; The integration of mathematics and aesthetics

报告 4-25/Presentation 4-25：

六年级学生"图形的测量"知识结构特征的研究——以概念图为评估工具

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本研究旨在探讨如何评估小学生头脑中的数学知识结构。以Novak团队开发的概念图技术为基础，调整并确定了由概念图要素、评分规则及标准共同构成的评分体系，以223名小学六年级学生独立绘制的"图形的测量"概念结构图为对象，分析学生的知识结构特征。调整后的概念图评分体包含"主题词、概念、层级、组成部分、分支、交叉链接"六个基本要素，对每个要素进行评分后，从"知识逻辑起点、知识广度、知识深度、知识完整程度、知识分化、知识整合"六个方面描述学生的知识结构特征。通过分析发现，六年级学生"图形的测量"内容，知识逻辑起点简明合理，但存在边界模糊、焦点分散等问

题；个体间的知识广度差异明显但多数达标；知识深度呈现集中趋势且受知识广度和知识分化的联合钳制；“图形的测量”内容的不同子维度及下属模块中知识完整程度表现各异；一般都具备知识分化能力但并未有突出表现；知识整合普遍存在着巨大短板。

关键词：概念图；概念图评分体系；知识结构；图形的测量

The Characteristics of the Knowledge Structure of Year 6 Students on "Measurement of Graphs": Using Concept Map as an Evaluation Tool

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1. Northeast Normal University

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This study aims to explore how to assess the structure of mathematical knowledge in the minds of primary school students. Based on the concept map developed by Novak's team, the scoring system composed of the concept map elements, scoring standard framework, and scoring rules was adjusted and determined, and the "measurement of graphics" conceptual structure diagrams independently drawn by 223 students of sixth grade were used as the objects to analyze the knowledge structure characteristics of the students. The adjusted scoring system consists of six basic elements of "subject words, concepts, levels, components, branches, and cross-links". After scoring each element, this article describes the characteristics of students' knowledge structure from six aspects: "logical starting point of knowledge, breadth of knowledge, depth of knowledge, completeness of knowledge, differentiation of knowledge, and integration of knowledge". Through the analysis, it is found that the content of "graphic measurement" of the sixth-grade students has a concise and reasonable starting point of knowledge logic, but there are problems such as blurred boundaries and scattered focus. The breadth of knowledge varies significantly between individuals, but most of them meet the standard. The depth of knowledge shows a concentrated trend and is constrained by the combination of knowledge breadth and knowledge differentiation. The content of "Measurement of Graphics" varies in different subdimensions and subordinate modules. The ability to differentiate knowledge is generally present but not outstanding, while the ability to integrate knowledge generally has a significant shortcoming.

Keywords: Concept mapping; Concept map scoring system; Knowledge structure; Measurement of graphics

报告 4-26/Presentation 4-26：

指向核心素养的数学课堂问题情境设计

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以核心素养培养为导向的数学教与学为课堂问题情境的设计提供了更为广阔的研究空间。本研究首先提出了数学问题情境的水平特征，包含“背景呈现”、“数学表征”、“任务要求”三个要素，接着分析了数学核心素养的三种水平（即知识理解、知识迁移和知识创新）的培养与问题情境设计存在对应性，然后构建了指向核心素养培养的数学问题情境设计的框架，最后确定了数学课堂问题情境设计的基本路径：一是确定数学问题情境设计的素养具体指向；二是寻找数学问题的真实情境原型；三是设计问题情境的召唤结构；四是评价和优化数学问题情境，并以人教A版（2019版）高中数学教材“数系的扩充与复数的概念”内容为例进行具体的阐述。

关键词：核心素养；数学教学；问题情境

Design of Mathematics Classroom Problem Context Focusing on Core Competencies

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Mathematics teaching and learning, guided by the cultivation of core competencies, provides a broader research space for the design of classroom problem contexts. This study first proposed that the horizontal characteristics of mathematical problem contexts include three elements: “background presentation”, “mathematical representation”, and “task requirements”. Then, it analyzed the correspondence between the cultivation of three levels of mathematical core literacy (namely knowledge understanding, knowledge transfer, and knowledge innovation) and the design of problem contexts. Then, a framework for designing mathematical problem contexts

aimed at cultivating core literacy was constructed, Finally, the basic path for designing mathematical classroom problem contexts was determined: firstly, the specific direction of literacy in designing mathematical problem contexts was determined; The second is to search for real situational prototypes of mathematical problems; The third is to design the summoning structure of the problem context; The fourth is to evaluate and optimize mathematical problem contexts, and to provide specific explanations based on the content of the "Expansion of Number Series and the Concept of Complex Numbers" in the high school mathematics textbook of the People's Education Press A version (2019 version).

Keywords: Core competencies; Mathematics teaching; Problem context

报告 4-27/Presentation 4-27：

探索听牌魔术在提升高二学生数学建模素养中的效果：一种创新的教学实践

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听牌术是一种利用模运算和组合数学原理，巧妙地识别观众手中纸牌点数和花色的技巧。本研究在高二《排列组合》结束后，开设了一门4课时的校本选修课，招募了15名对数学建模感兴趣且自愿参与的学生。教师首先向学生演示了听牌术的原理和实现方法，并让学生尝试操作纸牌，从而激发他们提出问题和探索规律的动机；然后引导学生构建听牌术的数学模型。在教学过程中，运用了数列、排列组合等知识，并采用算法设计的方法进行模型求解；最后，学生能够轻松地创造出属于自己的魔术。本文使用自编的数学建模素养量表和排列组合月考测试，收集并分析了参与和未参与选修课程的学生的测试和访谈，以评估本设计的实际教学效果。结果表明，参与选修的学生在非智力因素和数学建模水平方面有了显著提升。本文为将听牌术的数学模型作为一种教学资源融入到高中数学课程提供了一种可行的参考方式。

关键词：听牌术；Si Stebbins stack；数学建模；高中数学教育

Exploring the Effectiveness of Listening Card Trick in Enhancing Mathematical Modelling Competencies of Grade 11 Students: An Innovative Teaching Design and Implementation

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2. Escola Sun Wah

Mathematical modeling is a vital skill for high school students, but it is often overlooked or inadequately taught in traditional mathematics courses. This paper aims to explore how a mathematical magic skill that involves identifying cards by using modular arithmetic and combinatorics can be used as a scenario for mathematical modeling. An elective course on mathematical modeling based on this skill, which is called Listening Card Trick (LCT), was designed and implemented for 15 grade 11 students who were interested and voluntary. LCT is a magic technique that combines mathematics and art and can enhance students' mathematical interest and creativity. This paper used a self-developed mathematical modeling competency scale and a permutation and combination monthly test, as well as interviews, to collect and analyze the data of the students who participated and did not participate in the elective course, in order to evaluate the actual teaching effect of this design. It was found that the students who participated in the course improved significantly in their motivation, attitude, confidence, and problem-solving skills, as well as their mathematical modeling competencies, compared to those who did not participate. It is suggested that LCT can be an effective and engaging way to incorporate mathematical modeling into high school mathematics courses. This study provides a novel teaching mode and resource for high school mathematics curriculum design.

Keywords: Listening card trick; Si Stebbins stack; Mathematical modeling; High school mathematics education

报告 4-28/Presentation 4-28：

关于加强初中数学尺规作图教学的思考

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在初中数学中适当渗透并加强尺规作图教学，对于增强几何直观、深刻理解几何知识、提高推理能力等数学核心素养有着重要的价值。基于对《全日制

义务教育数学课程标准（实验稿）（2001年版）》、《义务教育数学课程标准（2011年版）》对尺规作图的弱化和对应教材先天不足及其教学现况不力的质性分析，结合《义务教育数学课程标准（2022年版）》对尺规作图重要性的定位，通过多年的课堂教学实践迭代探索研究，并结合对相关文献的进一步研习，本研究提出了尺规作图是建立学生几何直观的有效手段，锻炼学生逆向思维的有力工具，学生“做中学”的物化载体，体悟数学美传播数学文化的重要途径，培养学生推理能力的重要抓手，培养学生前思后想的有效途径，实现图形运动的有效手段等7条教学策略。本文从对应角度阐释了尺规作图是几何学习的重要路径。教学中应充分发挥尺规作图在发展学生核心素养中的重要作用，让尺规作图这朵思维之花绽放新的光彩。

关键词：几何直观；尺规作图；推理能力；核心素养

Reflections on Strengthening the Teaching of Ruler-and-compass construction in Junior High School Mathematics

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It is of great value to infiltrate and strengthen the teaching of ruler-and-compass construction in junior middle school mathematics, which can enhance the intuition of geometry, deeply understand the knowledge of geometry, and improve reasoning ability. Based on the qualitative analysis of the weakening of ruler-and-compass construction in Mathematics Curriculum Standards for Full Time Compulsory Education (Experimental Draft) (2001 ed.) and Mathematics Curriculum Standards for Compulsory Education (2011 ed.), as well as the congenital deficiency of corresponding teaching materials and the inadequate teaching situation, in the light of the importance of Mathematics Curriculum Standards for Compulsory Education (2022 ed.), through years of iterative exploration and research in classroom teaching practice, combined with further study of relevant literature, this study proposes 7 teaching strategies, which includes ruler-and-compass construction is an effective means to establish students' geometric intuition, a powerful tool to exercise students' reverse thinking, a material carrier for students' learning by doing, an important method to understand the beauty of mathematics and spread mathematical culture, an important lever to cultivate students' reasoning ability, an effective way to develop students' thinking and reflection ability, and an effective means to achieve graphic movement. From a corresponding perspective, this article explains that ruler-and-compass construction is an important path for geometry learning. In classroom

teaching, ruler-and-compass construction should play an important role in developing students' core literacy, to bloom with new brilliance.

Keywords: Geometric intuition; Ruler-and-compass construction; Reasoning ability; Core literacy

报告 4-29/Presentation 4-29：

国小数学教学中的问题类型、教师提问和数学言谈

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本研究探讨教师数学教学时使用的问题类型、教师提问与师生间的数学言谈。采个案研究法，31位不同学经历背景的教师参与本研究，每位教师进行3节课的录像，共录制93节课。透过教学录像的分析，本研究发现教师教学时使用的问题有91%属于低认知的问题，教学焦点有82%聚焦在事实的记忆和运算的熟练；教师提问大部分在协助学生理解题意或澄清问题中相关的数学概念，仅5%的提问提供学生解释、推理与应用的机会；师生间的数学言谈虽然都涵盖了数学语言、符号与图像等内容，但沟通的模式上有85%的问题教师采用传递模式，15%的问题采用建构模式。从不同背景教师93节课的教学分析中，本研究认为台湾教室内数学教学的样貌和课纲主张之间有不小的落差存在。

关键字：教师提问；数学教学；数学言谈；数学问题

The Types of Mathematics Problems, Teachers' Questioning, and Mathematical Discourses

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This study aims to investigate what kinds of problem types, teachers' questioning, and mathematical discourse are presented in elementary mathematics teaching. A case study was adopted as a method and there were 31 teachers with different academic backgrounds and teaching experiences participated in this study. Ninety-three mathematics lessons were recorded from each teacher with three mathematics lessons. Based on the analysis results from teaching videos, this study found that there were 91%

of problems the teachers presented in their teaching were the type of low-cognitive demand, and 82% of teaching focuses were on facts memorization and operation mastering. Most of the teachers' questioning were focused on problem understanding and mathematics concepts clarification for helping students' problem- solving. There were only 5% of teachers' questioning provided opportunities for students to explain, reason, and apply their thinking processes. The contents of mathematical discourse between teachers and students included mathematical language, symbols, and figures, and most of the way of communication the teachers adopted was the way of information-delivery rather than students-construction. According to the research results, we argued that there was a BIG gap between teachers' teaching practice and the argument of curriculum guidelines of Taiwan.

Keywords: Teachers' questioning; Mathematics teaching; Mathematical discourse; Mathematics problems

报告 4-30/Presentation 4-30：

指向数学推理能力培养的教学模式对初中生数学推理能力的影响

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为评价指向数学推理能力培养的教学模式（FC-MR）在数学教学中的有效性，研究调查了为期三个月的教学干预前后初中生的数学推理水平。统计人群包括来自华中地区某初中18个班级的九年级学生（N=966），其中干预组两个班（N=79），对照组十六个班（N=887）。研究基于建构理论设计了量表，以Rasch模型为测量模型，从测试建构、项目设计以及结果空间三个方面对学生进行了数学推理能力测试。结果发现，总体来说干预班后测数学推理能力显著高于前测；后测中，干预班数学推理能力显著高于对照班；具体来说，干预班的学生意识到经验论证具有局限性并主动寻求一般性论证；后测中，学生表现出更强的运用反例论证的意识；后测中，学生表现出更多表征形式与论证策略。

关键词：数学推理能力；教学模式；测评

The Effect of Teaching Mode Focusing on the Cultivation Of Mathematical Reasoning on Middle School Students' Mathematical Reasoning Competency

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In order to evaluate the effectiveness of applying teaching mode focusing on the cultivation of mathematical reasoning (FC-MR) in mathematics teaching, the current study investigated the mathematical reasoning competency of middle school students before and after a three-month intervention. The population included ninth-grade students from 18 classes in a middle school in the central district of China (N=966), with two classes in the intervention group (N=79) and sixteen classes in the control group (N=887). With a scale based on construction theory, this study tested students' mathematical reasoning ability from three aspects: test construction, project design, and result space, using the Rasch model as the measurement model. The outcomes of the study presented that the students in the intervention group had significantly higher mathematical reasoning competency in the post-test than in the pre-test. In the post-test, the students in the intervention group had significantly higher mathematical reasoning competency than those in the control group. The students in the intervention group realize the limitations of proving through experience and actively seek general demonstration. In the post-test, students showed a stronger awareness of using counterexamples to prove. In the post-test, students showed more representation forms and argumentation strategies.

