

## CHAPTER 2

# Developing the TIMSS Advanced 2015 Context Questionnaires

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TIMSS Advanced assesses students in specialized advanced mathematics and physics programs during their final year of secondary school. Monitoring the achievement of these students is a high priority in many countries since these students are considered to be the future leaders in science, technology, engineering, mathematics—fields renowned for fueling economic growth and innovation.

The TIMSS Advanced context questionnaires complement the achievement data by providing key information on students' contexts for learning. Countries collect background data from students, their teachers, and their principals, and National Research Coordinators (NRCs) from participating countries also provide country-level data. These data when analyzed in relation to TIMSS Advanced achievement yield insights into factors related to student achievement that can be relevant in developing educational policies.

## Development Process for the TIMSS Advanced 2015 Context Questionnaires

Developing the TIMSS Advanced 2015 context questionnaires was a collaborative process involving multiple rounds of reviews by staff at the TIMSS & PIRLS International Study Center, policy analysis experts on the TIMSS 2015 Questionnaire Item Review Committee (QIRC), and the NRCs from the participating countries. In broad strokes, the TIMSS Advanced 2015 context questionnaire development process for the student, home, school, and teacher questionnaires included:

- Writing the TIMSS Advanced context questionnaire framework
- Modifying and developing new context questionnaire items by staff at the TIMSS & PIRLS International Study Center
- Reviewing and revising the questionnaires by the QIRC and NRCs
- Administering the TIMSS Advanced 2015 field test
- Using the field test results to refine the questionnaires



Developing the Curriculum Questionnaires followed a collaborative process similar to other TIMSS Advanced questionnaires, including identifying important framework topics, developing questionnaire items, and iterative reviews by NRCs.

Exhibit 2.1 presents the TIMSS Advanced 2015 questionnaire development schedule. The development process was directed and managed by the staff of the TIMSS & PIRLS International Study Center at Boston College, including the Executive Directors Ina V.S. Mullis and Michael O. Martin, and the TIMSS Questionnaire Coordinator, Martin Hooper. NRCs had an essential role in updating the questionnaires by providing feedback and ideas at successive NRC meetings. The QIRC made major contributions in updating the TIMSS Advanced 2015 questionnaires with the 1<sup>st</sup> QIRC meeting focused on developing items/scales, and the 2<sup>nd</sup> meeting focused on refining the questionnaires in light of the field test results. Exhibit 2.2 lists the members of the QIRC.

**Exhibit 2.1: TIMSS Advanced 2015 Context Questionnaire Development Schedule**

Date(s)		Group and Activity
February	2013	NRCs reviewed TIMSS 2011 context questionnaires at the 1 <sup>st</sup> NRC meeting (Hamburg, Germany) to inform the TIMSS Advanced Context Questionnaire Framework
May-June	2013	Staff at TIMSS & PIRLS International Study Center drafted the TIMSS Advanced Context Questionnaire Framework Chapter
June	2013	1 <sup>st</sup> meeting of the Questionnaire Item Review Committee (QIRC) to review the draft TIMSS 2015 Context Questionnaire Framework chapter and the draft questionnaire items and scales (Singapore)
July–October	2013	TIMSS & PIRLS International Study Center extended the draft TIMSS 2015 questionnaires to include TIMSS Advanced-specific topics and continued drafting the TIMSS Advanced Context Questionnaire Framework chapter
November	2013	NRCs reviewed the TIMSS Advanced Context Questionnaire Framework chapter and draft context questionnaires at the 3 <sup>rd</sup> NRC meeting (Budapest, Hungary). A working group of NRCs developed additional items and scales for the TIMSS Advanced questionnaires.
November–December	2013	Staff at TIMSS & PIRLS International Study Center finalized the TIMSS Advanced field test context questionnaires
December	2013	Staff at TIMSS & PIRLS International Study Center provided the TIMSS Advanced field test context questionnaires to NRCs
March	2014	Staff at TIMSS & PIRLS International Study Center published <i>TIMSS Advanced 2015 Assessment Frameworks</i> , which includes the chapter on the Context Questionnaire Framework
March–April	2014	Countries conducted TIMSS Advanced 2015 field test
April–May	2014	Countries submitted field test data for analysis and review
June	2014	TIMSS & PIRLS International Study Center conducted an internal review of field test results
July	2014	QIRC reviewed questionnaire field test data, TIMSS 2011 Curriculum Questionnaire, and the TIMSS Advanced 2011 Curriculum Questionnaire at the 2 <sup>nd</sup> QIRC meeting (Muenster, Germany)

