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Teachers' perceptions of less successfully organized professional development practices in mathematics: A study of nine secondary schools in Shanghai, China

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Time: 2023.09.27

Journal of Mathematics Teacher Education (2023)



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- **Research questions**
- **Conceptual framework**
- **Methods and procedures**
- **Results**
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- **Background**





Background

- Professional development (PD) for mathematics teachers in China, especially in Shanghai, has received growing international attention over the last three decades (e.g., Chen, 2020; Zhao & Fan, 2022).



- Students' performance from PISA



- Teachers' teaching and learning



- Teachers' professional development





Background

- China has established a unique, hierarchal and institutionalized PD system for in-service teachers, in which **Teaching Research Groups (TRGs)** at the school level and **Teaching Research Offices (TROs)** within the government education bureaus at the county, district, city and provincial levels play a crucial role (e.g., Fan et al., 2015; Huang et al., 2017).
- So far, most available studies about PDs in China have focused on successful sides of the PD practices.
- There has been **no empirical research focusing on less successful PD practices** in China. The present study contributes to filling this gap in research.





Background

- Focusing on less successful sides from teachers' perspectives, the study examines the PD practices that offer a variety of organized learning experiences to in-service teachers in Shanghai in a relatively comprehensive manner.
- We use “**less successful PD**” to refer to the PD practices that do not meet teachers' expectations as perceived by the teachers due to various problems or inadequacies.
- Those PD practices include **in-service training programs, seminars, workshops, conferences and other forms of professional learning activities** organized by specific organizations, **including but not limited to TROs or TRGs**, at different levels for mathematics teachers (Fan, 2014; Sztajn et al., 2017).





- **Research questions**





Research questions

The study is guided by the following research questions:

1. What aspects are **manifested** in less successful professional development practices as perceived by mathematics teachers in Shanghai, China?
2. What are the **underlying reasons** for less successful professional development practices as perceived by mathematics teachers in Shanghai, China?





- **Conceptual framework**





Conceptual framework

- **What** does PD cover?
 - Earlier researchers have identified a number of components or features deemed important for effective PD, among which **content focus and coherence** were commonly emphasized as core features of PD (e.g., Desimone, 2009; Garet et al., 2001).
- **How** is PD delivered?
 - Garet et al. (2001) pointed out that **the forms of activities** may set the context for the substance (content) of the PD activities.
 - Darling-Hammond et al. (2017) identified three features: **active learning, collaboration, and sustained duration.**
- **Who** are involved in PD?
 - The **quality of trainers (or instructors)** is another factor leading to successful or less successful PD. For example, Bayar (2014) found that teachers considered the quality of trainers as a component that influenced the effectiveness of PD.





Conceptual framework

- **Problems and inadequacies** concerning less successful PD

Time conflicts

Inappropriate timing

Lack of incentives

Short duration of the programs

Lack learning opportunities

Lack different forms of activities

Out-of-date forms

Lack of coordination and smooth communication

Disconnected from classroom practices

Lack external supervision and evaluation

Lack of necessary and reasonable assessment

Lack of necessary feedback





Conceptual framework

Table 1 A conceptual framework about different aspects of less successfully organized PD

Aspect	Possible problem/inadequacy
Objective ← Why	Lack of clear objectives; Objectives not specific for the mathematics subject; Aims too high/low
Content ← What	Lack of new contents; Contents too simple/complex; Contents too repetitive; Lack of practicality; Lack of focus and coherence
Organization	Out-of-date forms; Lack of diverse forms; Scale too large; Lack of substance
Way to participate	Limited ways to participate; Passive participation; Inconvenient ways to participate
Time, duration and frequency	Too short/long duration; Inappropriate timing; Too many/few sessions
Assessment and management	Inappropriate/lack of necessary assessment for participants; Inappropriate/lack of necessary management (administration and logistics support)

↑
How



Conceptual framework

Who



- Furthermore, we explored the **underlying reasons** for less successful PD from the dimension of “who”:
 - (1) **organizers**: possible reasons included their plan, coordination of PD and the inappropriate evaluation for them,
 - (2) **trainers**: possible reasons included their understanding of teachers’ needs, practical experience, theoretical knowledge, training experience, preparation and creativity.





- **Methods and procedures**





Methods and procedures

Randomly selected 8 of the 16 districts in Shanghai → 8 high-performing and 8 ordinary schools → 6 high-performing and 3 ordinary schools replied to us and agreed to participate in the study



- Follow-up interviews were conducted with 18 of the participants, with 2 from each school.
- Collected the available relevant documents of the less successful.
- Sent out electronic anonymous questionnaire to all 138 mathematics teachers.
- Collected back 132 valid ones, with a response rate of 95.7%.





