

# Language course coordination – MAS scenario

## Scenario description:

In this coordination scenario, TCN agents coordinate among themselves to determine an optimal assignment of their TCNs into working groups. To do so, agents make use of individual, global constraints and progress level of TCNs. Once grouping is done, agents propose the result to the course instructor (teacher).

A mini-course will be conducted for teaching a language to TCNs in language coordination scenario. This mini-course will consist of 3 lessons. Each lesson is structured into **exercises** and **assessment activities**. Exercises and assessment activities are different such that the exercises are to enhance TCNs' language skills and the assessment activities are to evaluate their progress level over the course. MyWelcome app offers assessment activities at the end of each lesson. Assessment activities consist of **Reading, Grammar, Vocabulary** and **Writing** activities. Assessment activities are conducted at the **end of each lesson** to evaluate the lesson assessment score of the TCN. At the end of each lesson, regardless of the exercises during the lesson, TCNs will be asked to complete **all types** of assessment activities (Grammar, Reading, Writing, Vocabulary).

Grading results of assessment activities will be sent to agent by app-logic at the end of each lesson. The activities in mini-course will be **multiple choice questions**. MyWelcome app will calculate grades and then send them to the respective agent. Upon receiving the grades, agent will update the course progress level of the TCN and will be ready for coordination.

Lesson assessment score of a TCN consists of reading, writing, grammar and vocabulary activity assessment scores.

$$\text{Lesson\_assessment\_score} = 0.25 * \text{Reading\_A\_S} + 0.25 * \text{Writing\_A\_S} + 0.25 * \text{Grammar\_A\_S} + 0.25 * \text{Vocabulary\_A\_S}$$

**Reading\_A\_S**: assessment score of reading assessment activity on a scale between 0 and 100.

**Writing\_A\_S**: assessment score of writing assessment activity on a scale between 0 and 100.

**Grammar\_A\_S**: assessment score of grammar assessment activity on a scale between 0 and 100.

**Vocabulary\_A\_S**: assessment score of vocabulary assessment activity on a scale between 0 and 100.

Course progress level of a TCN is the average of all lesson assessment scores.

**Course\_progress\_level** = (Lesson\_assessment\_score#1 + . . . + Lesson\_assessment\_score#n)/n

### **Assesment activities:**

- **Reading**: Reading assessment activities are scored based on correct answers and based on the amount of time spent on the activity. The more time a TCN spends on an activity, the less score he/she gets. Scoring scale is 0-100.
- **Writing**: Writing activities are scored based on correct answers. Scoring scale is 0-100.
- **Vocabulary**: Based on the number of right/wrong answers, the score is on a scale from 0 to 100.
- **Grammar**: Grammar assessment activities are scored based on correct/incorrect answer. Scoring scale is 0-100.

### **Assessment Scoring Scheme:**

Score of an assessment activity will be calculated based on the number of correct and incorrect answers. While the lowest score is 0, the highest score is 100. Below is the list of evaluation of assessment activity scores:

- **0-49**: insufficient
- **50-59**: sufficient
- **60-69**: good
- **70-89**: remarkable
- **90-100**: outstanding

To calculate reading assessment activity score, the time that TCN spends on an assessment activity will be taken into account as well. The calculation of time will start when the activity is visible to TCN and will stop when TCN completes (or skips) the activity. Evaluation of time intervals is below:

- **0-5 minutes:** student is doing OK
- **5-10 minutes:** student is doing OK but faces some difficulties
- **10+ minutes:** student struggles to understand the text

## Constraints:

In order to formulate groups, agents will have two types of constraints: **Individual** and **System**.

### 1) **Individual** constraints:

Following 2 constraints can be specified by TCNs.

- **Gender:** A TCN is given the chance to specify with which gender he/she wants to be grouped. This constraint should always be considered as strict constraint when grouping.
- **Nationality:** A TCN is given the chance to specify whether he/she doesn't want to be grouped with other nationalities. The constraint will be taken into account as a preference rather than an exclusive constraint.

### 2) **System** constraints:

These constraints are given by language instructor.

- The number of TCNs in a group should be **at least 2** and **at most 5**.
- In the case that a TCN missed the previous lesson, he/she should be included in a group where all the TCNs attended the previous class. If there are multiple TCNs who missed the previous lesson, then they should be distributed equally between groups.
- Progress level of TCNs should be **similar intra-group** and **dissimilar inter-group**.

## Grouping:

To satisfy the similarity constraint, agents will use **only the progress level** of TCNs for comparison. For the first lesson, the TCNs will be grouped based on their individual constraints as there will be no progress level data for the first lesson. Starting from second lesson, agents will take into account progress level data and constraints to formulate groups.

## Time interval for delivering the result to teacher

In the worst case scenario, teacher needs the results in around **1 day after the lesson** ends. Because there will be **at least** 1 day in between 2 consecutive lessons. In the best case, there will be 1 week in between 2 consecutive lessons.