Keywords: Mathematical reasoning competency; Teaching mode; Measurement

报告 4-31/Presentation 4-31：

在非正式学习空间一起“玩”数学项目

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在校园非正式学习空间中蕴含着许多数学要素，教师在组织项目化学习时可以将这些要素渗透到日常数学教学设计中，学生在学习过程中体验数学项目活动，用数学的眼光观察世界、用数学的思维思考世界、用数学的语言表达世界，实践“玩数学”的乐趣。笔者尝试探索非正式学习空间中开展数学项目化学习路径，介绍通过数学项目落实数学核心素养培育的若干案例。在教学情境

创设中，合理地开发利用好身边的非正式空间资源，将更好地驱动设计情境化、蕴伏问题差异化、助力思维显性化、促进成果多样化，在环境中育人、在实践中创造，更充分地发挥课程育人价值。

关键词：非正式学习空间；数学项目学习

Playing Math Projects Together in Informal Learning Spaces

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In informal learning spaces on campus, there are numerous mathematical elements. When organizing project-based learning, teachers can integrate these elements into their daily mathematics teaching designs. Students can experience mathematical project activities, observe the world with a mathematical perspective, think about the world using mathematical thinking, and express the world with mathematical language. They can practice the joy of "playing with Mathematics". The author attempts to explore the path of mathematical project-based learning in informal learning spaces and introduces several cases of cultivating mathematical core competencies through mathematical projects. In the creation of teaching contexts, it is important to reasonably develop and utilize the informal spatial resources around us. This will better drive the design of contextualization, diversify problem variations, facilitate explicit thinking, and promote diverse achievements. Through nurturing students in the environment and creating in practice, the educational value of the curriculum can be maximized.

Keywords: Informal learning spaces; Mathematics project-based learning

报告 4-32/Presentation 4-32：

小学数学素养评价量表的编制——以几何直观能力评价量表为例

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在当前中国注重发展学生核心素养的改革背景下，构建小学生几何直观能力的评价工具显得重要而迫切。本文把量化评价和质性评价结合起来，在前人研究的基础上，从结构、认知、内容、情景四个维度出发构建了 5-6 年级学生几何直观能力评价框架，最终编制出 5-6 年级学生几何直观能力评价量表，并从“评价量表的评价指标，等级，标准，权重，分数”、“评价主体与结果”、“评价量表的使用”三个维度进行了具体阐述。本研究旨在为一线教师制定数学素养评价量表提供借鉴，并提高评估的准确性、可操作性、快捷性和统一性。

关键词：数学素养；评价量表；小学高年级学生；几何直观能力

Drafting an Elementary Mathematics Literacy Evaluation Instrument: Taking the Evaluation Scale of Geometric Intuition Ability as an Example

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In the current context of China's reform that focuses on developing students' core competencies, it is urgent to construct an evaluation instrument for primary school students' geometric intuition ability. This article combined quantitative and qualitative evaluation. Based on previous research, this study proposed an evaluation framework for the geometric intuition ability of students in grades 5 and 6 from four dimensions: structure, cognition, content, and scenario. This study ultimately developed an evaluation scale of geometric intuition ability for students in grades 5 and 6, elaborating on three dimensions: “indicators, grades, standards, weights, scores of the evaluation scale”, “evaluation subjects and results”, and “use of evaluation scales”. The purpose of this study is to provide a reference for teachers to develop an evaluation scale of mathematical literacy, and to improve the accuracy, operability, speed, and uniformity of the evaluation.

Keywords: Mathematical literacy; Evaluation scale; Primary school students in higher grades; Geometric intuition ability

报告 4-33/Presentation 4-33：

一个新的效度验证框架：基于数学核心素养的测评工具研发

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随着《义务教育数学课程标准（2022年版）》的颁布，基于数学核心素养的学业质量评价成为了当前的热点内容，如何提高基于数学核心素养的测评工具质量是当前面临的关键问题之一。本研究旨在构建一个新的效度验证框架，用于检验数学核心素养测评工具的质量。首先，研究采用文献分析的方式对已有的效度验证研究进行综述。然后，结合综述分析的结果和数学论证能力测评工具的研发过程，构建了一个新的效度验证框架，包含设定、表征、管理、评分、概化。最后，在整体效度验证观的指导下，采用基于论证的效度验证方法，进行解释性论证和效度论证，并形成系统性的效度验证方案。本研究的研究结果在指导命题研发者开发基于数学核心素养的高质量测评工具方面具有重要意义。

关键词：效度验证；数学核心素养；工具研发

A New Validation Framework of Developing Assessment Instruments Based on Mathematical Core Competencies

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With the issues of the Mathematics Curriculum Standards for Compulsory Education (2022 Edition), the academic assessment based on mathematical core competencies has become a hot topic, and it's one of the key issues currently faced how to improve the quality of assessment instruments based on mathematics core competencies. The purpose of this study is to construct a new validation framework for developing assessment instruments of mathematical core competencies. First, the document analysis was used to review the existing studies on validation. Then, a new validation framework was built by combining the results of document analysis and the process of developing assessment instruments of mathematical argumentation, and this validation

framework includes "setting, representing, administrating, scoring and generalizing". Finally, under the guidance of the whole validation approach, an interpretive argument and a validity argument were used to form the system scheme for implementing validation analysis based on the argument-based validation method. The results are very essential for researchers to develop high-quality assessment instruments of mathematical core competencies.

Keywords: Validation; Mathematical core competencies; Assessment instruments

报告 4-34/Presentation 4-34：

问题类型、教师反馈对高中数学课堂跨学科问题解决的影响

张棫彬[1]；蒋政[1]；钱梦凡[1]

1. 上海师范大学

跨学科素养作为双新背景下学生培养的重要目标之一，如何在数学课堂中培养学生的跨学科素养是每一位数学教师都需要思考的，教师们需要思考如何设计适合的教学活动和问题，如何给予学生及时、必要、合适的反馈。基于目前数学问题解决的已有研究，本研究旨在探讨在数学合作学习中，问题类型（跨学科问题和纯数学问题）、教师反馈方式对高中生问题解决能力与创新性行为的影响。本研究采用实验研究法，将上海高中学生随机分配到实验组与对照组，两人一组进行合作探究解决跨学科问题和纯数学问题。本研究发现：与纯数学问题相比，学生在跨学科数学问题中的问题解决能力与创新行为更好。教师的间接反馈相比于直接反馈更能促进学生的创新行为和问题解决。本研究的目的和意义是为高中数学教师有效开展高中数学跨学科教学提供可靠的方法和建议。

关键词：跨学科；问题解决；创新行为；教师反馈

The Effect of Problems and Feedback on Interdisciplinary Problem-Solving in High School Mathematics Classrooms

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1. Shanghai Normal University

Interdisciplinary literacy is one of the important goals of student cultivation under the double new background. How to cultivate students' interdisciplinary literacy in mathematics classrooms is what every mathematics teacher needs to think about. Teachers need to think about how to design appropriate teaching activities and problems, and how to give students timely, necessary, and appropriate feedback. This study aims to explore the impact of problem types (interdisciplinary problems and pure mathematics problems) and teachers' feedback methods on high school students' problem-solving abilities and innovative behaviors in cooperative learning in mathematics. This study adopted the experimental research method and found that students had better problem-solving abilities and innovative behaviors in interdisciplinary mathematics problems than in pure mathematics problems. Teachers' indirect feedback could better promote students' innovative behavior and problem-solving than direct feedback. The significance of this study is to provide reliable methods and suggestions for high school mathematics teachers to carry out interdisciplinary teaching in high school mathematics effectively.

Keywords: Interdiscipline; Problem-solving; Innovative behavior; Teachers' feedback

TSG5: 比较和国际数学教育（Comparative and international studies in mathematics education）

报告 5-1/Presentation 5-1：

数学教育研究中工具化理论的应用
——一个系统性文献综述

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工具化理论是国际数学教育界开展数学教育技术研究的主流理论之一，但在国内的关注度较低。为了探究工具化理论在数学教育研究中的应用现状与发展趋势，本研究采用系统性文献综述法，从Web of Science、 EBSCO、ScienceDirect和Wiley四个外文期刊数据库中筛选出73篇英文实证研究文献进行分析。研究发现，工具化理论逐渐受到不同国家、不同学科的研究者的关注；与之相关的实证研究以质性研究为主，跨越各个学段，研究场景主要涉及技术

支持的学习环境；其相关概念朝着心理工具中介类型的扩展、工具生成理论的演进以及工具编配理论的发展三个方向持续衍变；工具化理论被许多不同主题的数学教育研究用作理论框架之一，其中比较热门的主题是数学教学与学习、教师知识、教科书使用和协作学习等；此外，它还有很强大的联结作用，与之联结的理论可分为与学科特定主题的教学相关的理论以及一般的教育教学理论。

关键词：工具化理论；工具生成；工具编配；系统性文献综述

A Systematic Review on the Application of Instrumentation Theory in Mathematics Education Research

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Instrumentation theory is one of the most important theories of carrying out mathematics education research regarding integrating technology into teaching and learning, but it remains under-researched in China. This study aims to explore the application status and development trend of instrumentation theory in mathematics education research. By using a method of systematic review, this study selected 73 relevant empirical papers from four databases, namely, Web of Science, EBSCO, ScienceDirect, and Wiley, for analysis. It was found that instrumentation theory had gradually attracted the attention of researchers in different countries and disciplines. The relevant empirical research was mainly qualitative research, spanning all grades and the research scenario mainly involved the technology-supported learning environment. The related concepts of instrumentation theory continued to evolve in three directions: the expansion of mediation types of instruments, the evolution of instrumental genesis theory, and the development of instrumental orchestration theory. The instrumentation theory has been used as one of the frameworks in different mathematics education research topics, among which the popular topics were mathematics teaching and learning, teachers' knowledge, textbook-use, and collaborative learning. Moreover, instrumentation theory is extremely powerful in connecting with other theories which can be divided into theories related to specific topics of teaching and general educational teaching theories.

Keywords: Instrumentation theory; Instrumental genesis; Instrumental orchestration; Systematic review

报告 5-2/Presentation 5-2：

国际视野下数学奥林匹克的实践与特点

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数学实力影响国家科技实力，其中数学人才的发现和培养十分关键，因此20世纪以来世界各国纷纷举办全国性数学竞赛，以期及早发现和培养数学资优生，而国际上许多研究和证据也表明数学竞赛优胜者更可能成为数学、科学领域的优秀人才。本研究聚焦活动组织、选拔环节、竞赛形式、培养项目、奖励机制五个方面，对各国数学奥林匹克体系的特点进行分析，相关数据来源于中、美、俄、日、英、法、澳等十多个国家的教育部文件、竞赛官网、权威期刊文献等。目前，各国数学奥林匹克体系具有：组织体系构建完善，稳定资金支持；国际交流与合作紧密；关注弱势背景群体与地区，特殊政策保障；重视过程性评价，短期集训与长期跟踪结合；专业团队引领，保障数学活动高质量开展；学生广泛参与，活动普及性与选拔性并重等特点。尽管中国已经逐步建立起符合本土国情的中国数学奥林匹克体系，并在人才发现和培养上取得一定成效，但是仍需社会各方共同努力，营造健康自然的数学竞赛环境。

关键词：数学奥林匹克；数学人才；国际比较；实践特点

Practice and Characteristics of Mathematical Olympiads from an International Perspective

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Mathematical prowess influences a country's technological strength, with the discovery and cultivation of mathematical talent being crucial. Therefore, since the 20th century, countries around the world have been organizing national mathematics competitions in the hope of identifying and nurturing mathematically gifted students at an early stage. Moreover, many international research studies also indicate that winners of mathematics competitions are more likely to become outstanding talents in the fields of mathematics and science. This study focuses on five aspects, namely, activity

organization, selection processes, competition formats, training programs, and reward mechanisms, to analyze the characteristics of the Mathematical Olympiad systems in various countries. The data for this study were obtained from documents of the Ministry of Education, official competition websites, authoritative journal articles, and other sources from more than ten countries, including China, the United States, Russia, Japan, the United Kingdom, France, and Australia. Currently, the Mathematical Olympiad systems in various countries have well-established organizational structures, stable financial support, close international exchanges and cooperation, a focus on disadvantaged groups and regions with special policy support, an emphasis on process-based evaluation, a combination of short-term training and long-term tracking, leadership by professional teams to ensure the high-quality execution of mathematical activities, and widespread student participation, balancing both accessibility and selection. Although China has gradually established a Chinese Mathematical Olympiad system that suits its national conditions and has achieved some results in talent discovery and cultivation, it still requires joint efforts from all sectors of society to create a healthy and natural environment for mathematics competitions.

Keywords: Mathematical Olympiad; Mathematical talent; International comparison; Practical characteristics

报告 5-3/Presentation 5-3：

符号学视角下中日数学教科书的文化性探微——基于初中“函数与方程”内容的比较

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数学教科书既是国家课程的直观体现，也是传递各国文化内涵的重要载体。教科书的文化属性不仅影响教师教学设计的价值取向，更是在塑造学生数学学习经验活动中扮演重要的角色。本研究选择“数学教科书”为分析对象，并试图以皮尔斯符号学为理论视角，着重探讨数学教科书的文化性意涵、符号类型以及考察路径等问题。最后通过中日两国数学教材相应章节内容的比较，进一步剖析两国数学教科书在原始插图、数学思想方法、图示表征以及情境表达上所具有的文化性特征，以期对如何将文化融入数学教科书以及相关教学实际提供策略参考。

关键词：数学教科书；文化性；中日比较；符号学

An Exploration on the Cultural Attribute of Chinese and Japanese Mathematics Textbooks from the Perspective of Peirce Semiotics: Based on the Comparison Study on the Domain of Functions and Equations in the Level of Junior High School

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Mathematics textbooks are not only the visual manifestation of national curricula, but also the important carrier of the cultural connotations of various countries. The cultural attributes of textbooks make a non-negligible impact on the value orientation of teachers' teaching design, and play key roles in shaping students' learning experience in mathematics as well. This study chooses mathematics textbooks as the research objective, and attempts to discuss the cultural implications, symbol type, and investigation path of mathematics textbooks from the theoretical perspective of Peirce Semiotics. Finally, through the comparison of the contents of the corresponding chapters of the mathematics textbooks in China and Japan, the cultural characteristics of the original illustrations, mathematical thought methods, graphical representations and situational expressions of the mathematics textbooks in the two countries are further analyzed. Strategic suggestions for how to integrate culture into mathematics textbooks and relevant teaching practice are also discussed at the end.