Methods and procedures

- Questionnaire (five parts)
 1. **Participants' background information** (district, gender, age, length of teaching experience, professional title, education, frequency of PDs)
 2. **Teachers' satisfaction** of overall and four different levels of PD (school-level, district-level, city-level and country-level).
 3. **Teachers' perceptions of key aspects in less successful PD.**
 4. **Underlying reasons** behind less successful PD.
 5. An **open-ended question** to elicit teachers' suggestions on how to improve the quality of PD.





Methods and procedures

- Interview
 - The semi-structured follow-up interview was designed to gain in-depth information about teachers' less successful PD practices and their perceptions of underlying reasons for those less successful PD practices.
- Relevant documents
 - Teachers' field notes, outlines, syllabus, lecture notes of less successful PD programs.





Methods and procedures

- Validity and reliability

A pilot study → Five teachers from two non-sample schools in Shanghai → Refine the instruments

Table 2 Cronbach's α of each part of the questionnaire

Part	Satisfaction of PD	Objective	Content	Organization	Way to participate	Time, duration & frequency	Assessment & management	Underlying reasons
Cronbach's α	0.95	0.90	0.95	0.94	0.96	0.83	0.88	0.96

- The data collected from the interview were first transcribed verbatim and then coded using the conceptual framework described above.
- To ensure reliability, two researchers coded these transcripts independently. Inconsistencies were discussed until agreement was reached.





Methods and procedures

- Table 3 shows the profile of the participating teachers.

Table 3 Profile of participants ($N=132$)

Teacher profile								School characteristic						
Gender ¹		Educational background ²		Teaching experience ³		Professional title ⁴		Performance ⁵		Type		Location		
M	F	≤Ba	≥Ma	0–5	>5	<Senior	≥Senior	H	O	Public	Private	Urban	Suburban	
N	39	93	108	24	37	95	110	22	103	29	94	38	95	37
%	29.5	70.5	81.8	18.2	28.0	72.0	83.3	16.7	78.0	22.0	71.2	28.8	72.0	28.0

1. M: male; F: female. 2. Ba: bachelor; Ma: master. 3. Years. 4. “<Senior”: junior and intermediate level teachers; “≥Senior”: senior and full-senior level teachers. 5. H: high-performing; O: ordinary





- **Results**





Results—Overall

- An overall picture
- Mathematics teachers in Shanghai participated **rather frequently in school-level and district-level PD** while they rarely attended city- and country-level PD in the past three years.
 - 69.7% of the teachers attended school-level PD at least twice or three times a month and the figure for the district-level PD was 42.4%.
 - In comparison, 62.9% of the teachers had no opportunity or only once to participate in city- or country-level PD.

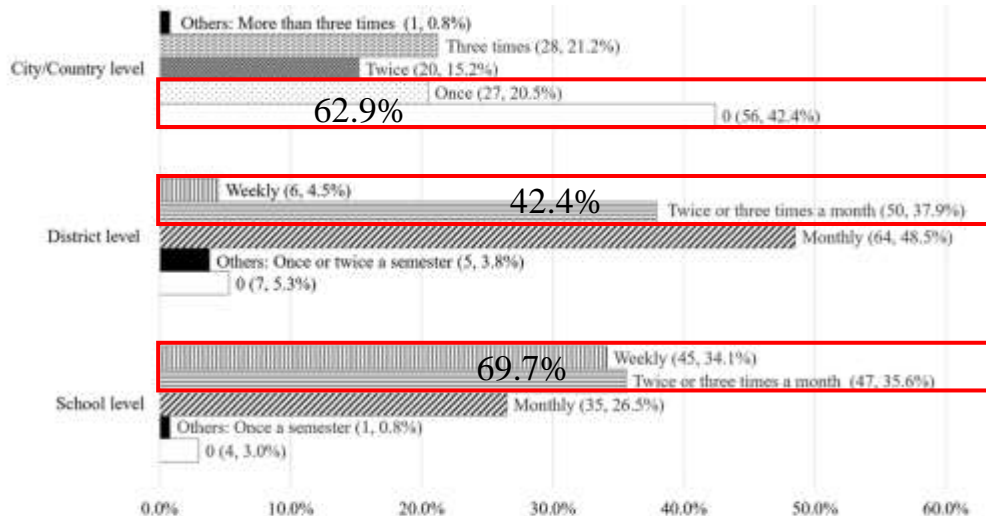


Fig.1 Distribution of frequency of teachers' participation at different levels of PD in the past three years (N = 132)





Results—Overall

- Table 4 shows teachers' satisfaction with different levels of PD, in which teachers were most satisfied with school-level PD ($M = 1.86$, $SD = 1.13$). Teachers were least satisfied with country-level PD ($M = 2.17$, $SD = 1.37$).

