**Systems Thinking Workshop**

**Problem Solving Activity**

**Problem Statement:** *List the problem being solved.*

A middle school math teacher wants to help one of her students, Todd, improve his score by 15% on the next Algebra test in two weeks.

Todd’s Biography: Todd received a 63% on his last Algebra test and is often daydreaming during class. Despite his low test score, he excelled in his previous Pre-Algebra class. He is currently doing well in both his English and Social Studies classes.

**Goal:** *What is the desired result of solving the problem?*

Improve Todd’s next test score by 15%.

**Elements:** *List elements of the system.*

* Student’s home life
* Student’s incentive
* Algebra knowledge
* Student’s classroom presence
* Class structure

**Distinctions:** *List the sub-elements with its related element in the designated space. Each sub-element can only be paired with an element* ***once.*** *Each element should have 3-5 sub-elements.*

|  |  |  |  |
| --- | --- | --- | --- |
| Extra-curriculars | Teaching style | Previous classes taken | Learning styles |
| Work ethic | Sleep schedule | Diet/nutrition | Subject interest |
| Lesson format | Personal reading on subject | Learning disability | Social dynamics |
| Time of class | Responsibilities at home | Emotional health |  |
| Motivation | Classroom Distractions | Guardian expectations |  |

Student’s homelife: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student’s incentive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Algebra knowledge: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student’s classroom presence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class structure: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Relationships:**

1. *Fill in the table with all of the elements for the system.*
2. *Rank each element based on its perceived impact on the system (1 being the highest impact).*
3. *Ask if you can control each element. If yes, put a Y and continue with steps 4 and 5. If no, put a N and put a dash mark in “Level of Control” and “Score” columns.*
4. *Rank the remaining elements based on how much you can control them (1 being the highest level of control). Make sure to take into account the timeline when completing this step.*
5. *Score the remaining elements by multiplying its impact score by its level of control score.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Elements** | **Impact** | **Can this be controlled? Y/N** | **Level of Control** | **Score** |
| Student’s Home Life |  |  |  |  |
| Student’s Incentive |  |  |  |  |
| Knowledge of Algebra |  |  |  |  |
| Classroom Presence |  |  |  |  |
| Class Structure |  |  |  |  |

1. *Choose the element with the* ***lowest*** *total score.*
2. *Go back to the “Distinctions” section and fill in the second table with the element’s sub-elements.*
3. *Follow steps 2-5 with the sub-elements.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sub-Elements** | **Impact** | **Can this be controlled? Y/N** | **Level of Control** | **Score** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

1. *Choose the sub-elements with the* ***lowest*** *total score.*

**Solution:** *Based on the sub-element that was chosen in the above step, provide a possible solution.*

**Discussion Questions:**

How does your proposed solution affect Todd and the other elements in the system?

If the proposed solution did not impact Todd as heavily as desired, what would be the next sub-element that you adjusted?

Why did you rate the sub-elements the way you did? Were there different criteria you used for rating the impact vs. the control?

Would this be the solution you would have come up with without this process?

What was surprising about this process/solution?

Did this process make you think about possible variables to change that you would not have otherwise?

Is this helpful? Where else could you use this process to help your students identify variables for current classroom/ club problem solving?