Keywords: Mathematics textbook; Cultural attribute; Comparison between China and Japan; Semiotics

报告 5-4/Presentation 5-4：

中日小学数学教材计数单位内容编写的比较研究——以人教版和启林馆教材为例

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1. 东北师范大学

自《义务教育数学课程标准（2022年版）》发布以来，计数单位作为小学数与代数领域下数与运算主题中的一个重要概念，也是该领域知识结构化统整的一个核心概念，引发了诸多关注。本研究以中国人教版和日本启林馆小学数学教材为对象，从“计数单位概念、基于计数单位概念认识数意义、依托计数单位概念解释算理”等维度，分析计数单位内容教材编写上的异同。分析发

现：计数单位概念，两版教材都注重其呈现，但人教版专门对整数、小数的计数单位以及分数单位进行了形式化定义，启林馆教材则缺少此类定义表述。基于计数单位认识数意义，两版教材都关注整数、小数组成中计数单位的线性表达，都缺少基于分数单位累加认识分数的编写，且人教版偏重文字表征，启林版重视符号表征。依托计数单位解释算理，在整数运算编写中两版教材都借助小棒等模型突出运算本质上是计数单位个数的运算，但小数、分数运算部分，两版教材在对算理的解释上均较为薄弱。

关键词：小学数学教材；计数单位；教材编写；中日比较

A Comparative Study on the Compilation of Counting Units in Primary Mathematics Textbooks in China and Japan: Takes the Textbooks of the PEP Edition and the Qilin Guan Edition as Examples

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Since the release of the Mathematics Curriculum Standards for Compulsory Education (2022 Edition), the counting unit has been an important concept in Number and Algebra in primary school, as well as a core concept in the structured integration of knowledge in this field, which has attracted a lot of attention. This study takes the PEP Edition and the Japanese Qilin Guan primary school mathematics textbooks as the objects, and analyzes the similarities and differences in the compilation of the counting units content from the dimensions of "the concept of counting units, understanding the meaning of numbers based on the concept of counting units, and explaining arithmetic based on the concept of counting units". Through the analysis, it is found that both versions of the textbook focus on the concept of counting units, but the Chinese version specifically defines the counting units of integers, decimals, and fractional units in a formal manner. However, the Japanese textbook lacks such definitions. For understanding the meaning of numbers based on counting units, both textbooks focus on the linear expression of counting units in the composition of integers and decimals, and both lack the content of understanding fractions based on the accumulation of fractional units. Moreover, the Chinese version emphasizes textual representation, while the Japanese version emphasizes symbolic representation. In terms of relying on counting units to explain arithmetic, in the compilation of integer operations, both textbooks highlight that the operation is essentially an operation of counting units with the help of the small sticks and other models. However, in terms of decimal and

fractional operations, both of them are relatively weak in the explanation of the operation principle.

Keywords: Mathematics textbooks for primary schools; Counting units; Compilation of textbooks; Comparison between China and Japan

报告 5-5/Presentation 5-5：

中国、芬兰数学教材中的推理与证明
——以初中方程内容为例

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本文应用斯蒂利亚尼德斯的推理与证明分析框架探究中国、芬兰数学教材中的方程内容给予学生的推理与证明机会，研究结果发现：两个系列数学教材方程内容包含的任务呈现显著差异，两个系列数学教材方程内容包含的推理与证明机会呈现显著差异，两个系列数学教材方程内容包含的推理与证明机会活动呈现显著差异。深入剖析芬兰数学教材中推理与证明任务设计的特点，对于促进我国数学教材建设具有重要的意义，同时也给予我们一定的教学启示：教师应合理运用教材中的例题、习题、复习题、附加题等来掌握学生情况，充分调动数学教材中设置的多种数学活动为学生搭建思维舞台，同时教材改革应坚持本土化特色，汲取他国优质经验，更具国际化视野。

关键词：数学教材；推理与证明；方程；比较研究

Reasoning and Proof in Mathematics Textbooks: Taking Equation Content in Chinese and Finnish Mathematics Textbooks as an Example

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2. Beijing Normal University

The reasoning and proof framework was applied to investigate the reasoning and proof opportunities given to students by the equation content in Chinese and Finnish mathematics textbooks. The results showed that the tasks contained in the equations of the two series of mathematical textbooks were significantly different, the reasoning and proving opportunities contained in the equations of the two series of mathematical textbooks were significantly different, and the reasoning and proving opportunities sub-activities contained in the equations of the two series of mathematical textbooks were significantly different. An in-depth analysis of the characteristics of reasoning and proof task design in Finnish mathematics textbooks has important implications for promoting the construction of mathematics textbooks in China, and also gives us certain pedagogical insights: teachers should reasonably use the settings of examples, exercises, review questions, additional questions, and other settings in the textbooks to grasp students' situations and fully mobilize a variety of mathematical activities in mathematics textbooks to build a stage for students' thinking, textbook reform should adhere to localized characteristics, draw on high-quality experience from other countries, and have a more international perspective.

Keywords: Mathematics textbook; Reasoning and proof; Equation; Comparative study

报告 5-6/Presentation 5-6：

国际视野下的数学教师情绪研究——基于 44 项核心研究的范围综述

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数学是一门强情绪学科，近年来，数学教师情绪开始成为国际数学教师教育研究中的热点。采用范围综述法对发表于国际核心期刊上的 44 项实证研究进行三级主题编码，发现：理论基础上，当前研究主要应用了认知评估理论、控制-价值理论、情绪智力理论和情绪劳动理论四种情绪理论；研究设计上，多选取在职中学教师为研究对象，且多采取量化取向的研究方法；研究成果上，已有研究涉及数学教师的特定情绪、二分对立的情绪、不同维度的情绪及混合情绪四种情绪类型，且以焦虑、热情等特定情绪的研究为主，情绪前因包括教师个体的认知和非认知因素、情绪能力、数学学习经历以及外部的情境因素四个

方面，情绪后果发生于教师个体与学生群体两个层面，情绪干预措施较少。透视国际研究现状，为教师教育研究者开展数学教师情绪研究提供了丰富理论视角、扩宽设计思路及增强问题意识三方面的启示与建议。

关键词：数学教师；教师情绪；范围综述；教师教育

Research on Emotions of Mathematics Teachers from an International Perspective: Theoretical Basis, Research Design and Research Results: A Scoping Review of Forty-four Empirical Researches

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Mathematics is an intensely emotional subject. In recent years, the emotions of mathematics teachers have increasingly become a hot topic in international mathematics teacher education research. This article adopts the scoping review method to make a three-level thematic analysis of 44 empirical studies published in international core journals. It is found that: in terms of theoretical basis, current studies mainly applied theories including Cognitive appraisal theory, Control-value theory, Emotional intelligence theory, and Emotional labor theory; in terms of research design, most of the in-service middle school teachers were selected as the research objects, and most of the research methods were quantitative orientation. In terms of research results, current researches involved mathematics teachers' specific emotions, dichotomous emotions, emotions of different dimensions, and mixed emotions, and mainly focused on specific emotions such as anxiety and enthusiasm. Antecedents of mathematics teacher's emotion include the personal cognitive and non-cognitive factors, emotional capacity, mathematics learning experience, and external contextual factors, while the consequences included the two levels of teacher individuals and students group. However, there was little intervention on the emotions of mathematics teachers. Overviewing the international research status provides enlightenment and suggestions for domestic research from three aspects: enriching theoretical perspectives, broadening design ideas, and enhancing problem awareness.

Keywords: Mathematics teacher; Teacher emotion; Scoping review; Teacher education

报告 5-7/Presentation 5-7：

US and Chinese Elementary Teachers' Noticing of Cross-Cultural Mathematics Videos

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Teacher noticing is an important indicator of teachers' expertise. Past studies have revealed that cross-cultural videos are a promising tool to support teacher noticing and learning. However, little is known about what US and Chinese elementary teachers may notice from cross-cultural mathematics videos under educational reforms and how they may reason about what they noticed. In this study, we explored teacher noticing differences of the sampled US and Chinese elementary teachers (grades 1-4) from cross-cultural mathematics videos. A total of 34 expert teachers commented on 25 video clips online. Overall, we collected 233 US and Chinese comment entries, which contained 634 video-noticing units (N_{US} = 326, N_{China} = 308). We coded "what" and "how" teachers noticed from the videos both quantitatively and qualitatively. Findings reveal that teachers in both countries demonstrated strong interests in their international counterparts' videos. For instance, there is a preponderance of teacher comments (US: 66.7%, China: 83.2%) left on videos of international rather than domestic peers. In addition, teachers in both sides provided profound reflections, especially in the teaching domain including representations, teacher questioning/guide, and communication styles. Cross-cultural differences in teacher noticing were also identified, which were discussed based on possible cultural influences. First, US teachers noticed the real-world situations and linear models in Chinese videos while Chinese teachers' mainly noticing unique representations such as cubes and arrays in the US videos, along with some tradeoffs. Second, US teachers noticed the rigorous and deep questions/guide in Chinese videos while Chinese teachers noticed the missing opportunities for deep questioning/guide in US videos. Finally, US teachers noticed the structured and engaged communication style in Chinese videos while Chinese teachers noticed relaxed and natural communication style in US videos. Implications in research and practice, teacher support, and methodology are discussed. The full article is available in the Journal of Mathematics Teacher Education.

Keywords: Cross-cultural videos; US and China; Teacher noticing; Expert teachers; Elementary mathematics

报告 5-8/Presentation 5-8：

The Relationship between Reading Literacy and Mathematics Performance: Insights from Multilevel Modeling Analysis of PISA Data

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The relationship between reading and mathematics is intricate and multifaceted. A range of factors, such as domain-general skills, environmental, and genetic factors, affect reading and mathematics performance in a consistent manner. These factors create a connection between the domains of reading and mathematics, albeit indirect. Moreover, reading comprehension also directly plays a role in a variety of mathematical tasks, especially those that involve problem-solving. This study aims to investigate the relationship between reading literacy and mathematical literacy among students using the Programme for International Student Assessment (PISA) 2018 worldwide data. The multilevel modeling analysis results of the dataset show that reading literacy has a significant and positive correlation with mathematical literacy. All the reading subareas, namely 1) locating information, 2) understanding, 3) evaluating and reflecting, 4) single texts, and 5) multiple texts, are all significantly correlated with mathematical literacy, yet with different strengths of correlation. Among all the three superordinate categories of reading literacy, namely 1) locating information, 2) understanding, and 3) evaluating and reflecting, understanding has the strongest correlation with mathematical literacy. With regard to text types, the correlation between performance in reading single texts and mathematical literacy is found to be slightly stronger compared to the correlation between performance in reading multiple texts and mathematical literacy. The inclusion of other variables does not improve the explained variance or goodness of fit, suggesting a dominant effect reading literacy and its subareas have in predicting students' performance in mathematical literacy. These findings suggest the interdisciplinary correlation in students' performance across academic subjects and the necessity of a comprehensive understanding of the relationship between reading and mathematical literacies for developing evidence-based educational policies and practices.

Keywords: PISA; Mathematical literacy; Reading literacy

报告 5-9/Presentation 5-9：

中英在线教学视频数学任务认知需求的比较研究

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席卷全球的新冠疫情导致各国通过建立门户网站或拍摄课程视频，解决学校关闭、学生停学等问题。在线视频成为学生在家学习的主要途径。然而，紧急状况下生成的视频资源给学生在家学习提供了哪些学习机会，目前尚缺乏必要的研究。在这个研究中，通过QUASAR项目（Quantitative Understanding: Amplifying Student Achievement and Reasoning）的数学任务认知需求分析框架考察上海和英格兰在疫情中开发的在线视频，并在“教材→课件→视频”路径中，探索两国数学任务的认知需求的变化以及主要影响因素。研究发现：（1）上海注重设计高认知的学习任务，而英格兰则重视设置高认知的热身任务与练习任务；（2）在变化路径中两国大部分任务认知需求维持不变，但上海教师更注重提升认知需求；（3）在保持或降低任务高认知需求方面，中英两国的影响因素呈现出一定差异。

关键词：在线教学视频；数学任务；认知需求；中英比较

A Comparative Study of Cognitive Demands of Mathematical Tasks in Online-Video Lessons Between China and England

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1. Shanghai Normal University

The COVID-19 pandemic led countries to address school closures and student suspensions by creating websites or producing online-video lessons. During that period, videos became the basic means for students to support their self-study at home. However, there is a lack of necessary research on what learning opportunities these videos which were produced in such an emergency can provide for students. In this study, we examine mathematical tasks in online video lessons between Shanghai (SOVLs) and England (EOVLs) through the lens of cognitive demands in Quantitative Understanding: Amplifying Student Achievement and Reasoning Project (QUASAR). We also explored the cognitive changes and factors judged to be an influence in

maintaining or declining at high levels through the process of task transition "tasks presented in curricular→tasks presented in slides→tasks presented in final videos". The study found that: (1) In SOVLs, teachers put emphasis on the design of high cognitive study tasks while teachers focused on producing high cognitive warm-up tasks and practice tasks in EOVLs; (2) Cognitive demands of most mathematical tasks in both SOVLs and EOVLs remained unchanged, but Shanghai teachers attached more importance to improving tasks cognition; (3) Factors judged to be an influence in maintain or decline at high levels demonstrated some differences in SOVLs and EOVLs.

