# Appendix I Questionnaire: Teachers’ Perceptions of Mathematical Modelling Teaching

Dear participants,

Thank you very much for taking the time to complete this questionnaire. The questionnaire you fill in will be used in the researcher's doctoral dissertation in the *Faculty of Education, The University of Hong Kong*. The data will not be used for any other purpose. The questionnaire you fill in will not be obtained by any third party, which can ensure the safety of personal privacy. Please feel free to fill in.

Part 1 Basic Information

1. Your age:

2. Your gender:

3. Your working year(s):

4. Your professional title:

Part 2 Your Theoretical Cognition of Mathematical Modelling Teaching

Please select the one that best suits your actual situation and mark it with “√” in the box.

5. For the following description of mathematical modelling, please choose whether you agree or not.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Items** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** |
| 5.1 Mathematical model is constructed when solving a complex problem with mathematical knowledge and methods. |  |  |  |  |  |
| 5.2 Mathematical models are closely related to physics, chemistry, and other disciplines. |  |  |  |  |  |
| 5.3 Carrying out mathematical modelling activities has improved the mathematical modelling ability of junior middle school students. |  |  |  |  |  |
| 5.4 The competition training organised for the mathematical modelling competition belongs to the teaching of mathematical modelling. |  |  |  |  |  |
| 5.5 In class, mathematical models are used to answer questions, that is, mathematical modelling teaching. |  |  |  |  |  |
| 5.6 Clear objectives of mathematical modelling activities shall be established before mathematical modelling teaching. |  |  |  |  |  |
| 5.7 There are many solutions to a mathematical modelling task. |  |  |  |  |  |
| 5.8 In mathematical modelling activities, the key is to transform life problems into mathematical language. |  |  |  |  |  |
| 5.9 After the mathematical modelling activity, teaching reflection should be carried out to facilitate the next teaching. |  |  |  |  |  |
| 5.10 Mathematical modelling is a part of the core quality of mathematics. |  |  |  |  |  |
| 5.11 Mathematical modelling literacy is closely related to mathematical abstraction literacy. |  |  |  |  |  |
| 5.12 Mathematical modelling literacy is closely related to problem-solving literacy. |  |  |  |  |  |
| 5.13 The introduction of mathematical modelling activities in the mathematics classroom is conducive to the improvement of junior middle school students’ mathematics performance. |  |  |  |  |  |

Part 3 Your Subjective Attitude to Mathematics Modelling Teaching

*Please rate each item of questions 6-8 according to your actual situation, and mark it with “√” in the box. 0 is the most negative evaluation and 4 is the most positive evaluation. Take 6.1 as an example:*

*“6.1 Carrying out mathematical modelling activities to improve the mathematical modelling ability of junior middle school students”*

*If you think that carrying out mathematical modelling activities cannot improve the mathematical modelling ability of junior middle school students, please rate this item as 0;*

*If you think that carrying out mathematical modelling activities can only improve a little the mathematical modelling ability of junior middle school students, please rate this item as 1 point;*

*If you think that carrying out mathematical modelling activities can generally improve the mathematical modelling ability of junior middle school students, please rate this item as 2 points;*

*If you think that carrying out mathematical modelling activities can greatly improve the mathematical modelling ability of junior middle school students, please rate this item as 3 points;*

*If you think that carrying out mathematical modelling activities can extremely improve the mathematical modelling ability of junior middle school students, please rate this item as 4 points.*

6. Please rate the teaching value of mathematical modelling.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Items** | **0 points** | **1 point** | | **2 points** | | **3 points** | **4 points** |
| 6.1 Carrying out mathematical modelling activities to improve the mathematical modelling ability of junior middle school students |  | |  | |  |  |  |
| 6.2 Promotion of mathematics achievement of junior high school students by carrying out mathematical modelling activities |  | |  | |  |  |  |
| 6.3 Contribution of mathematical modelling teaching to STEM Education |  | |  | |  |  |  |

7. Please rate the implementation of mathematical modelling teaching.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Items** | **0 points** | **1 point** | **2 points** | **3 points** | **4 points** |
| 7.1 Popularity of mathematical modelling activities among students |  |  |  |  |  |
| 7.2 Students’ enthusiasm to participate in mathematical modelling activities |  |  |  |  |  |
| 7.3 Proportion of mathematical modelling activities in the classroom in a semester (the closer to the appropriate proportion, the higher the score) |  |  |  |  |  |
| 7.4 Implementation of mathematical modelling activities in class |  |  |  |  |  |
| 7.5 Mathematical modelling teaching can meet the requirements in the curriculum standard |  |  |  |  |  |

8. Please rate the mathematical modelling activities in the textbooks.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Items** | **0 points** | **1 point** | **2 points** | **3 points** | **4 points** |
| 8.1 Proportion of mathematical modelling activities in teaching materials |  |  |  |  |  |
| 8.2 Difficulty of mathematical modelling activities in teaching materials |  |  |  |  |  |
| 8.3 The topic of mathematical modelling in the textbook is of interest to students |  |  |  |  |  |
| 8.4 Practical operability of mathematical modelling activities in teaching materials |  |  |  |  |  |

Part 4 Your Behaviour of Mathematical Modelling Teaching

Please select the one that best suits your actual situation and mark it with “√” in the box.

9. The following are descriptions of mathematical modelling teaching behaviour. Please choose whether these descriptions are consistent with your situation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Items** | **Strongly Inconsistent** | **Inconsistent** | **Neutral** | **Consistent** | **Strongly Consistent** |
| 9.1 When teaching mathematical modelling, I can formulate clear teaching objectives. |  |  |  |  |  |
| 9.2 When teaching mathematical modelling, I can choose teaching methods suitable for students. |  |  |  |  |  |
| 9.3 In class, I usually show students a variety of mathematical modelling methods. |  |  |  |  |  |
| 9.4 During teaching, I will take the initiative to organise the situational guidance in the textbook into mathematical modelling activities. |  |  |  |  |  |
| 9.5 During the semester, I will consider the class hours occupied by mathematical modelling teaching. |  |  |  |  |  |
| 9.6 In the teaching of mathematical modelling, I prefer to let students discuss and establish mathematical models by themselves. |  |  |  |  |  |
| 9.7 In the teaching of mathematical modelling, I prefer to tell students about the mathematical model used and let them calculate the details themselves. |  |  |  |  |  |
| 9.8 After each teaching task, I will evaluate whether it is too difficult for students. |  |  |  |  |  |
| 9.9 After each teaching session, I will reflect on and record the wrong links between mathematical modelling teaching activities. |  |  |  |  |  |
| 9.10 I think students’ mathematical modelling ability has been improved due to my teaching activities. |  |  |  |  |  |
| 9.11 I am good at developing new mathematical modelling teaching cases. |  |  |  |  |  |
| 9.12 I will encourage students to participate in the mathematical modelling competition. |  |  |  |  |  |
| 9.13 I am capable of training and teaching mathematical modelling competitions. |  |  |  |  |  |

10. If you have any additional information you would like to share, please write it here. If you are willing to participate in a follow-up interview, please provide your contact information, and we may contact you within 30 working days.