Table 4 Teachers' satisfaction of PD practices at different levels

	Highly satisfied (1)	Satisfied (2)	Somewhat satisfied (3)	Somewhat unsatisfied (4)	Unsatisfied (5)	Highly unsatisfied (6)	<i>M</i>	<i>SD</i>
School level ($N=130$)	58	52	10	5	0	5	1.86	1.13
District level ($N=128$)	49	53	11	9	2	4	2.02	1.18
City level ($N=113$)	41	49	8	7	3	5	2.09	1.28
Country level ($N=101$)	36	43	6	6	5	5	2.17	1.37
Overall ($N=132$)	16	78	25	7	1	5	2.35	1.04





Results—Overall

- Overall, 13 (9.8%) of the 132 participants were unsatisfied with the PD they attended ($M = 2.35$, $SD = 1.04$). It should be noted that even if a teacher had an overall positive evaluation on the PD, he/she may have experienced less successful PD due to various problems or inadequacies of the PD.
- 18 interviewees revealed 65 problems/inadequacies that they perceived unsatisfied about school-, district- and city-level PD. 81.5% of them were for the district- and city-level PD.
 - (1) “lack of practical contents” (11 times),
 - (2) “too few sessions” (5 times),
 - (3) “objectives not specific for the mathematics subject” (4 times), “lack of focus and coherence” (4 times) and “lack of substance” (4 times).





Results—Key aspects

- Key aspects of less successful PD practices
- As can be seen from Table 5, in terms of the percentages of selection, the three most unsatisfactory aspects to the teachers were found in “**time, duration and frequency**” of the PD activities they attended (68.9%), followed by “**assessment and management**” (62.1%) and “**objective**” (43.2%).

Table 5 Teachers' perceptions of problems/inadequacies in the unsatisfactory PD aspects identified

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Objective (<i>N</i> =57; 43.2%)	Aims too low (<i>N</i> =49)	19 (38.8%)	30 (61.2%)
	Objectives not specific for the mathematics subject (<i>N</i> =52)	29 (55.8%)	23 (44.2%)
	Aims too high (<i>N</i> =51)	29 (56.9%)	22 (43.1%)
	Lack of clear objectives (<i>N</i> =51)	34 (66.7%)	17 (33.3%)
Content (<i>N</i> =14; 10.6%)	Contents too simple (<i>N</i> =13)	6 (46.2%)	7 (53.8%)
	Contents too complex (<i>N</i> =13)	7 (53.8%)	6 (46.2%)
	Contents too repetitive (<i>N</i> =13)	8 (61.5%)	5 (38.5%)
	Lack of practicality (<i>N</i> =13)	9 (69.2%)	4 (30.8%)
	Lack of new contents (<i>N</i> =13)	10 (76.9%)	3 (23.1%)
	Lack of focus and coherence (<i>N</i> =13)	10 (76.9%)	3 (23.1%)
Organization (<i>N</i> =13; 9.8%)	Scale too large (<i>N</i> =13)	5 (38.5%)	8 (61.5%)
	Lack of diverse forms (<i>N</i> =13)	7 (53.8%)	6 (46.2%)
	Out-of-date forms (<i>N</i> =12)	7 (58.3%)	5 (41.7%)
	Lack of substance (<i>N</i> =13)	8 (61.5%)	5 (38.5%)
Way to participate (<i>N</i> =15; 11.4%)	Limited ways to participate (<i>N</i> =14)	10 (71.4%)	4 (28.6%)
	Passive participation (<i>N</i> =14)	10 (71.4%)	4 (28.6%)
	Inconvenient ways to participate (<i>N</i> =14)	10 (71.4%)	4 (28.6%)
Time, duration and frequency (<i>N</i> =91; 68.9%)	Too short duration (<i>N</i> =82)	28 (34.1%)	54 (65.9%)
	Too many sessions (<i>N</i> =85)	35 (41.2%)	50 (58.8%)
	Too few sessions (<i>N</i> =81)	33 (40.7%)	48 (59.3%)
	Inappropriate timing (<i>N</i> =86)	43 (50.0%)	43 (50.0%)
	Too long duration (<i>N</i> =85)	53 (62.4%)	32 (37.6%)
Assessment and management (<i>N</i> =82; 62.1%)	Lack of necessary assessment for participants (<i>N</i> =76)	39 (51.3%)	37 (48.7%)
	Lack of necessary management (<i>N</i> =75)	39 (52.0%)	36 (48.0%)
	Inappropriate management (<i>N</i> =75)	42 (56.0%)	33 (44.0%)
	Inappropriate assessment for participants (<i>N</i> =75)	48 (64.0%)	27 (36.0%)