**Exhibit 2.1: TIMSS Advanced 2015 Context Questionnaire Development Schedule (Continued)**

Date(s)		Group and Activity
August	2014	NRCs reviewed and approved context questionnaires for TIMSS Advanced 2015 data collection at 5 <sup>th</sup> NRC meeting (Paris, France)
September	2014	TIMSS & PIRLS International Study Center distributed TIMSS Advanced 2015 data collection context questionnaire instruments to NRCs for translation
January–March	2015	TIMSS & PIRLS International Study Center drafted TIMSS Advanced 2015 Curriculum Questionnaires
March	2015	NRCs approved draft TIMSS Advanced 2015 Curriculum Questionnaires at the 6 <sup>th</sup> NRC meeting (Prague, Czech Republic)
March–June	2015	TIMSS Advanced 2015 data collection
April–August	2015	TIMSS Advanced 2015 Curriculum Questionnaires administered online to NRCs

**Exhibit 2.2: TIMSS 2015 Questionnaire Item Review Committee (QIRC)**

Sue Thomson Australian Council for Educational Research <b>Australia</b>	Chew Leng Poon Planning Division, Research and Evaluation Ministry of Education <b>Singapore</b>
Josef Basl Czech School Inspectorate <b>Czech Republic</b>	Peter Nyström National Center for Mathematics Education University of Gothenburg <b>Sweden</b>
Wilfried Bos Institut für Schulentwicklungsforschung TU Dortmund University <b>Germany</b>	Jack Buckley The College Board <b>United States</b>
Martina Meelissen Department of Research Methodology, Measurement and Data Analysis, Faculty of Behavioural Sciences University of Twente <b>The Netherlands</b>	

## Updating the TIMSS Advanced 2015 Context Questionnaire Framework

The “[TIMSS Advanced 2015 Context Questionnaire Framework](#)”, Chapter 3 of the *TIMSS Advanced 2015 Assessment Frameworks*, provided the foundation for updating the TIMSS Advanced context questionnaires for 2015. The Framework chapter presents a review of a vast array of educational

research that identifies key context questionnaire topics and gives the theoretical justification for asking about these topics within the 2015 questionnaires.

NRCs described topics they thought should be covered in the TIMSS Advanced 2015 questionnaires at their 1<sup>st</sup> NRC meeting in February 2013 in Hamburg, Germany, and at the 2<sup>nd</sup> meeting in May 2013 in Amsterdam, The Netherlands. Taking into account feedback garnered at the meetings, the TIMSS Questionnaire Coordinator conducted an extensive literature review and drafted the TIMSS Advanced 2015 Questionnaire Framework chapter. Because the primary purpose of the context questionnaires is to identify factors that may contribute to differences in achievement within and between countries, the framework focuses on topics in educational research found to be related to achievement across a variety of settings and contexts.

The NRCs reviewed the draft chapter at the 3<sup>rd</sup> NRC meeting in November 2013 in Budapest, Hungary. Staff at the TIMSS & PIRLS International Study Center refined the draft based upon the recommendations received at the meeting and published the final *TIMSS Advanced 2015 Assessment Frameworks* online in March 2014, with printed copies distributed thereafter.

## Field Test Questionnaire Development

Because many of the key topics for learning are the same across the TIMSS and TIMSS Advanced populations, the TIMSS & PIRLS International Study Center developed the TIMSS 2015 and TIMSS Advanced 2015 questionnaires in tandem. As outlined in [Chapter 2](#) of the *Methods and Procedures in TIMSS 2015*, the development of the TIMSS 2015 questionnaires focused on improving and expanding the TIMSS 2011 context questionnaire scales and updating items to align with recent technological innovations. With the draft TIMSS questionnaires at hand, staff at the TIMSS & PIRLS International Study focused TIMSS Advanced questionnaire development on updating the questionnaires to be age- and context-appropriate for the TIMSS Advanced population, maintaining measurement of important components of the TIMSS Advanced 2008 questionnaires, and incorporating policies, practices, and educational constructs that are uniquely relevant to the TIMSS Advanced study.

