

Graphical Evaluation of Students' Academicals Expedients

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Abstract. Whenever one evaluates school data it is somewhat difficult to get an overview of the capabilities of a particular student or the class in general. This is because information about them is stored as numerical values, which need to be evaluated at a later date. This article proposes a system for generating rapid visual results, resulting in saving the teacher time and effort. This system is based on generating graphs, similar to those of football video games, showing the capabilities of a particular player, but instead of displaying such characteristics; it will show graphs concerning their ratings by subjects or their personal capacities. This will display the progress achieved and talents of each student, quickly and easily, making it easier for companies to assess each student, without taking the time to see their full record.

1 Introduction

Student evaluations and review of their records are routine tasks for any teacher, as well as being a means to qualify the student to discuss the different aspects with his peers [1]. It is essential to use this data for any change in academic activity [2]. Such actions and meetings are tough because of the large number of students and the evaluation data, which is generated regarding them. Thus, for each student the teacher must study all the data that is related to his test scores, work practices and attitudes for each of the studied subjects, which multiplies the amount of information to manage. So if we talk about 10 scores per subject, 10 subjects per student, and 25 students per class, we would be talking of 2,500 pieces of data to be processed for a single class [3]. Moreover, the search for information, or a particular student one is tutoring is complex, since it has to deal with this large amount of data.

Everything described above not only affects the amount of time that one has to dedicate to the task, but also influences the attitude of the evaluators, as they know firsthand the actions to be taken and the work, which will be involved to perform it. This not only complicates the work of teachers, as they must examine large amounts of data that will take some time and, consequently, adversely may affect his/her mood when performing the work. In this article we propose the inclusion of student data graphically, which will provide a wealth of information to teachers with just a glance [4]. This type of chart will follow the structure of the content similar to that in a football game, which shows an overall shape and a wealth of information of a particular

player. This will influence the amount of time teachers will have to invest to see a specific file and thus, in turn, will positively affect the state of mind of teachers.

Furthermore, it should be noted that it would positively influence student tutoring, as it will facilitate the observation of their attitudes and thus a teacher will be able to see the path that a student may take in the future. In a student's future that may be determined by corporate or institutional work, possible future employers will be able to see the attitudes of students in a much more intuitive and simple way, which may foster an interest in them for their future employment. To explain more fully what is proposed in this article, firstly we will discuss the state of the art with reference to the graphs showing the information, we will present a case study to develop the subject, and we will then detail how to apply the current system and how it can help students for future recruitment in the workplace. The paper will conclude with an overview of the future enhancements of our work.

2 Similar Applications

Video games have been one of the products that have evolved in terms of usability and sampling information [5]. This is because, for users who buy these games, it is very important to feel comfortable interacting with the interface and not to be overwhelmed with a lot of information that cannot be processed in a short time [6]. Due to this, companies have allocated significant resources in the development of interfaces and how to display large amounts of information easily so that the user can examine the game at a glance, easily and intuitively [7]. We took into account two games among the various existing games that have the characteristics described above. These were sports games, particularly related to football, which made use of graphics to show the user similar characteristics of a particular team or player without having to dig deeper into specific details as discussed in [8][9][10][11]. Between these video games we present the most used:

- Pro Evolution Soccer [12]. This is a football simulation game that in previous versions used graphs for a comparison between teams and players (Figure 1). In this way it was much easier for the player to select the most suitable footballer. As can be seen, Figure 1 shows the global parameters related to the offensive power (OFF), technique (TEC), physical (PHY), defence (DEF), tactics (CT) and speed (SPD).
- Football Manager [13]: This is a game based on the management of all aspects of the world of football, where the player has the role of manager and is responsible for different clubs. Since this is a game that uses a lot of data about players, clubs, etc., it uses visual elements to make it easier to evaluate the characteristics of a particular player or club. Figure 2 shows how the profile data sample of a particular player is presented.



Fig. 1. Equipment Selection and Comparison Chart in the game Pro Evolution Soccer 2011.



Fig. 2. Display attributes of a specific player.

This screen uses an octagon-shaped graph, which helps the user to globalize the attributes of a particular player. So in this way the user can compare and discuss aspects of players in a more simple and quick way. In the next section we detail the data used to create the graphical information in one of these examples and we see how it is related to the students' information.

