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| --- | --- | --- | --- | --- | --- | --- |
| Table 1. Results of Analysis: Task 1 # and Exit Ticket *n=13* | | | | | | |
| Structure | Add to/join | Take away/separate | Put together/take apart/part-part-whole | Compare | None |  |
| Task 1 # | 5 |  |  |  | 8 |  |
| Exit Ticket | 2 |  | 7 | 2 |  |  |
| Unknown location | Total unknown | Change unknown | Start unknown | Addend Unknown | Difference unknown | None |
| Task 1 # |  |  |  |  |  | 13 |
| Exit Ticket |  | 2 | 1 | 7 |  | 3 |
| Nature of equation/s | Solution equation | Situation equation | Both | Neither |  |  |
| Task 1 # | 7 | 1 | 4 | 1 |  |  |
| Exit Ticket | 5 | 4 | 4 | 1 |  |  |
| Operations | Addition | Subtraction | Both | Neither |  |  |
| Task 1 # | 4 | 5 | 4 |  |  |  |
| Exit Ticket | 5 | 4 | 4 |  |  |  |
| Total location | Left of equal sign | Right of equal sign | Both | Neither |  |  |
| Task 1 # |  | 12 |  | 1 |  |  |
| Exit Ticket | 2 | 8 | 3 |  |  |  |
| Representation number | Zero | One | Two | Three | Four or more |  |
| Task 1 # | 6 | 7 |  |  |  |  |
| Exit Ticket | 1 | 10 | 1 | 1 |  |  |
| Representation type | Direct model | Math mountain | Bar model | Comparison bar | Multiple | None |
| Task 1 # | 5 | 2 |  |  |  | 6 |
| Exit Ticket | 9 | 3 | 2 | 1 |  | 1 |
| Accuracy | Answer and label are accurate | Answer OR label are accurate | Neither are accurate |  |  |  |
| Task 1 # | 13 |  |  |  |  |  |
| Exit Ticket | 13 |  |  |  |  |  |

To analyze student progress in this lesson, we applied the Structures Rubric to Task 1, #3, and the word problem on the Exit Ticket. We had access to thirteen students’ paired responses to these two items. Results of this analysis are summarized in Table 1.

The most notable changes between the two problems are:

* Candidates were not asked to identify the structure of Task 1, #3, so it is not surprising that few students indicated a structure or location of the unknown. Some students appeared to add this information later in the lesson.
* Solution vs. Situation equation. Initially, 11 candidates wrote solution equations and 4 wrote situation equations (including those who wrote both). On exit tickets, 9 candidates wrote solution equations and 8 wrote situation equations.
* There was little change in whether candidates wrote equations involving addition, subtraction, or both.
* Initially, all candidates who included an equation wrote the solution to the right of the equal sign (e.g,. 8+3=11). On the exit ticket, five candidates wrote the solution to the left of the equal sign (e.g, 11=8+3). Combined with the slight shift in solution vs. situation equation, this suggests growth in attention to how the word problems are structured and/or how students might represent the problems with equations.
* More candidates included representations (other than equations) with their exit ticket than on Task 1, #3. Initially, six candidates included zero representation, and 7 included one representation. On the exit ticket, only one candidate did not include a representation and two included multiple representations.
* Although candidates used more representations at the end of class, direct models were the most widely used. On the exit ticket, candidates used 9 direct models, 3 math mountains, 2 bar models, and one comparison model (which was incorrectly applied to the situation).