Keywords: Online-video lesson; Mathematical task; Cognitive demand; Comparison between China and England

报告 5-10/Presentation 5-10：

跨文化背景下学习“图形的运动”的挑战——一项基于坦桑尼亚 4 课时学生作业单的研究

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本研究讨论在跨文化背景下坦桑尼亚学生学习“图形的运动”这一内容面临的挑战。研究者亲历坦桑尼亚达累斯萨拉姆某学校中学二年级某班（共 56 人）连续日常教学：平移、旋转各 2 课时。作业单有数学题目与自我评价两部分：题目考察概念理解、性质理解、运用性质作图与相关问题解决，自我评价调查学习的收获与困难。整体完成情况显示，较于平移，学生对旋转的理解困难显著，运用工具作图对学生具有挑战等。根据作业单正确率，分层抽样、跟踪样本，结果显示学生缺乏类比的数学思想等。自我评价显示，学习困难主要基于作业单的题目提出，对数学名词的理解有障碍。研究有助于聚焦跨文化下学生数学的学习关注点，对教师在实施跨文化教学设计有借鉴意义。

关键词：跨文化；图形运动；学习挑战

Challenges of Learning Transformation of Figures in a Cross-Cultural Context: A Study Based on Students' Performance of 4-lesson Worksheets in Tanzania

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The study discusses challenges faced by Tanzanian students in learning about transformation of figures in a cross-cultural context. The researcher taught in Tanzania, a class of 56 students in Form 2 in a school in Dar es Salaam, 2 lesson hours of translation and rotation each continuously. The worksheets were divided into two parts: questions that assessed students' conceptual understanding, understanding of properties, geometric construction, problem-solving using properties, and self-assessment that concerned with learning and difficulties. The results showed that students had more obstacles in understanding rotation than translation and they found challenging in drawing figures with set-squares. It showed a lack of analogical mathematical thinking by tracking samples randomly which stratified depending on the rate of accuracy of worksheets. Students' self-assessments showed that difficulties were related to the questions in the worksheets, and laid in the understanding of mathematical expressions. The study helps to focus on students' learning in an intercultural context, which can facilitate teachers' designing if teaching interculturally.

Keywords: Cross-culture; Transformation of figures; Learning challenges

TSG6: 公平与数学教育（Equity in mathematics education）

报告 6-1/Presentation 6-1：

学习压力对处境不利学生数学抗逆的影响—性别的调节作用

王嘉瑶[1]；付钰[2]；綦春霞[1]

1. 北京师范大学

2. 南京信息工程大学

根据“底层文化资本理论”，学习压力对不同性别的底层子弟会产生不同的影响。为了深入探讨学习压力对处境不利学生数学学习的影响，本研究依据OECD对阅读抗逆学生的界定方式，将数学抗逆学生界定为“家庭社会经济地位（ESES）处于本地区最低四分之一，但在控制了ESES后，数学成绩处于本地区最高四分之一的学生”。研究对象为中国中部某省的45067名八年级学生，采用自编与改编量表，通过构建路径模型，探究了性别对学习压力和数学抗逆之间的调节作用，研究结论如下：（1）性别会显著影响学习压力，女生的学习压力显著高于男生；（2）学习压力会显著正向预测数学抗逆；（3）性别显著调节了学习压力对抗逆的作用，相对于男生，女生的数学抗逆更容易受到学习压力的积极影响。

关键词：数学抗逆；处境不利学生；性别差异；学习压力

The Impact of Learning Pressure on Disadvantaged Students' Mathematical Resilience: The Regulatory Role of Gender

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2. Nanjing University of Information Science and Technology

According to the "cultural capital of underclass", learning pressure has different impacts on disadvantaged students of different genders. To further explore the impact of learning pressure on disadvantaged students' mathematics learning, based on the OECD's definition of reading resilient students, this study defines mathematics resilient students as "students with a family socioeconomic status (ESES) that is at the lowest quarter of the local area, but after controlling for ESES, their mathematics scores are at the highest quarter of the local area". The research subjects were 45,067 eighth-grade students from a certain province in central China. Using self-made and adapted scales, a path model was constructed to explore the moderating effect of gender on learning pressure and mathematical resilience. The research conclusions are as follows: (1) Gender significantly affects learning pressure, with female students having significantly higher learning pressure than male students; (2) Learning pressure significantly positively predicts mathematical resilience; (3) Gender significantly regulates the effect of learning pressure on resilience, and compared to boys, girls' mathematical resilience is more susceptible to the positive impact of learning pressure.

Keywords: Mathematical resilience; Disadvantaged student; Gender difference; Learning pressure

报告 6-2/Presentation 6-2：

社交媒体作为促进中国大陆本科少数民族学生数学认同的催化剂—一项路径分析研究

左浩德[1]；刘志伟[1]

1. 扬州大学

社交媒体在学术领域被广泛视为一种促进文化认同的工具。它不仅提供了一个连接人、思想和文化的平台，还构建了一个跨越地理界限的全球社区。在教育领域，社交媒体有着改变学习体验和学习成果的潜能。尽管关于社交媒体在教育中的研究日益增多，但很少有研究探讨它对这些学生数学学习的影响。因此，我们进行了一项研究，旨在调查社交媒体对中国大陆本科少数民族学生数学认同的影响，即个体对自己在数学领域的能力、价值和归属感的认同。本研究对223份问卷数据进行了路径分析，揭示了社交媒体自愿访问对数学学习存在间接影响，这种影响受到种族数学信仰和社会融入的调节。研究发现，在社交媒体上学习数学可以积极影响少数民族学生的数学认同。本文进而突出了将社交媒体平台整合到数学教育中的重要性，这种整合有助于促进包容性，支持少数民族学生的数学发展，创设一个多样化和包容性的学习环境。

关键词：社交媒体；在线和混合数学学习；少数民族学生；数学认同；种族-数学信仰；社会融合

Social Media as a Catalyst for Fostering Mathematical Identity among Undergraduate Ethnic Minority Students in China: A Path Analysis

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Social media is widely viewed in academic circles as a tool for promoting cultural identity. It not only provides a platform to connect people, ideas, and cultures, but also builds a global community that transcends geographical boundaries. In education,

social media has the potential to transform learning experiences and outcomes. Despite the growing body of research on social media in education, few studies have examined its impact on mathematics learning among these students. Therefore, we conducted a study to investigate the impact of social media on undergraduate minority students' mathematical identity in Mainland China, that is, individuals' identification of their abilities, worth, and belonging in the field of mathematics. This study conducted a path analysis on 223 questionnaire data and revealed that voluntary access to social media has an indirect effect on mathematics learning, and this effect is moderated by racial mathematics beliefs and social integration. This study finds that learning mathematics on social media can positively impact minority students' mathematics identity. This article further highlights the importance of integrating social media platforms into mathematics education to promote inclusivity, support the mathematics development of minority students, and create a diverse and inclusive learning environment.

Keywords: Social media; Online and blended mathematics learning; Ethnic minority students; Mathematical identity; Racial-mathematical beliefs; Social integration

TSG7: 其他数学教育相关研究（Other research areas related to mathematics education）

报告 7-1/Presentation 7-1：

中国数学教育研究三十年（1993-2022）—基于中国（大陆）数学教育博士学位论文的统计与分析

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本研究用内容分析法对检索到的534篇1993-2022年中国（大陆）数学教育博士学位论文从论文数量分布、学位授予单位、所属学科专业、论文研究领域及主题等维度进行统计与分析，以了解近三十年中国数学教育研究现状，并予以讨论，以促进数学教育研究健康发展。研究发现：论文数量分布可分为年均1.7篇、13.4篇和28.3篇三个阶段，呈增长趋势；学位授予单位多达32个，所属学科专业多达40个，但都存在“二八定律”现象；学位论文研究领域主要集中于数学学习、数学教学和数学教师；不同领域的研究主题不均衡。因此，做博士学位论文述评时拓宽检索方式、加大数学教育博士联合培养力度、深化博士

学位论文研究的某些领域、均衡博士学位论文的研究主题等应是其未来发展走向。

关键词：中国大陆；数学教育；博士学位论文；内容分析

Thirty Years of Research on Mathematics Education in China (1993-2022): Statistics and Analysis Based on Doctoral Dissertations in Mathematics Education in China (Mainland)

Weiyuan Fan[1], Wenbin Xu[1]

1. Nanjing Normal University

In this study, 534 doctoral dissertations on mathematics education in China (Mainland) from 1993 to 2022 were statistically analyzed from the perspectives of the number distribution of dissertations, degree-granting units, subject majors, research fields, and topics of dissertations, so as to understand the current situation of mathematics education research in China in the past 30 years and promote the healthy development of mathematics education research. The results show that the number of papers can be divided into three stages: 1.7, 13.4, and 28.3 per year, showing a growth trend; There are as many as 32 degree-granting institutions and as many as 40 majors, but all of them have the phenomenon of "80/20 law"; The dissertation mainly focuses on mathematics learning, mathematics teaching, and mathematics teachers; Research topics in different fields are uneven. Therefore, the future development trend should be to broaden the search methods, increase the joint training of mathematics education doctors, deepen some research fields of doctoral dissertations, and balance the research themes of doctoral dissertations.

Keywords: Chinese mainland; Mathematics education; Doctoral dissertation; Content analysis

报告 7-2/Presentation 7-2：

个体数学建模过程的特征分析：一种建模路线重建的方法

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1. 华东师范大学

如何改善当前数学教育中对数学建模的测评以及提高学生的数学建模水平是亟待解决的问题。现有研究较少地从认知层面来关注学生实际经历的数学建模过程。本研究旨在提供一种从认知角度刻画学生实际经历的数学建模过程的方法，重构了学生的个人建模路线图，从而更真实更直观地反映学生经历的数学建模过程。研究以Blum的七阶段建模循环周期为理论框架，结合调整后的Maaβ的编码类别表，通过对48名高中阶段被试在完成数学建模任务时的录音及纸质文本等数据进行编码分析，深入分析了不同水平学生经历的数学建模过程的差异。研究发现：（1）学生的数学建模过程和Blum的七阶段数学建模循环框架既有相似又存在不同。（2）高低水平组的学生在结构上的特征差异主要体现在完整性、流畅性和反复性上。本研究的成果为后续有关数学建模的认知研究提供了实证参考。

关键词：认知角度；数学建模过程；个人建模路线图

Characteristics Analysis of Students' Individual Mathematical Modeling Process

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1. East China Normal University

How to improve the evaluation of mathematical modeling in current mathematics education, and how to improve students' mathematical modeling level is an urgent problem to be solved. Existing research pays less attention to the mathematical modeling process that students actually experience from the cognitive level. This research aims to provide a method for describing the mathematical modeling process that students' actual experience from a cognitive perspective, reconstructing the students' personal modeling roadmap, so as to reflect the mathematical modeling process experienced by students more realistically and intuitively. The study takes Blum's seven-stage modeling cycle as the theoretical framework, combined with the adjusted Maaβ coding category table, through the coding analysis of 48 subjects' recordings and paper texts when completing mathematical modeling tasks, the differences in the mathematical modeling process experienced by students of different levels are analyzed in-depth. The research found that: (1) There are both similarities and differences between the students' mathematical modeling process and Blum's seven-stage mathematical modeling cycle framework; (2) The differences in the structural characteristics of students in the high- and low- level groups are mainly reflected in completeness, fluency, and repetition. The results of this study provide an empirical reference for subsequent cognitive research on mathematical modeling.

Keywords: Cognitive angle; Mathematical modeling process; Personal modeling roadmap

报告 7-3/Presentation 7-3：

小学生一般教育价值观的实证研究及其教学启示

李艳[1]；杨韵莹[2]；佘伟忠[3]

1. 四川师范大学

2. 华南师范大学

3. 墨尔本大学

为了从根本上回答通过学校数学教育为社会培养了什么样的人的问题，了解学生学习数学的根本目的是一个重要途径。一般教育价值观反映了通过数学教育达成什么样的教育目的是重要的。采用随机抽样和分层抽样，选取浙江省一所公立小学六年级一个班的 12 名学生作为研究对象进行了为期 2 个学期的课堂观察和访谈。研究发现：通过数学教学主要塑造了成就、关系和社会促进三种一般教育价值观，并且受重视程度依次降低。可见，小学生更重视个人价值而轻集体价值，这与我国传统文化存在差异。因此，在数学教学中应建立个人价值与集体价值之间的关联、显性化一般教育价值观的作用以及丰富学生接受数学教育的目的。

关键词：数学教育价值观；小学生；实证研究；教学启示

An Empirical Study of General Educational Values of Chinese Elementary School Students and Its Teaching Implications

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1. Sichuan Normal University

2. South China Normal University

3. The University of Melbourne

To answer the fundamental question of what kinds of people are being cultivated through school mathematics education for our society, it is important to know what our students value. This would include their general educational values, which reflect the

importance placed on the educational goals that can be attained through mathematics education. Twelve sixth graders from a public elementary school in Zhejiang Province, China were randomly and stratified sampled for an in-class observation and interview. It was found that local mathematics education was associated with three types of general educational values, namely, achievement, relationship, and social facilitation. These values were ranked in decreasing order of importance. Our data suggested that elementary school students in Zhejiang place greater value on personal worth than on the worth of the group, which is a departure from the cultural norms of China traditionally. In light of this, we propose the creation of connections between individual and group values in mathematical education, making more explicit the usefulness of general educational values, and enhancing the goals of mathematics education.

Keywords: General educational values; Elementary school students; Empirical research; Teaching implications

报告 7-4/Presentation 7-4：

分类讨论思想的深度解题研究——以一道数列题为例

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本文聚焦分类讨论思想的深度解题研究，旨在带领学生进行动态的思维过程，由表面的“得出答案”转变为“掌握数学思想”，训练学生的思维活动由“会解题”提升至“会思考学习”。本文从一道应用二进制思想的数列问题出发，探究学生如何在不熟悉的背景下对问题进行分类讨论。在此问题的基础上进行变式拓广，以应用三进制思想的数列问题再次强调解题中分类讨论的思维过程。本研究探索出的分类讨论的过程有以下四部分：依据问题的背景和形式挖掘出多种情形产生的根源、分析多情形问题的本质、剖析出有影响的分量、在数学方法论的指导下进行分类讨论。本文以非常规的数列问题敲响警钟，避免学生将数学方法技能视为学习的关键，忽视数学思想及数学核心素养的培养。

关键词：分类讨论；深度解题；进制；数列

An In-depth Problem Solving Study of Categorical Discussion: Taking a Problem on Sequence of Numbers as an Example

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To help students move from the surface level of "getting the answer" to "mastering mathematical ideas", this paper focuses on in-depth problem-solving research on the notion of categorical discussion. It also aims to train students' thinking activities to move from "can solve problems" to "can think and learn". Students receive training on how to switch their focus from "solving problems" to "thinking to learn" when they are thinking. The study investigates how students might engage in discussion within the setting of unfamiliar subjects by starting with a problem on a sequence of numbers that applies binary. Using this problem as a foundation, an expanded version is created to emphasize the categorical discussion step of problem solving with a trinary sequence of numbers. The categorical discussion process examined in this study consists of the following four steps: identifying the underlying causes of multiple scenarios based on the problem's context and format; examining the nature of the multi-scenario problem; identifying the key elements; and categorizing and discussing the issue using mathematical methodology. Uncommon problems on sequence of numbers are used to raise awareness and warn students away from emphasizing the acquisition of mathematical methodical skills over the growth of mathematical thinking and mathematical literacy.