3 Samples and Data Collection

To explain the values that are used to display within the visual graphic, we took as an example the graphical attributes of the game "Football Manager" because they can more easily verify their consistency with the data set of individual attributes. Thus each of the general attributes "Defending", "Physical", "Speed", "Creativity", "Attacking", "Technical", "Aerial" and "Mental", consists of a set of specific attributes:

- Defending: Marking, tackling and positioning.
- Physical: Acceleration, agility, balance, jumping, natural fitness, pace, stamina and strength.

- Speed: Acceleration, agility and pace.
- Creativity: Creativity.
- Attacking: Crossing, finishing, long shots, passing, creativity and off the ball.
- Technical: Corners, crossing, dribbling, finishing, first touch, free kick taking, heading, long shots, long throws, marking, passing, penalty taking, tackling and technique.
- Aerial: This global attribute varies as to whether it is a player or goalkeeper who would be performing it, where there are other elements to consider. However, it includes jumping and bravery.
- Mental: Aggression, anticipation, bravery, composure, concentration, creativity, decisions, determination, flair, influence, off the ball, positioning, teamwork and work rate.

From the first glimpse of the game, the user can determine the capabilities of a particular player, because of these global attributes. As in the game, we have also created a similar graph to expose the academic abilities of a particular student. This allows the teacher to locate the areas in which the student is strongest and those in which he/she is weakest at first glance. It also allows him/her to determine these values and establish models that establish students' needs and what kind of help to give them.

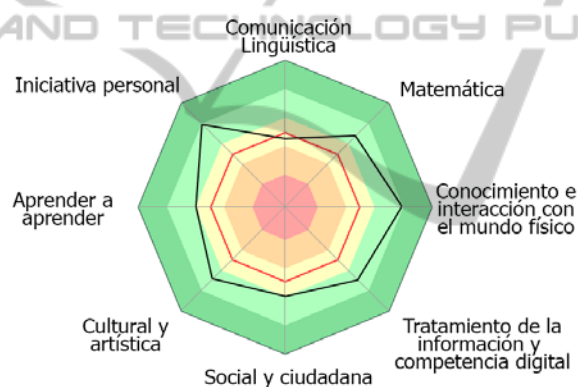


Fig. 3. Graphic core competencies for the subject of Natural Sciences.

For the case described in this article, we refer to the basic skills and qualifications of the subjects for a visual graph (determined by the particular core competencies of the subject). Thus, the graph of basic skills will be considered under the provisions of the European Union, as set out in Organic Law 2/2006 [14], which defines the following core competencies: Linguistics; Mathematics; Knowledge of, and interaction with, the physical world; Data processing and digital competence; Social and civic; Cultural and artistic; Learning to learn; Personal initiative. In relation to the studied subjects, taking as an example the subjects of the 1 ESO model, stipulated in Madrid: Natural Sciences; Social Sciences, Geography and History; Physical Education; Spanish Language and Literature; First foreign language (English); Mathematics; Plastic and Visual Education; Technology.

Figure 3 shows the graph of the function in the same grades, where the center of the octagon is a score of 0 and the perimeter points are a score of 10. The centered line corresponds to a rating of 5.

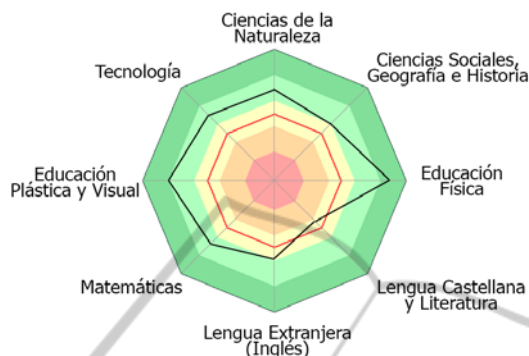


Fig. 4. Chart scores in function of the subjects.

It should be noted that each of the subjects is composed of notes of evaluations, not only related to exams, but also other aspects such as work or participation. Besides the above, the video game is selected as the basis for graphical elements containing a particular indicative quality, showing that a particular player may be based on a report (Figure 5). As happens with the graphics, they are very useful and indicative when judging how a player looks overall, thus further controlling the information without carefully examining the facts.

