

# Visual feedback in rubric based evaluation

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**Abstract**—Rubrics help assessing students’ work in an easy and efficient way, but they can also be used as a teaching tool. To get the most benefit from a rubric, the way of showing the rubric’s results has to be taken into account. If the right visualization is provided both students and teachers can benefit from it and improve the learning and teaching processes. In this paper a way for providing visual feedback for rubric-based evaluation is proposed.

**Keywords**—visualization; rubric; evaluation

## I. INTRODUCTION

The use of rubrics to evaluate students’ work is becoming very popular due to the fact that rubrics are scoring tools that lay out the specific expectations for an assignment, encouraging consistent grading and increasing objectivity in the evaluation [1], [2]. Another remarkable aspect of rubrics is that they can provide valuable feedback to students.

As stated in [3], visualization is an important part of the learning analytics area [4] which tries to improve the understanding of learning and its processes. Visualizations can support the two main actors involved in educational environments (students and teachers) in several ways. On the one hand, visualizations can help students in their self-reflection about their learning process [5]. On the other hand, they can also help teachers to improve their pedagogic interventions [6], [7].

However, the evaluations using rubrics are typically shown highlighting the performance level selected by the evaluator. This approach does not provide the advantages of good visualizations.

To facilitate rubric-based evaluation, the authors have developed AdESMuS, which stands for Adaptable Evaluation System using Multiple Sources. This system provides evaluation services, including the definition of the different parts that form a rubric: dimensions, levels of achievement and their corresponding weights and values in the calculation of the numerical grade.

This paper presents some of the capabilities of the visualization module of AdESMuS, which provides visual feedback for the evaluation. It offers different visualization possibilities both to students and teachers in order to ease the

understanding of the learning and evaluation processes and improve their results.

## II. TRADITIONAL RUBRIC VISUALIZATION

Traditionally, the way of presenting the result of a rubric-based evaluation is showing the rubric itself and somehow indicating which level of achievement the evaluator selected (see Fig. 1) or the points assigned to each dimension if that accuracy level is needed.

|                      | Excellent  | Advanced  | Average   | Developing  | Beginning   |
|----------------------|--|---|---|---|---|
| Content              | Shows a full understanding of the topic            | Shows a very good understanding of the topic                                  | Shows a good understanding of the topic                                       | Shows a good understanding of parts of the topic          | Does not seem to understand the topic                   |
| Organization         | Presentation has a clear, logical order throughout | Presentation order is mostly clear. The speaker may skip around once or twice | Presentation order is mostly clear. The speaker may skip around several times | The speaker skips around many times. Speech sounds choppy | Little or no clear order is evident in the presentation |
| Communication skills | Speaks clearly and distinctly all of the time      | Speaks clearly and distinctly the majority of the time                        | Speaks clearly and distinctly most of the time                                | Speaks somewhat clearly and distinctly some of the time   | Often mumbles or cannot be understood                   |
| ...                  | ...  | ...   | ...   | ...   | ...   |

Fig. 1. Traditional way of showing a fullfilled rubric.

This way, the student knows which expectations has satisfactory fulfilled and the level of achievement reached in each one of the evaluated dimensions. However, this visualization method does not provide any context to position the student’s performance in the different dimensions among the group. Moreover, even if the grade obtained by the student is similar to the grades obtained by the rest of the group, it is possible for the student’s work in one particular dimension to be considerably worse than the group’s one and to be compensated with a better performance in another dimension.

From the teachers’ point of view, this kind of visualization provides no benefit, because, as evaluators, they already know which expectations are fulfilled by the student. Furthermore, if the teacher wants to see the whole performance of the classroom in a particular evaluation, the most common way of displaying this information is through the arithmetic mean of the grades achieved. This visualization method does not allow analyzing the weaknesses and strengths in the different areas of the evaluated work.