Keywords: Categorical discussion; In-depth problem solving; Sequence of numbers; binary

报告 7-5/Presentation 7-5：

中学折纸数学校本课程开发的实践与思考

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根据当前中学数学课程改革的背景和实践经验，数学课程内容丰富而又多元，数学教学手段和评价工具也在不断更新。折纸数学拓展课有利于落实学校育人目标、有利于构建主动学习的数学课堂、有利于培养学生空间想象、抽象

概括、数理运算以及团队协作等面向未来的必要素养，能体现“激发学生兴趣、促进个性发展”的教育理念。在课程开发过程中，笔者始终关注“做中学”“做中思”“做中创”三个层面的问题，尝试构建基于数学折纸活动的中学数学拓展课程，依托折纸与几何、折纸与艺术、折纸与科技等主题学习，根据ARCS理论对注意力、关联性、学习信心、满足感等要素进行设计，促进学生数学核心素养和高阶思维养成，在掌握知识和方法的基础上进一步丰富经验和能力。

关键词：校本课程开发；折纸数学

Practice and Reflection on the Development of Origami Mathematical Curriculum in Secondary School

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1. Shanghai Experimental School

2. East China Normal University

Based on the current background of secondary school mathematics curriculum reform and practical experience, the mathematics curriculum is rich and diverse, and teaching methods and assessment tools are constantly being updated. The extension course of origami mathematics is beneficial for implementing the goals of education, constructing an active learning mathematics classroom, cultivating students' spatial imagination, abstract generalization, mathematical operations, and teamwork, which are necessary qualities for the future. It can reflect the educational concept of "inspiring students' interest and promoting personal development". During the course development, the author has consistently focused on three aspects: "learning through doing", "thinking while doing", and "creating while doing". The author has attempted to construct a high school mathematics enrichment course based on mathematical origami activities. This course integrates origami with geometry, art, and technology, and utilizes the principles of ARCS theory, such as attention, relevance, confidence, and satisfaction, to design the course. The aim is to promote students' mathematical core literacy and the development of higher-order thinking skills. It aims to further enrich their experiences and abilities based on the mastery of knowledge and methods.

Keywords: Development of school-based curriculum; Origami mathematics

报告 7-6/Presentation 7-6：

近十年国际数学焦虑研究综述与启示—基于 CiteSpace 的可视化分析

刘燕红[1]；郑欣[1]

1. 集美大学

基于数学焦虑对学生的影响，本研究意在梳理数学焦虑相关研究的发展趋势，为进一步研究提供参考。运用CiteSpace软件对来源于Web of Science（WOS）的有关数学焦虑主题的文献进行可视化分析，通过关键词时区分布、关键词共现图谱、高被引关键词视角的分析，发现研究热点主要集中于学生的学业成就、教师的信念态度、学生的自我价值保护与数学焦虑的关系；研究对象主要集中于初中和高中阶段的学生；同时也发现学生的学业成就、学习动机、性别差异以及自我效能感等多方面或将成为未来数学焦虑研究的趋势。根据研究结果，提出以下建议：研究对象可向小学阶段学生扩展；进一步探求数学焦虑产生的原因；从教师的角度出发分析师生关系对于学生的数学焦虑产生的影响。

关键词：数学焦虑；知识图谱；研究热点

Review and Inspiration of International Math Anxiety Research in Recent Ten Years: A Visual Analysis Based on CiteSpace

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1. Jimei University

Based on the impact of math anxiety on students, this study aims to sort out the development trend of research related to math anxiety and provides a reference for further research. The CiteSpace software was used to visually analyze the literature on the topic of math anxiety from the Web of Science (WOS). Through the analysis of keyword time zone distribution, keyword co-occurrence map, and strongest cited keyword perspective, we found that the research hotspots are mainly focus on the relationship between student academic achievement, teacher beliefs attitude, student self-worth protection, and math anxiety. The research objects mainly covered junior high school and senior high school students. At the same time, we also found that student academic achievement, learning motivation, gender difference, and self-efficacy may become the trend of future math anxiety research. According to the results of the study, the following suggestions are putting forward: The research objects can

be extended to primary school students and can further explore the causes of math anxiety. From the teacher's point of view, this study analyzed the impact of teacher-student relationship on student math anxiety.

Keywords: Math anxiety; Knowledge map; Research hotspots

报告 7-7/Presentation 7-7：

高中生数学高阶思维量表的开发与验证

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数学高阶思维（MHOTS）的培养和评价在国际上受到了高度关注，而数学高阶思维研究面临着测评研究薄弱、测评方式单一、测评工具缺失等多重阻碍。针对目前缺乏高中生数学高阶思维量表的研究现状，鉴于数学高阶思维内涵和结构的复杂性，本研究依据量表开发和验证的严格程序，开发适合高中生的数学高阶思维量表。本研究通过对954名高中生展开调查，综合运用项目分析、探索性因素分析（EFA）和验证性因素分析（CFA）的方法，开发了高中生数学高阶思维量表（H-MHOTS）。本研究运用项目分析（n=320）检验了量表中个别题项的可靠程度，运用EFA（n=328）确认了一个“4维9因素”的测量结构，其中包括四个主要维度：数学批判性思维、数学创造性思维、数学问题解决能力和数学元认知能力。此外，运用CFA（n=279）和相关性分析，本研究还检验了量表质量和结构效度，并以数学成绩为效标检验了其效标效度。双重效度分析的结果均呈现出良好状态，说明量表结构设置合理且有效。研究结果表明，H-MHOTS对于衡量高中生的数学高阶思维水平是可靠和有效的。

关键词：高中生；数学高阶思维；量表开发

Development and Validation of Mathematical Higher-Order Thinking Scale for High School Students

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The cultivation and evaluation of mathematical higher-order thinking (MHOTS) has received high attention internationally. However, research on MHOTS faces multiple obstacles, such as weak evaluation research, single evaluation methods, and a lack of evaluation tools. In response to the current lack of research on higher-order mathematical thinking scales for high school students, considering the complexity of the connotation and structure of higher-order mathematical thinking, this study developed a mathematical higher-order thinking scale suitable for high school students based on strict procedures for scale development and validation. This study conducted a survey on 954 high school students and developed the Higher-order Mathematics Thinking Scale for High School Students (H-MHOTS) by comprehensively using methods such as project analysis, exploratory factor analysis, and confirmatory factor analysis. This study used project analysis (n=320) to test the reliability of individual items in the scale, used EFA (n=328) to confirm a measurement structure of "4 dimensions and 9 factors", which includes four main dimensions: critical thinking in mathematics, creative thinking in mathematics, problem-solving ability in mathematics, and metacognitive ability in mathematics. In addition, using CFA (n=279) and correlation analysis, this study also tested the quality and structural validity of the scale, and used mathematical performance as the criterion to test its criterion validity. The results of the dual validity analysis showed a good state, indicating that the scale structure was reasonable and effective. The research results indicate that H-MHOTS is reliable and effective in measuring higher-order mathematical thinking levels of high school students.

Keywords: High school students; Mathematical higher-order thinking; Scale development

报告 7-8/Presentation 7-8：

Observing Mathematics Teaching: Tools and Tensions

Ariel Lindorff[1]

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In the classroom observation literature, mathematics has been one of the core subject areas that has received particular attention. Both generic and subject-specific observation schedules have been applied to study the behaviours of mathematics teachers, their interactions with students, and the effects of certain behaviours and interactions on student outcomes (including cognitive outcomes via scores on mathematics assessments, but also affective outcomes such as motivation, engagement, and self-efficacy). The tools that have been developed to facilitate observations of mathematics teaching are numerous, and they vary both in the degree to which they are psychometrically robust in the extent to which they may be practically informative

towards a variety of purposes such as accountability, evaluation of interventions, professional development and learning, and contribution to the academic knowledge base on mathematics teaching and its quality (or effectiveness). In this paper, I review a range of tools designed and/or used to observe mathematics teaching, focusing on the English-language literature and basing this scoping review on literature published from 2000-present. For the observation tools identified in this search, I consider their strengths, limitations and practical utility in relation to different purposes for observing, and propose implications for the observation of mathematics lessons in both research and practical applications.

Keywords: Classroom observation; Teaching quality; Mathematics instruction

工作坊（Workshops）

工作坊1（Workshop 1）

新加坡数学教育之基于真实情境的数学问题解决

黄卫民[1]

1. TP 教育

发展问题解决能力是新加坡数学教育中框架的核心。 除了考核数学问题解决的方法，在新加坡初中阶段考试内容中，学生需完成解答一个“基于真实情境下的数学问题”。此类“基于真实情境下的问题”不同于“应用题”或者“文字题”，问题的设置强调的是其真实性，开放性，且不会针对某些既定的数学内容。学生需要总结所教所学的内容，分析问题上提出的条件，厘清对应的数据和变量，并作出假设或建立模型，然后提出解决办法以及解读。显然，此类题目对学生的综合能力是有一定的挑战性。

本工作坊将通过新加坡初中数学的真实题目探讨

1. 设置真实情境的数学问题
2. 教与学上的困难点及其教学建议

关键词：问题解决，数学建模

Mathematics in Singapore: Problems in Real-World Context

David Ng Wei Min[1]

1. TP Education

The central focus of the Singapore mathematics curriculum is the development of mathematical problem-solving competency. While assessing the skills of problem solving, under the Singapore Secondary School syllabus, students are required to attempt solving a math problem in a real-world context. Such real-world context problem is different from the usual 'application problem' or 'word problem' as emphasis is on the 'real-world' and 'open-endedness', and it is not topic related. Students are required to consolidate whatever that was taught and learnt, analyze the conditions in the problem statement, sort out the data and variables involved, make necessary assumptions or model, so as to suggest a possible solution or interpretation to the problem. Obviously, such problems pose genuine challenges to students' general ability in Mathematics.

Through presenting genuine Singapore Secondary School past year assessment questions, this workshop will discuss with its participants on the following:

1. *Posing problems in real-world context.*
2. *Teaching and learning difficulty and its teaching implications.*

Keywords: Problem-solving，Mathematical Modelling

*工作坊2（**Workshop 2**）*

卡西欧计算器助力数学教与学

周五主讲人：林素华[1]/周六主讲人：齐敏[2]

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国家中长期教育改革和发展规划纲要》中指出加快教育信息化进程，强化信息技术应用。在中国的义务教育与高中数学课程标准中也都强调信息技术比如计算器的使用。在国际的 A-level、IB、SAT、AP 等数学课程/考试中也都离不开计算器的使用。卡西欧计算器作为一种非常重要的信息技术工具,一直在助力数学的教学中发挥着积极作用。恰当地利用计算器辅助教与学不仅有助于让数学学习更直观易懂，让学生更加理解数学的本质，更有利于让学生通过学会借助工具与数学知识思考探究现实生活中数学的问题。卡西欧计算器具有强大的功能，本工作坊将以卡西欧新品函数计算器 fx-991CN CW 为例说明卡西欧计算器的功能及操作方法，并展示如何通过计算器促进数学的教与学。

关键词：数学课程标准；数学教与学；卡西欧计算器fx-991CN CW

The Active Role of Casio Calculators in Mathematics Teaching and Learning

Presenter on Friday: Suhua Lin[1]/Presenter on Saturday: Min Qi[2]

1. CASIO (CHINA) CO., LTD.

2. Shanghai Pudong Institute of Education Department (Retired from here)

The Outline of the National Medium and Long-term Education Reform and Development Plan points out that the process of education informatization should be accelerated and the application of information technology should be strengthened. China's compulsory education and high school mathematics curriculum standards also

emphasize the use of information technology such as calculators. Calculators are also widely used in math courses/exams, such as A-level, IB, SAT, AP, and so on. The Casio calculator, as one of the most important kinds of information technology, is playing an active role in the teaching and learning of mathematics. The proper use of calculators to assist teaching and learning not only helps to make mathematics learning more intuitive and easier to understand, but also enables students to understand the nature of mathematics better, so that students can learn to explore mathematical phenomena in real life with the help of mathematical tools and knowledge. Casio Calculator has powerful functions. This workshop will take the new-launched fx-991CN CW calculator as an example to explain how the functions and operation methods of Casio calculator aid the teaching and learning of mathematics.

Keywords: Mathematics curriculum standard; Mathematics teaching and learning; Casio fx-991CN CW calculator

工作坊3（Workshop 3）

“网络画板”赋能数学教育数字化——互联网+动态数学新型工具、资源与应用

杨承云[1]；管皓[1]；吴冠男[2]

1. 景中动态数学研究院

2. 浙江桐乡濮院桐星学校

我国将深化实施教育数字化战略行动，以教育数字化带动学习型社会、学习型大国建设迈出新步伐。“网络画板”是适应我国移动互联网环境下教育信息化、数字化发展的新趋势和新需求的智能动态数学教育软件。其学科工具具有完备的作图环境、自动适配各种终端设备的系统和分辨率、交互方式灵活及丰富的作图工具等特点。在此基础上，结合我国数学教育特点，创新数字资源形态，建设体系化数学实验资源及课程，形成优质数字教育资源的共建共享机制与平台，变革传统数字资源的应用与供给模式。最后以浙江桐乡濮院桐星学校为例，介绍基于网络画板在学校开展校本数学实验室和数学实验课程建设、应用等实践经验。

关键词：网络画板；动态数学；教育数字资源；数学实验

The “NetPad” Empowers the Digitalization of Mathematics Education: New Tools, Resources, and Applications for Internet+Dynamic Mathematics

Chenyun Yang[1], Hao Guan[1], Guannan Wu[2]

1. Jingzhong Institute of Dynamic Mathematics

2. Tongxiang Puyuan Tongxing School

China will deepen the implementation of the strategic action of education digitization, and take new steps in the construction of a learning society and a learning country through education digitization. "NetPad" is an intelligent and dynamic mathematics education software that adapts to the new trend and new needs of education informatization and digitalization under the mobile Internet environment in China. Its disciplinary tools are characterized by a complete drawing environment, automatic adaptation to various device resolutions, flexible interaction, and rich drawing tools. On this basis, combined with the characteristics of Chinese mathematics education, innovative digital resources form, construction of mathematical experimental resources and courses, the formation of high-quality digital educational resources and sharing mechanisms and platforms, change the traditional digital resources application and supply mode. Finally, taking Tongxing School in Puyuan, Tongxiang, Zhejiang Province as an example, it introduces the practical experience of carrying out the construction and application of school-based mathematics laboratory and mathematics experimental curriculum in schools based on the NetPad.