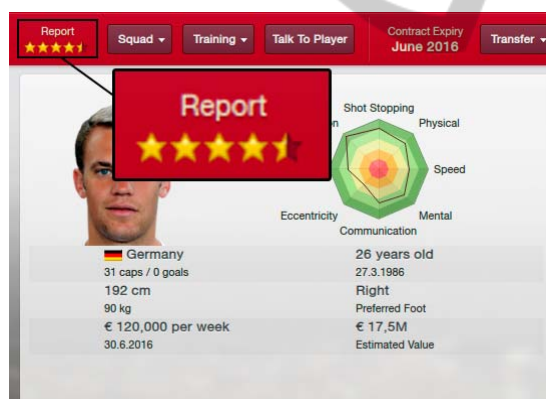


Fig. 5. Stars related to the quality of the player based on a report of an employee.

Such elements will be used to examine certain aspects within each subject or core competency. For example, if we inquire into the subject of mathematics, these pointers can be found in relation to the different lessons or skills concerning the calculation of equations, mental math, derivatives, integrals, etc. Where each star within our proposal is determined by an attribute (figures in parentheses are equivalent values which indicate grades from 0 to 10):

- 1 star: Very Bad (0-2 inclusive).
- 2 stars: Poor (2-4 inclusive).
- 3 stars: Regular (4 to 5.5 inclusive).
- 4 stars: Good (5.5 - 7 inclusive).
- 5 stars: Good (7-9 inclusive).
- 6 stars: Excellent (9-10).

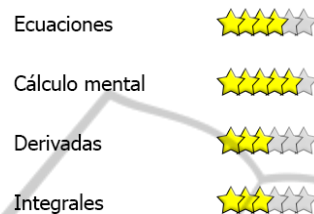


Fig. 6. Capabilities of specific attributes.

This will achieve a concrete vision of all aspects related to a particular subject, increasing the details without going into values that would involve the user in a more comprehensive study. Furthermore, it is achieved, not only by having an overall perspective with reference subjects and basic skills, but it also possesses the individual elements constituting these general graphics.

4 Applying “PRO” to Educational Environments

Once we have viewed how the materials and basic skills are associated with the graphics (and considering that each subject determines the global core competencies) we can begin to apply this system to the current educational settings. Today, most of the students’ tracking systems are managed by software applications that facilitate this work. For the purpose of this article, only minor modifications are necessary within that system. In fact, as it is only a visual representation, it is only essential to associate the appropriate values of the academic file to the relevant graphic, so that it is updated concurrently with the student's file.



Fig. 7. Graph showing student model with specific problems.

The inclusion of such visual elements within the student's curriculum is very useful as it greatly facilitates the work of the tutor and evaluators [15]. This is because, de-

pending on the graph model associated with a given student, it may disqualify one policy type or another. For example, if there is a group of students whose overall basic skills graphs are similar to that shown in Figure 7, they should pursue a policy of strengthening math attitudes, in addition to trying to help them to be more participatory, to not be afraid to make mistakes and try to improve their learning skills [16].

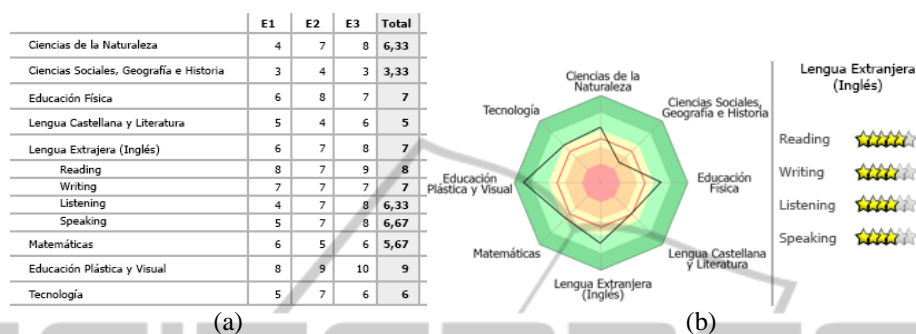


Fig. 8. Example table with scores of a particular student.

Based on the above, from the inclusion in the database of specific models, we can establish where students have certain needs, so that the teacher and / or tutor would know instantly with just the service records. These models are still being studied so it will not be discussed in this article.