Much of the TIMSS/TIMSS Advanced scale development work took place at the first meeting of the QIRC, which was held jointly with the first meeting of the PIRLS Questionnaire Development Group (QDG). The QIRC and QDG worked with staff from the TIMSS & PIRLS International Study center to revamp the teacher job satisfaction scale by incorporating insights gained from the *Utrecht Work Engagement Scale* (Schaufeli, Bakker, & Salanova, 2006). The questionnaire committees also revised the Confidence in Teaching Mathematics/Science scales, with item development influenced by the *Ohio State Teacher Efficacy Scale* (Tschannen-Moran & Hoy, 2001). Additional items were also included for the students engagement scales, with one item sourced from Fauth, Decristan, Rieser, Klieme, and Büttner (2014).

Updating questionnaires to “keep up with the times” was an essential part of the 2015 development process. Staff at the TIMSS & PIRLS International Study Center worked with the QIRC and QDG to ensure that the questionnaires included items on the availability of prevalent digital resources for education such as ebooks, tablets, and interactive whiteboards.

A major step of the TIMSS Advanced-specific questionnaire development process took place at the 3<sup>rd</sup> National Research Coordinators meeting in Budapest, Hungary. At the meeting, a working group composed of NRCs and other country representatives developed TIMSS Advanced-specific items focusing on topics such as educational expectations, intended areas of study, and intended future profession for these advanced students. The working group also developed the TIMSS Advanced School Supports Advanced Mathematics and Physics Education scales, and the group extended and modified existing TIMSS items and scales focusing on instructional practices, student affect, and home resources to match the age and educational context of the TIMSS Advanced populations. For example, the TIMSS Students Like Learning Mathematics/Science scales were revised and extended to better match the TIMSS Advanced population, with modifications influenced by items in the academic motivation literature (Lepper, Corpus, & Iyengar, 2005; Marsh, Craven, Hinkley, & Debus, 2003; OECD, 2003; Pierce, Stacey, & Barkatsas, 2007).

## Review Field Test Results and Refine Questionnaires for Data Collection

The TIMSS Advanced 2015 countries administered a full-scale field test in the nine participating countries, eliciting questionnaire data from 11,922 students, 547 principals, and 884 teachers. Following field test administration, staff at the TIMSS & PIRLS International Study Center produced data almanacs and scale summaries to facilitate the review of the field test data:

- Data almanacs document the use of response categories for each context questionnaire item as well each item’s relationship with achievement
- Scale summaries detail each scale’s reliability, dimensionality, fit to the Rasch model, and relationship with achievement

In June 2014, staff at the TIMSS & PIRLS International Study Center reviewed the field test context questionnaire results, proposing revisions to the QIRC. At their 2<sup>nd</sup> meeting in July 2014, the QIRC accepted many of the recommendations and suggested some additional changes. In August 2014, NRCs reviewed the final draft questionnaires and accepted the questionnaires with a few minor revisions. Following the NRC meeting, staff at the TIMSS & PIRLS International Study Center implemented the revisions and posted the final TIMSS Advanced instruments on September 18, 2014, so that countries could begin the [translation process](#).

## Developing the TIMSS Advanced 2015 Curriculum Questionnaires

The TIMSS Advanced Curriculum Questionnaires complement the student, teacher, and school questionnaires by collecting information from NRCs about country-level contexts. The Curriculum Questionnaires cover each country's advanced mathematics and physics curricula, goals and standards for instruction, and other national or regional policies such as the preprimary education process and the teacher education process.

Similar to the other TIMSS Advanced 2015 questionnaires, the process for updating the Curriculum Questionnaires started with the TIMSS Advanced 2015 Context Questionnaire Framework. Then, the QIRC identified the information from the TIMSS 2011 and TIMSS Advanced 2008 Curriculum Questionnaires that they thought was useful to continue collecting.

Based on the framework and the QIRC feedback, staff at the TIMSS & PIRLS International Study Center updated the TIMSS Advanced 2015 Curriculum Questionnaires for review by NRCs at their 6<sup>th</sup> meeting in March 2015. Following the NRC meeting, staff at the TIMSS & PIRLS International Study Center finalized the questionnaires, incorporating the suggestions that emerged from the meeting. NRCs completed the online Curriculum Questionnaires between April 23, 2015 and August 31, 2015.



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