Keywords: NetPad; Dynamic mathematics; Educational digital resources; Mathematical experiments

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Yuan, Mingqian	Guangdong University of Education	China
Yuan, Xiaolin	East China Normal University	China
Zeng, Ting	East China Normal University	China
Zhai, Wenjuan	Xijie Primary School, Nanjing	China
Zhang, Chuyu	East China Normal University	China
Zhang, Dongdong	Hangzhou Yungu School	China
Zhang, Fenghua	East China Normal University	China
Zhang, Guangchao	East China Normal University	China
Zhang, Hao	Zhejiang Normal University	China
Zhang, Haoyu	Nanjing Normal University	China
Zhang, Jianxiong	Ningbo Shuguang Middle School	China
Zhang, Jinjun	No.1 Middle School of Macheng Hubei	China
Zhang, Qiaoping	The Education University of Hong Kong	China (Hong Kong)
Zhang, Ruiqi	East China Normal University	China
Zhang, Runyu	East China Normal University	China
Zhang, Tianyi	East China Normal University	China
Zhang, Weiping	Shanghai Normal University	China
Zhang, Wenqing	East China Normal University	China
Zhang, Xiaohui	Zhengzhou Normal University	China
Zhang, Yanbin	Shanghai Normal University	China
Zhang, Ying	The University of Hong Kong	China (Hong Kong)
Zhang, Yong	Yunnan Normal University	China
Zhang, Yue	Northeast Normal University	China
Zhang, Yunji	Shanghai Normal University	China
Zhao, Dongchen	Harbin Normal University	China
Zhao, Hui	East China Normal University	China
Zhao, Jiayi	East China Normal University	China
Zhao, Li	Changchun Normal University	China
Zhao, Qianhui	East China Normal University	China
Zhao, Wenmin	Guangdong University of Education	China
Zhao, Xiaoyan	Nanjing Normal University	China
Zhao, Yan	East China Normal University	China
Zhao, Zhedong	East China Normal University	China
Zheng, Cunpu	East China Normal University	China
Zheng, Wenxun	East China Normal University	China
Zheng, Xin	Jimei University	China
Zheng, Xuan	Teaching and Research Office, Jiangbei District Bureau of Education, Ningbo, Zhejiang, China	China
Zheng, Yuexing	Shanghai Huayao Baoshan Experimental School	China
Zhong, Huan	Nanjing Normal University	China
Zhou, Da	Northeast Normal University	China
Zhou, Guodong	East China Normal University	China
Zhou, Jiayi	East China Normal University	China

Name	Affiliation	Country/Region
Zhou, Xiaokai	East China Normal University	China
Zhou, Yue	East China Normal University	China
Zhu, Aijia	East China Normal University	China
Zhu, Chenfei	Nanjing Normal University	China
Zhu, Fangchun	Shanghai Jianqiao University	China
Zhu, Huiling	Zhejiang Normal University	China
Zhu, Jiawen	Shanghai Normal University	China
Zhu, Junzhu	East China Normal University	China
Zhu, Yan	East China Normal University	China
Zhu, Yixuan	East China Normal University	China
Zuo, Haode	Yangzhou University	China
Zuo, Siyu	Beijing Normal University	China

举办单位简介

主办单位简介

亚洲数学教育中心: 全称华东师范大学亚洲数学教育中心 (Asian Centre for Mathematics Education，简称 ACME)，于 2018 年 10 月在上海成立，由华东师范大学数学科学学院创办，位于闵行校区。亚洲数学教育中心的愿景是成为一个世界级的数学教育研究和发展机构，目标是为中国、亚洲和世界的数学教育和教育事业的发展做出贡献。

亚洲数学教育中心自成立起就致力于促进数学教育及相关领域的发展，为成为一个世界级的数学教育研究和发展机构而砥砺奋进。自成立以来，中心在在科学研究、人才培养、学术交流、实践创新等多方面努力开拓进取，取得了丰硕成果。中心积极开展与国内外数学教育研究者的合作与交流，先后邀请了海内外近百名数学教育专家、学者进行学术报告，举办/参与了数场国内外学术会议。中心也承担了多项省部级、校级教育课题和教学改革项目，取得了很多成果。中心成员在本专业领域高质量期刊和重要国际学术会议上发表论文几十余篇，其中多篇论文发表在 *ZDM—Mathematics Education* 等国际著名研究刊物上，受到了国内外数学教育研究者的广泛关注。由亚洲数学教育中心创办的英文版《亚洲数学教育学刊》（*Asian Journal for Mathematics Education*，简称 *AJME*）是亚洲首个与世界一流学术出版社合作出版的数学教育研究期刊，编委会成员由二十多位国际著名学者组成，作者和审稿者也来自世界各国，在很多方面具有开创性的意义。

协办单位简介

上海市“立德树人”数学教育教学研究基地（华东师大）——全称上海高校“立德树人”人文社会科学重点研究基地——上海数学教育教学研究基地（华东师范大学），是由上海市教育委员会和华东师范大学共同建设，位于华东师范大学闵行校区数学科学学院。基地的建设目的在于搭建高等教育和基础教育之间交流、服务的沟通桥梁，进一步推动高校为基础教育改革提供必要的智力支持，为数学教育改革做出应有的贡献。

上海市核心数学与实践重点实验室围绕《国家中长期科学和技术发展规划纲要》确定的优先发展领域“核心数学及其在交叉领域的应用”，对核心数学中的若干重要问题开展研究。实验室以核心数学的研究作为实验室课题的立足点，发挥实验室在代数几何与低维拓扑研究方面的优势，联合上海市多方面的力量，推动核心数学中几个密切相关的重要方向的发展。

Organizers

Main Organizer

The Asian Centre for Mathematics Education (ACME) of East China Normal University (ECNU) was founded in October 2018 by the School of Mathematical Sciences, East China Normal University (ECNU). It is located in the Minhang Campus of ECNU, Shanghai. ACME's vision is to become a world-class institute of mathematics education research and development, and its mission is to contribute to the advancement of mathematics education research and development in China, Asia and the World.

Since its inception, ACME has aimed to contribute to the advancement of mathematics education and related fields, with a vision to become a world-class institute of mathematics education research and development. The centre has made great efforts in scientific research, talent cultivation, academic exchange, and practice innovation. Being actively engaged in dialogues with researchers around the world, we have invited nearly 100 mathematics education experts at home and abroad to ACME to offer lectures and presentations, organized and involved in a lot of academic conferences.

ACME has also undertaken various research projects at different levels and achieved fruitful results. Our members have published dozens of papers in reputable research journals in mathematics education, including internationally renowned research journals such as *ZDM—Mathematics Education*. Some of the centre's research publications have received wide attention from mathematics educators internationally. The centre has successfully launched the new journal, *Asian Journal for Mathematics Education*, which is regarded as the first mathematics education research journal published in Asia in cooperation with one of the top academic publishers in the world.

Co-organizers

The **Shanghai "Nurturing Character and Developing People" School Mathematics Education Research Base (ECNU)**, whose full name is the Shanghai University's "Nurturing Character and Developing People" Key Research Base for Humanities and Social Sciences: The Shanghai School Mathematics Education Research Base (East China Normal Uninversity), is jointly constructed by the Shanghai Education Commission and East China Normal University. It is located in the School of Mathematical Sciences, East China Normal University. The purpose of the construction of the base is to build a bridge for communication and service between tertiary education and basic education, further promote universities to provide necessary intellectual support for basic education reform and make contributions to mathematics education reform.

The **Shanghai Key Laboratory of Core Mathematics and Mathematical Practice** researches several important issues in core mathematics, focusing on the priority development field "core mathematics and its applications in cross-disciplinary fields" identified in the "National Program for Medium-to-Long-Term Scientific and Technological Development". The laboratory takes the research of core mathematics as its foothold, plays its advantages in algebraic geometry and low dimensional topology research, and collaborates with various forces in Shanghai to promote the development of several closely related important directions in core mathematics.

华东师范大学数学科学学院简介

华东师范大学数学科学学院是我国具有重要影响的数学研究基地、人才培养基地和国家公费师范生培养基地。2017 年，数学学科入选国家“一流学科”建设计划。近年来，在国际权威的 ESI 全球学科排名中，她位于全球数学学科排名的前百分之一，在国内名列前茅，在最近的一轮评估中被评为优秀学科。她拥有国家数学学科一级博士点和数学教育博士点，数学博士后流动站，国家理科基础科学人才培养和科学研究基地，上海市核心数学与实践重点实验室，上海市首批“海外高层次人才创新创业基地”和若干个数学专门研究中心。学院根据数学学科的特点和未来发展需求，下设六个系：基础数学系、应用数学系、数学教育系、数据数学系、智能数学系和金融数学系。

数学学科拥有最为悠久的历史，积淀了深厚的底蕴，取得了辉煌的成就。她成立于 1896 年，在新中国成立时拥有 4 名国家二级教授，改革开放以来培养和吸引了一批优秀的留学归国数学家，包括顶级数学家肖刚，顶级数学教育学家范良火，数学奥林匹克国家队总教练熊斌等。另外，有 11 名教授入选国家级领军人才计划，6 名青年学者入选国家级青年人才计划。目前，学院拥有一支以多位国际著名数学家、数学教育家为领军人物，以中青年骨干数学家为主体的科研、教学队伍。

数学科学学院的人才培养成绩卓著，培养了一批杰出的科学家和数学家，包括中国科学院院士胡和生、席南华，美国工程院院士著名物理学家程正迪，国际著名的“中国邮递员问题”开创者管梅谷，全国首批博士王建磐，被誉为

“代数几何白马王子”的天才数学家肖刚，以及解决著名数学难题的郁星星等活跃在国际、国内一流大学的数学家。

数学科学学院还培养了一大批教育学家、企业家和金融人士，成为数学多样化复合人才培养的成功典范。比如致力于推广数学文化和智慧数学的四季教育集团创始人田培庆，多位杰出金融人士，多家人工智能与大数据研究机构和企业的创办人等等。他们在各自领域，为国家做出重大贡献，所取得的成就让数学科学学院熠熠生辉。学院正在承担多项数学教育、人工智能和大数据的重大项目，完成了国家重大建设项目洋山港无人码头智能系统的设计，将主办“第十四届国际数学教育大会”等。

学院已经形成了一套完善的本科培养体系。除了基础课程、核心课程和丰富的专业选修课之外，我们还依托优质师资力量，建立了一系列富有特色的数学荣誉课程，让学生提前感受现代数学研究和应用的乐趣；我们为拔尖人才培养提供特殊支持，打通了本科生和研究生的课程学习通道，鼓励优秀的本科生提前进行研究生阶段的课程学习；作为“国家理科基础科学人才培养和科学研究基地”，学院为所有学生提供参与各类科研活动的机会和平台；我们重视本科生创新能力的培养，学生已在国际和全国各类数学竞赛、数模竞赛中捧杯夺奖。在课堂学习之外，学院致力于数学文化的研究和推广，以话剧为载体，把数学从单纯的逻辑演绎推理中解放出来，肯定数学作为文化存在的价值，帮助更多的学生培养对数学的兴趣，让更多的人了解数学、了解数学文化。学院为一切优秀学生创造去美国、德国、澳大利亚、新西兰等国外知名高校以及港澳台和国内其他高校交流学习的机会。

（来源：https://math.ecnu.edu.cn/introduction01.html）

East China Normal University

School of Mathematical Sciences

The School of Mathematical Sciences of ECNU is an influential base for mathematics research, talent cultivation, and professional mathematics teacher education. In 2017, the mathematics subject was selected as a national "first-level discipline" construction plan. In recent years, the mathematics discipline ranked top 1% in the world-renowned ESI Ranking. She has a first-level doctoral program in the national mathematics discipline and a doctoral program in mathematics education, a mobile postdoctoral station in mathematics, a national base in science for cultivating talents and conducting research, a key laboratory for core mathematics and practice in Shanghai, the first batch of "overseas high-level talent innovation and entrepreneurship bases" in Shanghai, and several specialized research centres in mathematics.

The school has six departments based on the characteristics and future development needs of the mathematics discipline: Basic Mathematics, Applied Mathematics, Mathematics Education, Data Mathematics, Intelligent Mathematics and Financial Mathematics. The school has a very long history, which has accumulated a profound foundation and has achieved brilliant achievements. Outstanding achievements have been made in talent cultivation, and a group of outstanding scientists and mathematicians, a large number of educators, entrepreneurs as well as financial professionals were cultivated. It is really a successful example of diversified and composite talent cultivation in mathematics.