### III. RUBRIC VISUALIZATION PROPOSAL

In order to improve the information displayed and allow getting more benefits from it, the visualization module of AdESMuS provides several ways of visualizing the data corresponding to the evaluations. For example, radar plots, among others, are used to represent the result in a rubric based evaluation in order to supply information that allows extracting knowledge about the learning and teaching processes.

When representing a rubric in a radar plot, the axes of the plot correspond with the dimensions of the rubric, and the different performance levels form the scale.

Next the provided visualization and some of their benefits are presented.

#### A. Visualization for students

The visualization for students through a radar plot of an evaluation where a rubric has been used shows the student's degree of achievement for each dimension (blue in Fig. 2). Fig. 2 shows the result of a rubric to evaluate an oral presentation where aspects as the correctness of the used "grammar and vocabulary" and the adequateness of the "content", among others, are taken into account.

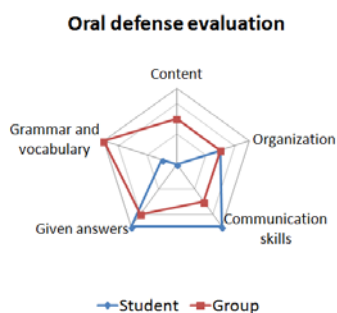


Fig. 2. Student's visualization for a rubric based evaluation

This kind of chart allows the student to visualize if his or her work is regular in all the evaluated aspects or if there are some aspects that stand out in a simple glance. For example in Fig. 2 the performance of the student in both "content" and "grammar and vocabulary" dimensions is very poor, but the performance in the other dimensions such as "communication skills" and "given answers" fully satisfies the expectations.

Radar plots allow navigation, showing specific information when clicked. For example, when a node of the plot is selected, more information about the selected dimension is shown (i.e. standard deviation of the group, position of the student in the ranking of grades, etc.).

This visualization also allows the student to compare his/her achievement for each dimension with the results achieved by the rest of the classroom (red in Fig. 2).

When comparing to the group, in Fig. 2 it is easily spotted that the student's work in the "grammar and vocabulary" area is remarkably worse than the work done by the rest of the group he or she belongs to. This way the student knows to what extent he or she is keeping up with the rest of the group

and which his or her weaknesses are in order to take measures to strengthen those areas.

#### B. Visualization for teachers

This type of chart has also benefits for the teachers. Teachers can visualize the same information a student does, just selecting one from the list of students. Teachers can also visualize the whole group's achievement in a radar plot to detect straightforwardly, which dimensions are the majority of students performing worst. This will help teachers to take measures to overcome the detected problems.

As shown with an orange dotted line in Fig. 3, the considered group gets quite bad results referring to the "grammar and vocabulary", so this is an area where some reinforcement would be beneficial for the students.

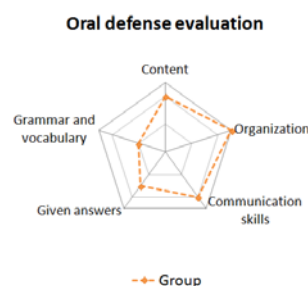


Fig. 3. Teacher's visualization for a rubric based evaluation

The system allows teachers to define the students groups to be visualized (for example, two groups of students that have used different approaches to carry out a task). Moreover, the teacher can see in a unique plot several groups, which will allow making richer performance comparisons among groups. This way, the teacher can analyze the teaching process carried in those groups and detect if there are significant differences that explain the different performance levels and take measures to improve the teaching process.

The radar plots for teachers are also interactive, showing group related statistics when clicked and allowing accessing information about a particular student among other possibilities.

This visualization enriches the teacher's knowledge about the students' performance and allows reinforcing the efforts in those areas and groups with lower results in order to improve the pedagogic interventions.

The possibility of defining the groups to visualize using different criteria enables a great amount of analysis not only about the learning process but also about the evaluation process. For example, comparing groups based on the evaluator, allows analyzing the evaluators' behavior and strictness when evaluating, which can be useful information at the time of composing an evaluation board.

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