1. The figures are aggregated by combining “strongly agree”, “agree” and “somewhat agree”. 2. The figures are aggregated by combining “strongly disagree”, “disagree” and “somewhat disagree”



Results—Key aspects

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Time, duration and frequency (<i>N</i> = 91; 68.9%)	Too short duration (<i>N</i> = 82)	28 (34.1%)	54 (65.9%)
	Too many sessions (<i>N</i> = 85)	35 (41.2%)	50 (58.8%)
	Too few sessions (<i>N</i> = 81)	33 (40.7%)	48 (59.3%)
	Inappropriate timing (<i>N</i> = 86)	43 (50.0%)	43 (50.0%)
	Too long duration (<i>N</i> = 85)	53 (62.4%)	32 (37.6%)

- Regarding the problems about “time, duration and frequency” of the PD activities, most respondents (62.4%) who were unsatisfied with this aspect indicated that the durations of the PD activities they attended were too long.
- T11: “[For the required district-level PD] there were generally a set of online courses, in which I had to watch dozens of course videos online with certain time requirements. But we were not free to watch those videos every day, and then the courses tended to lose their substance. [... As you know] I had lots of work to do. As a teacher [having at least two lessons each day], each lesson takes time (40 min), and we don’t have a complete block of half day time or such a timeslot to watch course videos. [...] Thus, I have to watch these videos when grading students’ assignments.”





Results—Key aspects

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Assessment and management (<i>N</i> = 82; 62.1%)	Lack of necessary assessment for participants (<i>N</i> = 76)	<u>39 (51.3%)</u>	37 (48.7%)
	Lack of necessary management (<i>N</i> = 75)	<u>39 (52.0%)</u>	36 (48.0%)
	Inappropriate management (<i>N</i> = 75)	42 (56.0%)	33 (44.0%)
	Inappropriate assessment for participants (<i>N</i> = 75)	48 (64.0%)	27 (36.0%)

- About the aspect concerning “assessment and management”, the largest percentage of respondents (64.0%) felt that “inappropriate assessment for participants” was a problem.
- In the interview, many teachers pointed out some inappropriate assessments, such as a final paper irrelevant to the PD content (T12), a summary paper of about 1,000 words assigned on the last day of the PD program without any formative assessment (T11).





Results—Key aspects

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Objective (<i>N</i> = 57; 43.2%)	Aims too low (<i>N</i> = 49)	19 (38.8%)	30 (61.2%)
	Objectives not specific for the mathematics subject (<i>N</i> = 52)	<u>29 (55.8%)</u>	23 (44.2%)
	Aims too high (<i>N</i> = 51)	29 (56.9%)	22 (43.1%)
	<u>Lack of clear objectives (<i>N</i> = 51)</u>	<u>34 (66.7%)</u>	17 (33.3%)

- About the problems concerning “objective”, two thirds (66.7%) of the respondents reported that the objectives were unclear.
 - For example, in the same PD seminar on educational research and academic writing (with participants from different school subjects as mentioned by T16), T15 indicated that “the trainer provided rough steps of how to conduct a research project. [...] As interdisciplinary research was popular, at the beginning, we [mathematics teaching team] tried to conduct an interdisciplinary study with the teaching team of physical education. Then we found it too difficult to conduct such [an ambitious] study [without sufficient research experiences, etc]. [...] Finally, we did not continue our project.”





Results—Key aspects

- There were only around 10% of the teachers unsatisfied with the other three aspects: “way to participate” (11.4%), “content” (10.6%) and “organization” (9.8%).

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Content (N=14; 10.6%)	Contents too simple (N=13)	6 (46.2%)	7 (53.8%)
	Contents too complex (N=13)	7 (53.8%)	6 (46.2%)
	Contents too repetitive (N=13)	8 (61.5%)	5 (38.5%)
	Lack of practicality (N=13)	9 (69.2%)	4 (30.8%)
	Lack of new contents (N=13)	10 (76.9%)	3 (23.1%)
	Lack of focus and coherence (N=13)	10 (76.9%)	3 (23.1%)
Organization (N=13; 9.8%)	Scale too large (N=13)	5 (38.5%)	8 (61.5%)
	Lack of diverse forms (N=13)	7 (53.8%)	6 (46.2%)
	Out-of-date forms (N=12)	7 (58.3%)	5 (41.7%)
	Lack of substance (N=13)	8 (61.5%)	5 (38.5%)
Way to participate (N=15; 11.4%)	Limited ways to participate (N=14)	10 (71.4%)	4 (28.6%)
	Passive participation (N=14)	10 (71.4%)	4 (28.6%)
	Inconvenient ways to participate (N=14)	10 (71.4%)	4 (28.6%)