华东师范大学简介

华东师范大学是由国家举办、教育部主管，教育部与上海市人民政府重点共建的综合性研究型大学。学校成立于 1951 年 10 月 16 日，是以大夏大学（1924 年）、光华大学（1925 年）为基础，同时调进圣约翰大学、复旦大学、同济大学和浙江大学等高校的部分系科，在大夏大学原址上创办的。1959 年学校被中共中央确定为全国 16 所重点院校之一。1972 年学校与上海师范学院、上海体育学院等院校合并，改名上海师范大学。1978 年学校再次被确认为全国重点大学。1980 年学校恢复华东师范大学校名。1986 年学校被国务院批准成为设立研究生院的 33 所高等院校之一。1996 年被列入“211 工程”国家重点建设大学行列。1997-1998 年，上海幼儿师范高等专科学校、上海教育学院和上海第二教育学院等先后并入。2002 年根据上海市高校布局结构调整的战略部署，学校启动闵行校区规划建设，并于 2006 年主体搬迁到闵行校区，形成了“一校两区、联动发展”的办学格局。2006 年教育部和上海市决定重点共建华东师范大学，学校进入国家“985 工程”高校行列。2017 年学校进入国家“世界一流大学”建设高校 A 类行列，全面开启扎根中国大地建设一流大学的新征程。

立德树人，攀高行远。作为新中国成立后组建的第一所社会主义师范大学，学校始终秉承“智慧的创获，品性的陶熔，民族和社会的发展”这一崇高大学理想，恪守“求实创造，为人师表”的校训精神，全面深入贯彻党的教育方针和各项决策部署，落实立德树人根本任务，为党育人、为国育才，按照学校第十四次党代会精神、“十四五”发展规划和新一轮“双一流”建设方案确定的建设目标路径，锚定卓越航标，践行“育人、文明、发展”使命，坚定不移全面从严治党，以推动更高质量发展为主题，以推进“三大卓越工程”（卓越育人工程、卓越学术工程、卓越服务工程）为重点，以“五个一流行动计划”（一流学科生态构筑计划、一流人才队伍引育计划、一流对外开放提质计划、一流治理能力提升计划、一流保障服务支撑计划）为支撑，构建卓越育人、卓越学术、卓越服务融通共进的新发展格局，加快建设引领育人创新的中国特色世界一流大学，为“建

教育强国”和“以教育强国”的光荣事业做出持续性贡献，为中华民族伟大复兴和人类文明进步做出历史性贡献！

学校目前设有 4 个学部、33 个学院（系），包括 3 个国家（全国）重点实验室在内的 22 个校管科研平台，另设有 3 个书院。现有博士学位授权一级学科 36 个，硕士学位授权一级学科 37 个，硕士学位授权二级学科 3 个，硕士专业学位类别 31 个，博士专业学位类别 4 个，博士后科研流动站 26 个。本科专业总数 85 个，涵盖文学、历史学、哲学、教育学、经济学、理学、工学、管理学、法学、艺术学、医学等 11 大学科门类。拥有教育学、生态学、统计学 3 个国家“双一流”建设学科，6 个上海市高峰学科（I 类：教育学、世界史，II 类：地理学、统计学，IV 类：岛屿大气与生态、智能教育），第五轮学科评估中 40%参评学科获评 A 类学科。在历年评选中还曾获 2 个国家一级重点学科，5 个国家二级重点学科、5 个国家重点培育学科，12 个上海市重点学科和 17 个上海市一流学科（A 类 4 个，B 类 13 个）。

学校现有教职工 4,297 人，其中专任教师 2,378 人。教授及其他高级职称教师 2,143 人，其中含中国科学院和中国工程院院士（含双聘院士）23 人，国家级及上海市人才计划入选者 700 人次。在校全日制本科生 15,799 人；在校博士研究生 4,242 人，硕士研究生 18,031 人；在校留学生（学历生）1,495 人。学校主要校区为闵行校区（地址为上海市东川路 500 号）和普陀校区（地址为上海市中山北路 3663 号），校园占地总面积约 207 公顷。

学校理工科建有 3 个国家（全国）重点实验室，1 个国家工程技术研究中心，1 个国家野外科学观测研究站，1 个国家级国际联合研究中心，9 个教育部重点实验室和工程研究中心，1 个教育部国际合作联合实验室，1 个教育部战略研究基地和高等学校软科学研究基地，1 个教育部野外科学观测研究站，1 个民政部研究中心，1 个国家新闻出版署重点实验室，2 个自然资源部重点实验室和工程技术创新中心，12 个上海市重点实验室和工程技术研究中心，1 个上海市工程研究中心，1 个上海市野外科学观测研究站，1 个上海市软科学研究基地，1 个上海市协同创新中心，2 个上海市前沿科学研究基地；学校文科拥有 6 个教育部

人文社会科学重点研究基地，1 个教育部哲学社会科学实验室（培育），2 个国家教材建设重点研究基地，1 个四部委铸牢中华民族共同体意识研究基地，6 个教育部国别和区域研究中心，2 个国家智能社会治理实验基地，1 个全国普通高校中华优秀传统文化传承基地，1 个中国老龄协会老龄科研基地，1 家国家新闻出版署出版智库（培育），7 个上海市社科创新基地（含 1 个上海市重点智库），6 个上海市人民政府决策咨询研究基地工作室，4 个上海高校智库，10 个上海高校“立德树人”人文社会科学重点研究基地，1 个上海高校中华优秀传统文化基地。现有基础学科拔尖学生培养计划 2.0 基地 10 个，国家级实验教学示范中心 2 个，国家级虚拟仿真实验教学中心 1 个，上海市实验教学示范中心 9 个。学校主办、承办和合办各类中文期刊 24 种、英文期刊 7 种。学校拥有实体馆藏文献总量 530.67 万余册、各类电子文献数据库 176 个（485 个子库）。学校积极对接、主动服务和融入国家战略。教育集团以“卓越”为引领打造基础教育示范校、示范区，现有自办与合作举办的附属中小学、幼儿园共 68 所（正式招生办学）。学校继续教育坚持管办分离，探索培育高品质非学历教育项目，注重推进内涵式发展，统筹提升社会效能和经济效能。

学校注重国际合作交流，先后与里昂高师等法国三所高等师范学院、美国纽约大学、弗吉尼亚大学、加拿大不列颠哥伦比亚大学、俄罗斯莫斯科罗蒙诺索夫国立大学、俄罗斯高等经济大学、澳大利亚昆士兰大学、日本东京大学等世界著名大学建立了紧密合作关系，与世界 300 余所高校和科研机构签订了学术合作与交流协议。与里昂高师等法国三所高等师范学院成立中法联合研究生院；与法国里昂高师和法国国家科学研究中心成立中法社会与科学联合研究院；与美国纽约大学联合创办的上海纽约大学，是第一所具有独立法人资格的中美合作创办的大学；与法国里昂商学院合作共建亚欧商学院；与以色列海法大学合作共建转化科学与技术联合研究院；与加拿大阿尔伯塔大学共建先进科学与技术联合研究院。学校设有国际汉语教师研修基地，作为中方合作院校建设 4 所孔子学院和 2 所独立孔子课堂。

（来源：https://www.ecnu.edu.cn/wzcd/xxgk/xqjj.htm）

East China Normal University

East China Normal University (ECNU) is located in Shanghai---a renowned international metropolis with architectural landmarks that capture the eye with new aesthetic designs. The architectural designs are emblematic of the skyline over the city, revealing a nurturing culture of people and an abundance of resources for boosting the city.

Founded in Shanghai in October 1951, ECNU is one of the prestigious universities in China. In 2017, ECNU was selected as one of the Category A universities in China's Double First-Class University Program, a higher education initiative launched by the Ministry of Education aiming to develop elite Chinese universities into world class institutions by the end of 2050.

ECNU, with a total area of more than 207 hectares, has long been known as a Garden University. This is because the university has two campuses, located in Minhang and Putuo districts of Shanghai, that are both full of unique nature and beauty.

Adhering to the strategy of "Interdisciplinary, Internationalization and Informatization", the "Three Programs" – "Developing education excellence, Promoting interdisciplinary academic excellence, and Serving national strategies", and the mission - "Education, Civilization, Development", ECNU has made tremendous achievements in talent training, scientific research, community service, and international exchanges in the recent decades.

ECNU's motto is: "Seek Truth, Foster Originality, and Live up to the Name of a Teacher", with a mission to foster " Creativity, Character, Community". Today, ECNU is striving to transform itself into a world-class university, with a number of first-class disciplines and well-coordinated discipline programs development. The university also intends to lead in the development of China's teacher education, part of its faculty of education.

(Source: https://english.ecnu.edu.cn/About/Introduction_to_ECNU.htm)

《亚洲数学教育学刊（英文）》简介

由亚洲数学教育中心创办的《亚洲数学教育学刊》（*Asian Journal for Mathematics Education*，简称 *AJME*）是一个经同行评议，且以英文出版的、开放获取的学术期刊。该刊的创办筹备工作由华东师范大学数学科学学院、亚洲数学教育中心承担，中心主任范良火教授担任创刊主编，来自世界各国的二十多位著名学者组成编委会。

AJME 发表针对关于数学教育各个领域的高质量原创性研究和学术论文，包括（但不限于）：数学的教与学；数学课程与教材研究；数学教师教育与专业发展；数学教育的国际与比较研究；现代技术在数学教育中的应用。该刊致力于促进亚洲及世界数学教育研究、理论与实践的进步。

该期刊包含在以下摘要和索引数据库中：CROSSREF、Directory of Open Access Journals (DOAJ)、Norwegian Register for Scientific Journals, NSD (Norway)、ROAD、Sherpa Romeo 和 The KEPERS。

出版社：SAGE

第一期出版时间：2022 年 3 月

AJME Platform：https://journals.sagepub.com/home/mea

官网地址：https://uk.sagepub.com/en-gb/asi/asian-journal-for-mathematics-education/journal203738

投稿链接：https://mc.manuscriptcentral.com/mea

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AJME 网站二维码

Asian Journal for Mathematics Education

Asian Journal for Mathematics Education (*AJME*) a peer-reviewed open access journal published in English. The mission of the journal is to contribute to the advancement of mathematics education research, theory and practice in Asia and, more generally, the world. The journal seeks to publish high-quality original research and scholarly articles focusing on various areas/topics in mathematics education including, but not limited to, as follows:

- Mathematics teaching and learning
- Mathematics curriculum and textbook research
- Mathematics teacher education and professional development
- International and comparative studies on mathematics education
- Use of modern technology in mathematics education
- Cross-disciplinary research involving mathematics education (e.g., STEM education with mathematics as one of the subjects)

The journal welcomes manuscripts based on methodologically sound empirical studies, as well as high-quality scholarly articles including literature review papers in mathematics education. In principle, all the manuscripts submitted to the journal are expected to have specific relevance for Asia or general significance for the world in mathematics education. The journal particularly encourages submissions from authors in Asia, but equally welcomes submission from other regions of the world.

The journal is included in the following abstracting and indexing databases: CROSSREF, Directory of Open Access Journals (DOAJ), Norwegian Register for Scientific Journals, NSD (Norway), ROAD, Sherpa Romeo and THE KEEPERS.

Publisher: SAGE

First issue: March 2022

AJME Platform：https://journals.sagepub.com/home/mea

Website: https://uk.sagepub.com/en-gb/asi/asian-journal-for-mathematics-education/journal203738

Submission site：https://mc.manuscriptcentral.com/mea

Email: ajme@math.ecnu.edu.cn

QR Code for *AJME* Website:

有关展览（单位）简介

（Exhibitors & Exhibitions）

展览单位 1：高等教育出版社（Higher Education Press）

高等教育出版社简介

高等教育出版社（以下简称高教社）是新中国最早设立的专业教育出版机构之一，社名由邓小平同志题写。高教社拥有全国文化名家暨“四个一批”人才、全国新闻出版行业领军人才、韬奋出版奖获得者、中国出版政府奖获得者等一批行业领军人才。年出版图书万余种，发行量超过 1.5 亿册。

高教社以出版普通高等教育、职业教育、继续教育等教育类和专业学术类出版物为主的大型综合性出版社，业务体系涵盖教育出版、学术出版、在线教育与服务，产品覆盖图书、音像制品、电子出版物、网络出版物、期刊、数字化教学平台及服务、教师培训等形态。曾获得中国出版政府奖、中华优秀出版物奖、“五个一工程”奖、全国教材建设奖、国家级教学成果奖、国家科学技术进步奖等重要奖项，被评为“全国优秀出版社”“中国出版政府奖先进出版单位”“全国百佳图书出版单位”，是唯一获得“世界知识产权组织创意金奖——单位奖”、唯一入围全球 50 强的中国单体出版机构。综合实力处于中国出版行业领先地位，具有广泛知名度和国际影响力。

高教社数学分社，是最早成立的编辑室。多年来，名家名作荟萃，苏步青、丁石孙、樊映川、江泽坚等老一辈数学家的经典之作为数学教育的发展，奠定了稳固的基础。数学分社与中国高等教育学会教学研究分会、全国高等学校教学研究中心、教育部高等学校数学与统计学相关教学指导委员会、中国数学会、中国工业与应用数学学会密切合作，如“苏步青应用数学奖”赞助、“全国大学生数学建模竞赛”赞助等等。为数学人才培养实践，提高数学教育教学质量、数学课程教学改革的思考、探索与实践等，做出了积极的贡献。

展览单位 2：华东师范大学出版社（East China Normal University Press）

关于华东师大出版社

华东师范大学出版社创建于 1957 年，秉承大夏大学的人文精神，依托华东师范大学深厚的学术底蕴，形成了以“大教育”为出版宗旨的综合性出版特色。出版物主要由教材、学术著作、社会读物构成。

出版社在印刷类图书出版、电子音像出版、数字网络出版多方位布局，产品覆盖 K12 教育、高等教育、职业教育、教育学、心理学、人文社科等领域。

出版社始终坚持为教育和学术服务，注重出版物的高质量和品牌打造，并作为国家文化出口重点企业，致力于讲好中国教育故事。努力打造中国教育理论和心理类图书领域领先品牌。

出版社目前已和世界各地 500 余家出版机构建立了合作关系，出版物已翻译成 32 种语言，远销 45 个国家和地区。

关于上海数学项目

上海数学项目包括 1 年级至 11 年级的练习册，完全覆盖了英格兰课程目标。每年级的练习册均包含分级的算术练习，以及对关键概念的多样化练习和总结性评估，为学生提供智能化的练习和巩固，促进深度学习并培养高阶思维能力。

这是柯林斯（Collins）与华东师范大学出版社有限公司合作的项目，旨在为英格兰定制后者的畅销数学课程《一课一练》，借助一支由专家作者和审阅者组成的团队。这个精心设计的课程在过去的 24 年里不断完善，意味着教师和学生们已经通过实践对这些教材进行了验证。上海数学项目中添加了一些新的材料，但保留了原始资源的结构，并尽可能保留了大部分原始材料。

应注意，上海数学项目与华东师大出版社所出版的一课一练另一个英文版本—— “上海英文版”是有所区别的：后者是中文版《一课一练》的直接翻译版本，基于上海数学课标，适合母语为中文的使用者。

About East China Normal University Press

Founded in 1957, East China Normal University Press (ECNUP), inheriting the humanistic spirit of East China Normal University and relying on its profound academic heritage, has developed a comprehensive publishing characteristic with the

aim of "promoting education". Its publications mainly consist of textbooks, academic works, general interest books and so on.

