

## Opinion Short Paper

### *Closing the Loops Between Mathematics Standards And Courseware Why open communication between Standards developers, and Curriculum & Assessment developers, matters so much...*

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CCR is unique as a curriculum organization through its vertical integration: from standards to curriculum/courseware to assessments, and back. The open line of communication maintained between the teams developing the standards and those developing the curriculum and assessments, provides several benefits for to the modernization of mathematics:

- **Rigor:** Open communication helps promote high expectations for student learning and achievement. Curriculum developers work with standards writers to ensure that the standards reflect high expectations for students, and then develop curriculum that meets those expectations. When writing standards for modern content, the standards team often starts generally and revises standards to be more specific after feedback from developers because the developers feel they are able to reach a higher level of rigor than initially envisioned.  
*Example: The standards team began with a probability standard about dependent events, but revised it to be focused specifically on Bayes' theorem after feedback from the curriculum team that Bayes' theorem could be taught and assessed extensively without making the course too challenging.*
- **Relevance:** At CCR, developers keep curriculum relevant by tying the content to the real world. Connections are made to interdisciplinary themes, core concepts and competencies along with the standards. These connections allow students to see math from different perspectives and think flexibly in different situations. By regularly communicating, curriculum developers and standard writers ensure the standards accurately reflect the modern content CCR strives to teach. As the educational landscape evolves, working together allows curriculum developers and the standards team to ensure both the content and the standards remain relevant and effective.  
*Example: The standards team includes examples of sample topics when designing the standards. A standard on choosing the appropriate model for data has sample topics that include the rule of 72 and compound interest. The curriculum designers use these samples to make the curriculum more relevant to learners.*
- **Alignment:** When there is a closed loop between the curriculum developers and standard writers, it can help ensure that the curriculum is aligned with the standards. Curriculum developers always start with the standards when planning new content, but at CCR they also have the ability to provide feedback to standard writers on the clarity and relevance of the

standards, and standard writers can use that feedback to refine and improve the standards. In addition, if the development team feels there is something missing from the standards, they can communicate with the standards team to determine why that was intentionally left out, where it was covered and missed (indicating a lack of clarity), or that it was unintentionally excluded and needs to be included.

*Example: In the study of probability, the curriculum developers wanted to emphasize the idea of unlikely events being more noticeable when they happen than when they don't happen. They worked with the standards team to create an improbability standard to capture this idea, and the standards team properly linked it in the sequence of the other standards and allocated time to it appropriately.*

- **Clarity:** When the curriculum team reviews and uses the standards and gives feedback, this ensures the standards are clear and understandable to educators. Curriculum developers can provide input on how to make the standards more clear and actionable, while standard writers can use feedback from curriculum developers to clarify any ambiguities or confusing language in the standards.

*Example: Standards often include examples to clarify intentions. By working together, the curriculum and standards team changed an example from “what percent of the time do you do your homework?” to “what are the chances you'll do your homework on a given day?” increasing the readability of a standard.*

- **Time on task:** By working with curriculum developers, the standards writers were able to develop an estimate of the total amount of time devoted to each standard in a working curriculum. These values, expressed as a percentage of total time devoted to the subject for both instruction and assessment, were extended to indicate how much depth of coverage was intended for the new standards. A ‘small’ standard that isn’t expecting much of the students may get as little as 1% of the total time for the year while a ‘large’ standard might get assigned 8% of the time. Most standards are expected to be 2-3% of the time for the year. This allows curriculum developers and instructors to have an idea how much time should be allocated to different aspects of the curriculum.

*Example: arithmetic is expected to be 59% of the time in grade 1, while grade 5 spends 34% of the year on statistics and probability, and grade 7 allocates 46% of the year to algebra.*

- **Assessments:** Assessments in the CCR way include formative check in questions, knowledge checks and projects that draw from the standards of a module or course as a whole. Assessments provide feedback to curriculum developers about how well the curriculum met its goals. This feedback loop contributes to the larger feedback loop between curriculum and standards.

*Example: At the end of each module we ask learners to design a project they would implement with their students learning this content. Learners who have internalized the*

*standards are able to create cohesive projects for their students that integrate the standards, core concepts and competencies of the discipline.*

Overall, having the latitude to iterate standards through open communication between the standards team, the curriculum, and assessments developers makes the educational program more responsive to the needs of students and educators, and that the standards are more effective in guiding the development of meaningful and relevant curriculum.