- T17 mentioned that the COVID-19 pandemic limited the ways to participate in the district-level PD activities. For example, before the COVID-19 pandemic, district-level PD practices were usually held in different schools, while during the pandemic, district-level PD practices were generally delivered online. **Moreover, online PD may lead to teachers’ passive participation.** T2 mentioned her passive participation experience in a city-level online PD, saying: “We watched the video of teaching contests, but it is quite different from when we observe the classroom onsite, [as] I could not observe students’ reaction, teachers’ teaching style and had no opportunity to know critiques and discussions between teachers and teaching research fellows [in great detail].”



Results—Key aspects

- T3 shared her experience in a district-level PD about task design (see Fig. 2): “In fact, this online PD is mainly the presentation of several mathematical tasks that teachers designed. However, the PD had no information about the design process and the guidelines for implementing tasks with participants. I still remain confused about how to design tasks by myself.”

Unsatisfactory aspect	Specific problem (inadequacy)	Agree ¹	Disagree ²
Content ($N=14$; 10.6%)	Contents too simple ($N=13$)	6 (46.2%)	7 (53.8%)
	Contents too complex ($N=13$)	7 (53.8%)	6 (46.2%)
	Contents too repetitive ($N=13$)	8 (61.5%)	5 (38.5%)
	Lack of practicality ($N=13$)	9 (69.2%)	4 (30.8%)
	Lack of new contents ($N=13$)	10 (76.9%)	3 (23.1%)
	Lack of focus and coherence ($N=13$)	10 (76.9%)	3 (23.1%)
Organization ($N=13$; 9.8%)	Scale too large ($N=13$)	5 (38.5%)	8 (61.5%)
	Lack of diverse forms ($N=13$)	7 (53.8%)	6 (46.2%)
	Out-of-date forms ($N=12$)	7 (58.3%)	5 (41.7%)
	Lack of substance ($N=13$)	8 (61.5%)	5 (38.5%)
Way to participate ($N=15$; 11.4%)	Limited ways to participate ($N=14$)	10 (71.4%)	4 (28.6%)
	Passive participation ($N=14$)	10 (71.4%)	4 (28.6%)
	Inconvenient ways to participate ($N=14$)	10 (71.4%)	4 (28.6%)

Paper-Cut Homework Z2008

As shown in the figure below, there is an isosceles triangle ABC with $\angle A=36^\circ$, $AB=AC$. Using scissors, cut the triangle into three smaller pieces of paper, so that each smaller piece is an isosceles triangle. Try as many methods as possible. Please use the triangular pieces of paper, draw a diagram and explain it briefly. (If the backup figures are not enough, please add it by yourself)

Diagrams of Paper-Cut

Step 1: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .	Step 2: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .	Step 3: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .
Step 4: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .	Step 5: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .	Step 6: Draw the perpendicular bisector of AB , intersecting AC at a point D . Draw the perpendicular bisector of AD , intersecting AB at a point E . Cut along the line segments BD , DE .

Fig. 2 An example of PD on task design (excerpt from supplementary materials collected in the study)



Results—Teachers' perceptions

- Perceptions of less successful PD between teachers with different demographic features
- The results of chi-square tests revealed that there were **no statistically significant differences** between the distributions of different teachers' dissatisfaction with all the six aspects except the **“time, duration and frequency”** aspect, which was identified as unsatisfactory by a significantly higher proportion of teachers from private schools (81.6%) than from public schools (63.8%, $\chi^2 = 3.891$, $p < .05$).





Results—Teachers' perceptions

- Overall, there were **statistically significant differences** between different groups of teachers in terms of demographic features, but not in terms of school characteristics.

