

**Development and validation of a Universal Science Writing Rubric in order to facilitate assessment of STEM students in science communication competencies**  
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**Purpose/Background:** STEM students need training in professional competencies like science communication for diverse audiences. However, it can be difficult for STEM instructors or departments to assess the quality of students' communication skills. Thus, we developed a Universal Science Writing Rubric (USWR) for consistent assessment of science writing for any genre/audience.

**Methods:** The USWR assesses science content, audience targeting, interpretation, organization, & writing quality. We collected writing samples (n=334) of many genres – lab reports, grant proposals, reviews, and news articles – at the 200- to 600-level. Two coders scored each writing sample until interclass correlation coefficient (ICC) was over 0.8, indicating interrater reliability. Using the non-parametric Wilcoxon rank test, we analyzed the differences between groups of writing samples at different levels or in different genres. Finally, we compared the scores produced by our USWR to those produced by the actual grading rubric used for student writing samples.

**Results:** We had four main findings: (1) We found that students struggle with writing about the interpretation of scientific content at lower levels. Students develop this skill over time when writing to scientific but not to lay audiences. (2) Only some students improve between draft and final. (3) Students do not improve over time when grading rubrics change for each assignment. (4) Compared to the scores produced by using some grading rubrics, our USWR was more discriminating, identifying students who may have earned points on traditional rubrics by “covering” needed content or “checking off” boxes but failed to communicate clearly using best practices in science writing.

**Conclusions/Discussion:** While limited by number of samples, we found the USWR was usable for diverse genres and revealed student writing concerns noted by instructors, suggesting validity. The USWR could be adapted for instructor grading, peer grading, student self-assessment, pedagogical research, or programmatic assessment.