<table>
<thead>
<tr>
<th>Learning Dimension</th>
<th>Indicators</th>
<th>Descriptions of learners' interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement</strong></td>
<td>Spending time in Tinkering activities</td>
<td>• Play, envision, make, explore materials, try something over and over, etc.</td>
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</tbody>
</table>
|                                          | Displaying motivation or investment through affect or behavior              | • Show emotions such as joy, pride, disappointment, frustration  
• Remain after they appear “finished,” and start something new                                                                                                                 |
| **Initiative and Intentionality**        | Setting one's own goals                                                    | • State goals or pose problems  
• Plan steps for future action  
• Develop unique strategies, tools, objects or outcomes  
• State intention to continue working outside the Tinkering Studio                                                                                                           |
|                                          | Seeking and responding to feedback                                         | • Actively seek out feedback or inspiration from materials/environment  
• Anticipate further outcomes  
• Innovate approaches in response to feedback                                                                                                                                  |
|                                          | Persisting to achieve goals in the problem space                           | • Persist toward their goal in the face of setbacks or frustration within the problem space  
• Persist to optimize strategies or solutions                                                                                                                                    |
|                                          | Taking intellectual risks or showing intellectual courage                   | • Disagree with each other’s strategies, solutions, or rationales  
• Try something while indicating lack of confidence in outcome                                                                                                                        |
| **Social Scaffolding**                   | Requesting or offering help in solving problems                             | • Request or offer ideas and approaches  
• Offer tools or materials in service of an idea                                                                                                                                                                                         |
|                                          | Inspiring new ideas or approaches                                          | • Notice, point out, or talk about others' work  
• Innovate and remix by using or modifying others’ ideas or strategies  
• Leave something of their work behind to share with others                                                                                                                    |
|                                          | Physically connecting to others’ works                                     | • Produce work that physically interacts with other learners’ work                                                                                                                                                                   |
| **Development of Understanding**         | Expressing a realization through affect or utterances                       | • Show excitement when expressing a realization  
• Claim to realize or newly make sense of something                                                                                                                                                                                     |
|                                          | Offering explanations for a strategy, tool or outcome                       | • Offer or refine explanations for a strategy, tool or outcome, possibly by testing and retesting                                                                                                                                    |
|                                          | Applying knowledge                                                        | • Connect to prior knowledge, including STEM concepts  
• Employ what they have learned during their explorations  
• Complexify by engaging in increasingly complicated and sophisticated work                                                                                                          |
|                                          | Striving to understand                                                     | • Indicate not knowing (e.g., through surprise, bewilderment, confusion) and remain in the problem space to explore their confusion and build an understanding                                                                 |