One thing to keep in mind, which is vitally important, is the usability of such visual elements. As mentioned earlier, the fact that academic staff can get a lot of information with a glance greatly facilitates the work of teachers. To confirm this reasoning, we suggest the following exercise to the reader, which consists of displaying Figure 8 (a) and Figure 8 (b) each for five seconds, and to try to remember the information stored.

Without knowing the outcome that has been given to the reader, we can deduce that in most cases (if not all), the remembered information from Figure 8 (a) is much closer to reality than the values remembered from Figure 8 (b). This exercise just goes to prove that visual information, such as well-structured graphical query information, facilitates and reduces the time required to read it.

5 Institution & Company Relationships

Until now there has been talk of using this type of graphic in elementary teaching so that it makes use of the basic skills as an evaluator. However, it can not only be used for that teaching level, but also it can be applied to high school, vocational training or colleges, where the graphs can serve as a showcase for a future foray into the world of work. As discussed above, these stages, where students are defining their future and deciding exactly what they want to do in their life, have elements that show their capabilities, which is helpful for both the students themselves and for companies wishing to find future new employees. If the student is encouraged in their interests and wants to improve their skills, companies will be able to consult their records. In

case of companies, they will benefit from the ease of use of query profiles to assess which students might fit their needs in the future [17]. Obviously, it must be clarified that this is personal information and that students, parents or guardians must consent to the diffusion of information in this type of field. Thus, the relationship between employer and educational institution will develop closeness and benefits that could benefit both [18]. The school would welcome a large number of students who are successful in their school work, and the company would be very interested in acquiring students with the characteristics which are as close as possible to their requested profiles or who will be useful to them. Here we propose a scenario where the call signs will be associated to particular students who are completing the Engineering Computing course (Figure 9). These show the problem solving ability of the student to different programming languages [19].

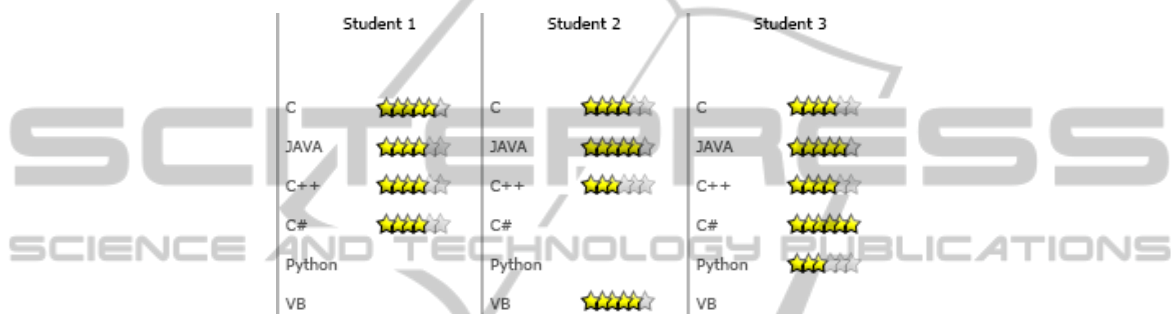


Fig. 9. Example table with scores of a particular student.

With this information, the recruiting companies will have much easier time scouting potentially good students, which will facilitate the recruitment of new graduates and the unemployment rate will decrease.

6 Conclusions

The current tasks of consultation and evaluation of student records, and the tutoring of students, are somewhat arduous, and this may influence the mood of teachers who have to achieve these tasks. Besides this, the absence of elements that facilitate such consultation limits the scope that would have been on the record or a particular student curriculum. Given the above, this article has introduced the concept of visual graphical assessment, which is easier to perform and is more intuitive. If we also add the scope that can be achieved because of these features, these simple graphic elements are also very useful as they provide a lot of information at a glance. Ultimately, it will help both the student and the teacher, and will provide a link between the institution and company that will benefit both parties.

This type of graph will help to improve access and other tasks within the school, which are necessary for future new proposals to increase the reporting capabilities inherent to these. So modeling is being studied as a basis for establishing what branch would be the most appropriate in terms of the capabilities of a particular student. For example, a student who is good in subjects such as mathematics, physics and comput-

er science, would be very likely to be employed in future as a computer engineer, or an industrial or electronic engineer, etc. Thus, the work of mentoring a particular student would be more useful, as a result of these models, so the student's professional future would resemble the student's abilities more.

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