Table 6 Statistical results of different teachers' perceptions of problems/inadequacy about less successful PD

Problem/inadequacy	Length of teaching experience			Gender			Title		
	Group	<i>M (SD)</i>	<i>t (df)</i>	Group	<i>M (SD)</i>	<i>t (df)</i>	Group	<i>M (SD)</i>	<i>t (df)</i>
Aims too low	0-5	2.50 (1.09)	- 2.225*	Male	3.38 (1.78)	.508	< Senior	3.23 (1.46)	.363
	> 5	3.49 (1.50)	(47)	Female	3.12 (1.29)	(22.918)	≥ Senior	3.00 (1.55)	(47)
Limited ways to participate	0-5	3.33 (1.63)	- 1.702	Male	2.80 (1.10)	- 3.240** (12)	< Senior	3.91 (1.45)	- .465
	> 5	4.50 (.93)	(12)	Female	4.67 (1.00)		≥ Senior	4.33 (1.15)	(12)
Inconvenient ways to participate	0-5	3.33 (1.63)	- 1.702	Male	2.80 (1.10)	- 3.240** (12)	< Senior	3.91 (1.45)	- .465
	> 5	4.50 (.93)	(12)	Female	4.67 (1.00)		≥ Senior	4.33 (1.15)	(12)
Too short duration	0-5	2.50 (1.19)	- 2.071*	Male	3.60 (1.73)	2.243* (33.174)	< Senior	2.86 (1.30)	- 2.441* (80)
	> 5	3.20 (1.41)	(80)	Female	2.75 (1.12)		≥ Senior	3.85 (1.57)	
Too many sessions	0-5	2.78 (1.44)	- 2.377*	Male	3.76 (1.64)	1.523 (36.890)	< Senior	3.42 (1.43)	.796
	> 5	3.58 (1.35)	(83)	Female	3.20 (1.29)		≥ Senior	3.08 (1.32)	(83)
Inappropriate assessment for participants	0-5	3.32 (1.17)	- 2.253*	Male	4.04 (1.31)	1.104	< Senior	3.80 (1.26)	- .143
	> 5	4.02 (1.25)	(73)	Female	3.70 (1.23)	(73)	≥ Senior	3.86 (1.29)	(73)
Lack of necessary assessment for participants	0-5	3.27 (1.20)	- .990	Male	3.46 (1.56)	- .239	< Senior	3.34 (1.34)	- 2.256* (74)
	> 5	3.61 (1.41)	(74)	Female	3.54 (1.26)	(74)	≥ Senior	4.20 (1.21)	
Inappropriate management	0-5	3.14 (1.13)	- 2.012* (73)	Male	3.83 (1.37)	1.152	< Senior	3.48 (1.30)	- 1.414
	> 5	3.77 (1.30)		Female	3.47 (1.22)	(73)	≥ Senior	4.00 (1.13)	(73)
Lack of necessary management	0-5	2.91 (1.15)	- 2.333* (73)	Male	3.54 (1.56)	.460	< Senior	3.27 (1.33)	- 2.816** (28.022)
	> 5	3.66 (1.32)		Female	3.39 (1.18)	(73)	≥ Senior	4.13 (.99)	

* $p < .05$, ** $p < .01$



Results—Teachers’ perceptions

Problem/inadequacy	Length of teaching experience		
	Group	<i>M (SD)</i>	<i>t (df)</i>
Aims too low	0-5	2.50 (1.09)	- 2.225*
	> 5	3.49 (1.50)	(47)
Limited ways to participate	0-5	3.33 (1.63)	- 1.702
	> 5	4.50 (.93)	(12)
Inconvenient ways to participate	0-5	3.33 (1.63)	- 1.702
	> 5	4.50 (.93)	(12)
Too short duration	0-5	2.50 (1.19)	- 2.071*
	> 5	3.20 (1.41)	(80)
Too many sessions	0-5	2.78 (1.44)	- 2.377*
	> 5	3.58 (1.35)	(83)
Inappropriate assessment for participants	0-5	3.32 (1.17)	- 2.253*
	> 5	4.02 (1.25)	(73)
Lack of necessary assessment for participants	0-5	3.27 (1.20)	- .990
	> 5	3.61 (1.41)	(74)
Inappropriate management	0-5	3.14 (1.13)	- 2.012* (73)
	> 5	3.77 (1.30)	
Lack of necessary management	0-5	2.91 (1.15)	- 2.333* (73)
	> 5	3.66 (1.32)	

p* < .05, *p* < .01

➤ Due to different professional backgrounds and needs, it was more likely that experienced teachers had higher expectations of “objective”, “assessment and management” for their PDs.

➤ T4, who had more than 20 years of teaching experience, said: “In fact, I think nowadays novice teachers are more diligent and have a strong desire to learn more [meaningful or new content] from PD.” A novice teacher, T3, pointed out: “I have gained a lot from every district-level PD, twice a month, and I hope there will be more district-level PD”.