ECNUP has diversified its portfolios in various aspects of book publishing, electronic audio-visual publishing, and digital publishing covering K12 education, higher education, vocational education, padagogy, psychology, humanities and social sciences, and more.

ECNUP is devoted to serving education and academia, emphasizing high-quality publications and brand building, and telling the story of Chinese education as a key cultural export enterprise of China. It strives to create a leading brand in the fields of educational theory and psychology books.

It has established cooperation with more than 500 publishing institutions around the world, and its publications have been translated into 36 languages and sold in 49 countries and regions.

About The Shanghai Maths Project

The Shanghai Maths Project series consists of practice books for years 1–11, providing complete coverage of the curriculum objectives for England. With graded arithmetic exercises plus varied practice of key concepts and summative assessments for each year, each practice book offers intelligent practice and consolidation to promote deep learning and develop higher order thinking.

It is a collaboration between Collins and East China Normal University Press Ltd. to adapt its bestselling maths programme “One Lesson, One Exercise”(OLOE) for England, using an expert team of authors and reviewers. This carefully crafted programme has been continually refined over the last 24 years, meaning that the materials have been tried and tested by teachers and children alike. Some new material has been written for The Shanghai Maths Project but the structure of the original resource has been preserved and as much original material retained as possible.

It should be noted that The Shanghai Maths Project is different from OLOE Shanghai English Edition published by ECNUP: the latter is a direct translation of the Chinese version of OLOE, based on the Shanghai maths curriculum, and is suitable for users whose native language is Chinese.

展览单位 3：上海民办华曜宝山实验学校（Shanghai Huayao Baoshan Experimental School）

数学与美学的交融

——上海民办华曜宝山实验学校学生拓展性作业展

我们的教育在学生的身上究竟留下什么痕迹？过滤掉学科知识和应试技巧，能够沉淀下来在学生的生命中持续发挥作用的才是教育的精华。我们推行以问题驱动为特征的课堂教学和课外拓展，极大地促进了学生的思维发展。

我们的课堂教学和课外拓展是在学校的智慧学习体系框架下实施的（在此次研讨会的平行论坛中将有介绍）。

怎样才能让学生有独特的见解呢？首先想到的是数形结合。我们要求学生绘制一幅美丽的图案，然后用数学语言来描述这幅图案。绘制图案可以有多种方式，也可以应用数学中的对称、旋转、伸缩等手段。描述可以有多种路径，可以计算图案的面积和周长，也可以用函数解析式精确刻画图像。这种数学与美学的交融给学生提供了自由拓展、发挥的空间。

我们在初中四个年级都设计了数学开放性作业，所有学生都参与其中。这批开放性作业，彰显了学生犀利的观察能力，缜密的思考能力，不俗的审美能力。这些学生的作品，具有独特性、奇异性和不可替代性的，也将成为他们童年时代最深刻、最美好的记忆。

数学是理性的，美学是感性的，数学与美学的交融会如此美妙，令人叹为观止！

科学技术的发展对教育提出了新的挑战，我们要面对未来，培养适应社会发展的学生。我们华曜宝山实验学校很高兴在一个微观的领域为中国教育走向现代化做出微薄的贡献。

Integration of Mathematics and Aesthetics: Students' extended assignment in Shanghai Huayao Baoshan Experimental School

What marks does our education leave on students? It is the essence of education that filters out the subject knowledge and exam-taking skills, and can precipitate and

continue to play an important role in students' lives. We promote problem-driven classroom teaching and extracurricular expansion, greatly promoting students' thinking development.

Our classroom teaching and extracurricular expansion are implemented within the framework of the school's smart learning system (which will be introduced in the forum of this seminar).

How can students have unique insights? The first thing that comes to my mind is the combination of numbers and shapes. We require students to draw a beautiful pattern and describe it in mathematical language. There are various ways to draw patterns, and the mathematical methods such as symmetry, rotation, and stretching can also be applied. There are various ways to describe, such as calculating the area and perimeter of the pattern, and accurately depicting the image using functional analysis. This integration of mathematics and aesthetics provides students with a space for free expansion and expression.

We designed open-ended math assignments in all four grades of junior high school, with all students participating. This batch of open-ended assignments demonstrates students' sharp observation ability, meticulous thinking ability, and excellent aesthetic ability. The works of these students, with their uniqueness, singularity, and irreplaceability, will also become the most profound and beautiful memories of their childhood.

Mathematics is rational while aesthetics is emotional, and the integration of them can be so wonderful. It is amazing!

The development of science and technology has posed new challenges to education. We need to face the future and cultivate students to adapt to social development. Huayao Baoshan Experimental School is pleased to make a modest contribution to the modernization of Chinese education.

参展单位 4：上海教育出版社（Shanghai Educational Publishing House）

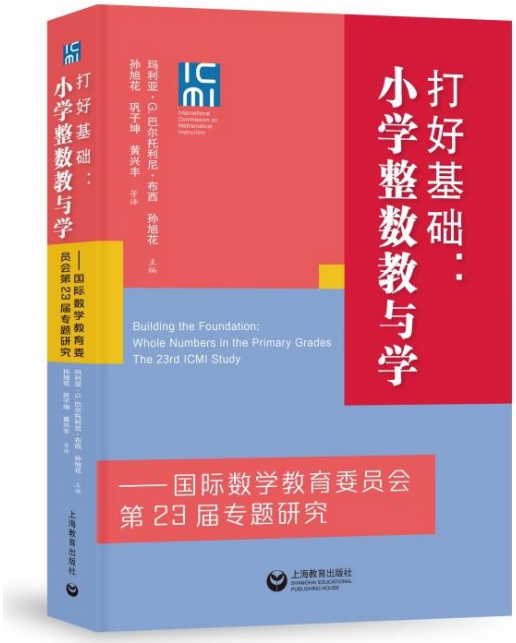
《打好基础：小学整数教与学——国际数学教育委员会第 23 届专题研究》新书发布会

出席嘉宾：梁贯成[1]；范良火[2]；孙旭花[3]；蒋徐巍[4]；李达[4]

1. 香港大学，国际数学教育委员会
2. 华东师范大学亚洲数学教育中心
3. 澳门大学教育学院
4. 上海教育出版社

Building the Foundation：Whole Numbers in the Primary Grades The 23rd ICMI Study 是国际数学教育委员会（ICMI）第 23 届专题研究成果，由 Maria G. Bartolini Bussi 和孙旭花主编，作者来自世界二十多个国家和地区，均是当今学界具有代表性和权威性的专家学者。

ICMI 首次聚焦小学整数教与学专题，发起了一次真正包含五大洲的国际化、高规格、学术性、权威性研究，建立了一幅关于整数算术的真实世界地图，为衡量世界各地的整数算术教学理论和实践提供了综合基础。



本次发布的《打好基础：小学整数教与学——国际数学教育委员会第 23 届专题研究》一书，是 ICMI 首次授权将专题研究系列成果翻译成中文出版！中文版由孙旭花、巩子坤、黄兴丰三位学者领衔翻译，原则上忠于英文原著，保留原汁原味，希望让读者看到世界各地优秀的学者是如何讨论整数算术教与学的。相信本书的出版能够提升国内学者在整数算术教育领域研究的高度与深度。

展览单位 5：上海科技教育出版社（Shanghai Scientific & Technological Education Publishing House Co., Ltd）

上海科技教育出版社简介

上海科技教育出版社 1986 年 9 月成立，2003 年 8 月并入上海世纪出版集团，2005 年 11 月转企改制为上海世纪出版股份有限公司科技教育出版社，2017 年 6 月更名为上海科技教育出版社有限公司。主要出版中小学教材、教学用书、科普图书和学术专著，以各类学校的师生和广大科技工作者、科技爱好者为主要服务对象。同时，还出版《中学科技》《上海课程教学研究》《新发现》《中小学班主任》《新会计》《漫旅》等 6 种期刊。

多年来，上海科技教育出版社遵循“愿做科教兴国马前卒”的办社宗旨，在基础教育、科学技术普及和青少年科技活动出版领域辛勤耕耘、开拓创新，形成了品牌和特色，得到业界与读者的褒赞。在基础教育出版领域，开发、出版了高中《信息技术》、高中《物理》、高中《生物学》、小学《书法练习指导》等国家课程新课标教材，出版了《自然》《劳动技术》《品德与社会》等上海基础型课程教材，还开发了中小学《综合实践活动》《技术》等地方课程教材和资源，在首届全国教材建设奖评选中荣获优秀教材一等奖二等奖数项。在科学技术普及出版领域，引进了一大批国外优秀科普图书，形成了颇具影响力的科学人文图书品牌——“哲人石丛书”，推出了诸多原创科普精品和学术专著，在中国出版政府奖图书奖（含提名奖）、中华优秀出版物（图书）奖、“三个一百”原创出版工程等国家级图书评奖和省部级优秀图书评选中屡获殊荣。在青少年科技活动出版领域，依靠期刊不断推动科技创新活动的开展和科学知识的普及，与时俱进服务于学生和教师。

1993 年至今，上海科技教育出版社连续 14 次被评为“上海市文明单位”。

About Shanghai Scientific & Technological Education Publishing House Co., Ltd

Shanghai Scientific and Technological Education Publishing House Co. Ltd. (SSTE) is a nation-wide press specialized in the field of education of science and technology. We mainly publish books related to scientific, technological and vocational education, as well as popular science books. We sincerely serve teachers and students from all kinds of schools, along with scientists and lovers of science.

SSTE was established in 1986. Until now we have published more than 9000 different books, of which more than 500 have won awards in a variety of contests. Since During 1993-2022, SSTE was conferred the title of Shanghai Civilization Unit for 13 times successively.

SSTE has the following editorial departments: The Comprehensive Education Department, The Technological Education Department and The Scientific Education Department mainly publish teaching materials and reference books for students as its publishing focus. The Science Department and The Children's Readings Department mainly engaged in the publication of professional science books, science culture books and popular science books (including hundreds of books translated from other languages), as well as reading materials for children. The Medical Books Department is mainly involved in publishing all kinds of books about medicine. The Education Assistant Readings Department mainly publishes guidance materials and exercise books associated with courses in primary and middle school. The Rights Department undertakes rights trade activities. The Magazine Centre is in charge of the publication of 6 periodicals: *Middle School Science and Technology*, *Science and Vie*, *Easy PC*, *The Digital World*, *New Findings and Shanghai Curriculum and Teaching Research*.

展览单位 6：浙江教育出版社（Zhejiang Education Publishing House）

浙江教育出版社简介

浙江教育出版社成立于 1983 年，是一家地方教育专业出版社，出版各类教材及配套课程资源、教育学著作、心理学著作、大众读物和青少年读物。

浙教版《数学》（7-9 年级）教科书基于课程标准编写，作者团队在数学教育领域深耕多年、论著丰富。该套教材注重数学学科的整体性，着眼思维能力的培养，聚焦学习过程和问题解决，力求提升学生发现问题和解决问题的能力，为学生的终身学习和可持续发展奠基。

浙教版《数学》（1-6 年级）实验教科书长期的实验研究作为基础，在内容结构设置、活动环节设计、素材选取与习题配置方面锐意创新，结构上注重知识点的联系和综合运用，过程上注重情境创设和自主学习，结果上注重难度分层和多途径解决问题，构建了以开发学生可能性为中心的小数学课程，进而发展学生高层次思维能力。

About Zhejiang Education Publishing House

Founded in 1983, Zhejiang Education Publishing House is a specialized educational publisher that produces a diverse array of textbooks, curriculum resources, educational and psychological literature, and readings for both the general public and youngsters.

The “Mathematics” textbook series for grades 7 to 9 adheres to curriculum standards and is authored by a team with extensive experience in mathematics education. This series emphasizes the integrity of the mathematics discipline and promotes the development of problem-solving skills and critical thinking. It aims to boost students’ capabilities in problem identification and resolution, thus paving the way for their lifelong learning and sustainable development.

The “Mathematics” textbook series for grades 1 to 6 is based on long-term experimental research. It features innovative designs in content structure, activity arrangement, material selection, and exercise configuration. The series focuses on integrating knowledge points and promoting independent learning through situational creation. It also places emphasis on multi-faceted problem-solving and difficulty stratification. This design cultivates a math curriculum that encourages students’ potentialities and fosters high-level thinking skills.

致谢

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- 上海民办华曜宝山实验学校
- 上海科技教育出版社有限公司
- 《亚洲数学教育学刊》编辑部
- 张奠宙数学教育奖专项基金
- 浙江教育出版社

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我们也感谢所有其他机构和个人为本届研讨会的成功举办提供的各种帮助！

Acknowledgement

Supporting Schools:

- Wellington College International Shanghai
- Shanghai Huayao Baoshan Experimental School
- You Ai Experimental Middle School Affiliated to Minhang Education Institute
- Shanghai Yangjing-Juyuan Experimental School

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- Shanghai Scientific & Technological Education Publishing House Co., Ltd
- ZHANG Dianzhou Mathematics Education Award Foundation
- Zhejiang Education Publishing House

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Zizhen Lin, Feng Liu, Wanglong Lu, Chaohu Luo, Yiwen Ma, Danyang Meng, Haowen Pan, Kang Pan, Pinhao Pan, Yanxing Qi, Qiwei Qian, Han Qiu, Shehryar Rao, Yang Ren, Jiaqi Rong, Qianli Sha, Xiangyu Shen, Mengqi Song, Rui Sun, Qi Tan, Jiali Tang, Xiaohui Wang, Deliang Wei, Jiabi Wen, Linhan Wu, Qiyuan Xue, Binbin Yang, Dunkun Yang, Peixuan Yang, Xiufeng Yao, Xiaolin Yuan, Xiaohe Yue, Aoyue Zhang, Wenqing Zhang, Xue Zhang, Qianhui Zhao, Xiaoxin Zhao, Yan Zhao, Cunpu Zheng, Xiaokai Zhou

We are also grateful to all the other institutions and individual persons who have offered various assistance and help which contributes to the success of this symposium.

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为中国、亚洲和世界的数学教育和教育事业的进步作出贡献

To contribute to the advancement of mathematics education and education of China, Asia and the world

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成为一个世界级的数学教育研究和发展机构

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