Results—Teachers' perceptions

Problem/inadequacy	Gender		
	Group	<i>M</i> (<i>SD</i>)	<i>t</i> (<i>df</i>)
Aims too low	Male	3.38 (1.78)	.508
	Female	3.12 (1.29)	(22,918)
Limited ways to participate	Male	2.80 (1.10)	- 3.240** (12)
	Female	4.67 (1.00)	
Inconvenient ways to participate	Male	2.80 (1.10)	- 3.240** (12)
	Female	4.67 (1.00)	
Too short duration	Male	3.60 (1.73)	2.243* (33,174)
	Female	2.75 (1.12)	
Too many sessions	Male	3.76 (1.64)	1.523 (36,890)
	Female	3.20 (1.29)	
Inappropriate assessment for participants	Male	4.04 (1.31)	1.104
	Female	3.70 (1.23)	(73)
Lack of necessary assessment for participants	Male	3.46 (1.56)	- .239
	Female	3.54 (1.26)	(74)
Inappropriate management	Male	3.83 (1.37)	1.152
	Female	3.47 (1.22)	(73)
Lack of necessary management	Male	3.54 (1.56)	.460
	Female	3.39 (1.18)	(73)

* $p < .05$, ** $p < .01$

- It appears that the results are largely related to the **differences in the family responsibility**, in other words, female teachers may spend more time than male teachers in their families, which is particularly evident in Chinese culture (e.g., Zhang & Ryden, 2002), and thus female teachers may have inadequate time for long-duration PD and would like to take part in PD in more flexible and convenient ways.



Results—Teachers' perceptions

Problem/inadequacy	Title		
	Group	<i>M (SD)</i>	<i>t (df)</i>
Aims too low	< Senior	3.23 (1.46)	.363
	≥ Senior	3.00 (1.55)	(47)
Limited ways to participate	< Senior	3.91 (1.45)	-.465
	≥ Senior	4.33 (1.15)	(12)
Inconvenient ways to participate	< Senior	3.91 (1.45)	-.465
	≥ Senior	4.33 (1.15)	(12)
Too short duration	< Senior	2.86 (1.30)	-2.441* (80)
	≥ Senior	3.85 (1.57)	
Too many sessions	< Senior	3.42 (1.43)	.796
	≥ Senior	3.08 (1.32)	(83)
Inappropriate assessment for participants	< Senior	3.80 (1.26)	-.143
	≥ Senior	3.86 (1.29)	(73)
Lack of necessary assessment for participants	< Senior	3.34 (1.34)	-2.256* (74)
	≥ Senior	4.20 (1.21)	
Inappropriate management	< Senior	3.48 (1.30)	-1.414
	≥ Senior	4.00 (1.13)	(73)
Lack of necessary management	< Senior	3.27 (1.33)	-2.816** (28,022)
	≥ Senior	4.13 (.99)	

* $p < .05$, ** $p < .01$

- The results are understandable as those with senior level titles were likely more experienced teachers and had higher expectations of PD activities.
- In short, we think it is reasonable to argue that the differences found in teachers' perceptions of problems in PD activities between teachers with different teaching experiences, educational backgrounds and professional titles are **largely related to the differences in their professional backgrounds and needs for PD.**





Results—Underlying reasons

- Underlying reasons for less successful PD practices
 - The questionnaire data revealed that teachers perceived that PD practices were less successful mainly due to “**lack of appropriate evaluation for organizers**” ($M = 3.54$, $SD = 1.41$) and “**lack of necessary coordination between organizers at different levels**” ($M = 3.52$, $SD = 1.36$).
 - In the interview, teachers also pointed out some other reasons for less successful PD, which included **deviation from pre-defined objectives, lack of continuous support or access to PD materials and the organizer/trainer’s failure to accommodate teachers’ specific needs.**





Results—Underlying reasons

- Underlying reasons for less successful PD practices
 - Among the above reasons, it is particularly noteworthy that a tension or inconsistency was revealed between teachers' needs for customized PD and the organizers/trainers' unawareness or failure to cater for those needs, even though they may be aware of the existence of such needs.
 - In the interviews, six teachers pointed out that the organizers only focused on teachers' general needs rather than their individual needs.
 - T7 described his experience in a PD program on classroom discourse: he and his fellow trainees first watched selected videotaped lessons from one or two of the trainee teachers, and then attended a presentation on the results of video analysis based on selected videos by a team of researchers from one university, and finally listened to lesson critiques by teaching research fellows from the TRO of the education bureau.





Results—Underlying reasons

- Underlying reasons for less successful PD practices
- Finally, in responding to the open-ended question in the questionnaire and the corresponding question in the interview which asked their opinions on how to improve the effectiveness of PD, teachers called for **more practical** (nine teachers) and **enriched** (eight teachers) **PD contents, a more variety of forms of PD activities** (six teachers), and **more sessions to choose** (six teachers).
- Other suggestions included **setting the objectives more mathematics-specific, offering more customized and systematic content, organizing PD activities with more substance and providing more resources.**





- **Discussion and conclusions**





Discussion and conclusions

- This study examined key aspects and underlying reasons for less successfully organized PD practices in Shanghai from teachers' perspectives. The data were collected from 132 mathematics teachers in nine randomly selected secondary schools through a questionnaire survey and follow-up interviews with 18 of them.
- The results show that although Shanghai mathematics teachers were largely satisfied with different levels of organized PD, there were indeed less successfully organized PD practices with various problems and inadequacies that call for attention and improvement.





Discussion and conclusions

- First, Shanghai mathematics teachers perceived “**time, duration and frequency**”, “**assessment and management**” and “**objective**” as the three most unsatisfactory aspects in less successfully organized PD practices, while a small percent of the teachers were unsatisfied with other three aspects, namely, “way to participate”, “content” and “organization”.
- **This result highlights the importance of addressing the issue concerning the “time, duration and frequency” of PD for participating teachers**, which was also supported by the data of TALIS 2018 that more than half of Shanghai teachers of all school subjects (54.9%) indicate continuing PD conflicts with the teacher’s work schedule. The percentages of teachers who were dissatisfied with this aspect in other East Asian countries (e.g., Japan: 87.0%; Korea: 88.1%) are far above that of Shanghai, as well as TALIS average (OECD, 2019b) .





Discussion and conclusions

- Second, in the different aspects, the specific problems perceived by the teachers include that, to a more or less degree, the contents were lack of practicality, novelty and coherence, the ways of participation were limited, passive and inconvenient, the objectives were unclear or inappropriate, the organization was merely for formality without adequate substance (content), the duration was unsuitable, and the management and assessment for participants were lacking or inappropriate.
 - Prior assessments for PD participants were generally summative assessments, and there was a lack of formative assessments during the PD and a disconnection between the assessment and teachers' lifelong professional development.
 - Thus, a more balanced form of assessment for PD participants is needed in the design and delivery of PD.
 - Future study in this direction is needed in order to obtain research-based evidence to address the issue.





Discussion and conclusions

- Third, there were statistically significant differences in teachers' perceptions of a variety of issues concerning less successful PD between different groups of teachers in terms of demographic features (e.g., length of teaching experience and gender). Compared with teachers' demographic features, the school characteristic (e.g., school type, location) played a less important role in their perceiving of less successful PD.
- This result also reminds us of the **crucial distinction between pre-service teacher education and in-service PD programs**. In China, most of the pre-service teachers are trained in normal universities, where the trainees are **homogenous**. On the contrary, for in-service PD activities, especially those organized ones that cover a large group of teachers, the trainees are often **heterogeneous**, and hence they have various backgrounds and needs for PD.





Discussion and conclusions

- Therefore, instead of using a uniform PD model, there is a need for the organizers to adopt a differentiated approach to the design and delivery of PD for in-service teachers, tailored to different groups of teachers with various needs.
- This implication can also be generalized beyond the Chinese context, as the heterogeneity of in-service teachers for PD exists globally.





Discussion and conclusions

- Fourth, the study revealed that Shanghai teachers perceived that PD practices were less successful mainly due to a lack of appropriate evaluation for the PD organizers and necessary coordination between the PD organizers at different levels.
- It should be noted that this issue has also been identified in other educational settings, for example, Ingvarson et al. (2013) reported that most of the 30 countries they studied lacked specific evaluation systems geared to teacher education institutions or programs.
- Further research is needed to investigate the internal mechanisms in the teacher professional development system and possible ways to improve such coordination.





Discussion and conclusions

- Finally, we should point out that, given this study was conducted in the Shanghai educational settings, the results obtained about the mathematics teachers' perceptions of less successfully organized PD practices might not be generalizable to different parts of China or other countries, which is a limitation of our study.
- In addition, the study focuses on teachers' perspectives. While teachers' voices about the quality of PD as they perceived has critical importance and must be heard and studied, their voices and expectations are subject to their professional experiences and needs.
- In future, more research with **a larger scale with a specific focus** on city/country-level, district-level, and school-level PD practices, in different social and educational contexts, and **from different perspectives** is needed to further advance the understanding of related issues and challenges, and hence improve the quality of the PD for teachers.

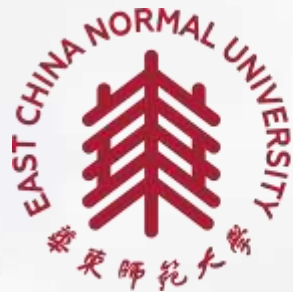




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Thanks!

Q & A



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