



**Improving 10th Grade Students' Writing of Scientific Reports through Self-
Assessment Techniques**

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Starting with the invention and revolutionizing the way languages were taught, many schools across the world started immersion and bilingual programs with the purpose of offering better educational services. These, simultaneously, provided new opportunities for young learners to start mastering a foreign language: English, especially. Across time and boundaries, many non-English speaking countries researched and developed better methodologies for both kids and teens to engage in a new language.

Ecuador is not the exception. In 2014, the National Curriculum proposed by the Ministry of Education invited all institutions to reconsider and adapt to the idea of providing the same range of skills through the years of education in primary and secondary, for the successful outcome of having a B1 English level.

Having thought of these issues, there are many limitations that may be presented for teachers to have at the moment of making students catch up in the learning process. One of these challenges, as an example, is the way learners write through content subjects, like Science, Social Studies, and Business, among others. This is the case of students from 10th Grade from a private high school in Daule, Ecuador.

Science (since it is not seen in Spanish) is one of the most challenging curricular topics they struggle with, up to the point of low scores and problems when writing ideas and failing in plagiarism as a consequence. Learners are unaware of the academic dishonesty this latter involves, and how to put their words in the scientific context of the class topic. Through the present Action Research, the implementation of self-assessment techniques for making learners improve their scientific writing skills might

transform positively the way these students enhance the content and their autonomous abilities for life as well.

Literature Review

Self-assessment

At any point in life, a person has reflected upon the good and the wrong things they are doing with their acts. From that very first moment, a child gets the logic that something is not correct, or whether they are doing it accurately, that is self-assessment. Any younger or adult human being with the cognitive development of being good at something or not so well is judging the quality of their actions and trying to improve. In the educational field, same as life, there is no difference. Alternatively, maybe there is one. In the words of Brown and Harris (2013), “self-assessment is a descriptive and evaluative act carried out by the student concerning his or her work and academic abilities.” (p. 370). There will be situations where this type of assessment may relate the skills to be developed and how these were instructed as the teacher proposes an academic topic to cover.

Needless to say, many researchers and educators have been aware of the multiple benefits this type of assessment presents. As an example, authors Duque and Cuesta (2017) dealt with self-assessment in oral and vocabulary skills for young adult learners. The researchers involved in the process, the use of learning logs, audio recordings and other techniques that successfully achieved the expected results in speaking post-tests by the end of the study.

In a similar case, researchers Andrade et al., (2010) improved essay models by the use of rubrics with middle school students. Thanks to an effective scaffolding,

reading material and guided instruction for the use of the rubric were indicators that satisfactorily enhanced the learners' writing skills.

Last but not least, a pair of female researchers from Iran, Fahimi and Rahimi (2015) plotted the impact of self-assessment in EFL female learners from Iran to boost their writing. They reported the way these participants had no idea about how to measure and judge their own work, and how progressively, they were able to improve, the same as a positive attitude towards the development of their academic skill was taken by both learners and teachers. To sum up, case studies like these can confirm and support the way theorists have agreed on the employment of new classroom ideas.

Advantages and drawbacks

In the long-term, self-assessment may present varieties of positive aspects to be considered. Having more learners thinking how good they can be and monitor their progress, ensures better citizens and more professional people globally (Deneen, 2014). In the same way, students who are supported and encouraged to constantly self-assess their work are most likely to be applying this process in their everyday situations and making judgments of their performance for improvement (Vattøy, 2015, p. 9). Finally, it has been demonstrated that this type of assessment improves the cycle of learning being: "Self-evaluation is really the combination of the self-judgment and self-reaction components of the model, and if we can teach students to do this better, we can contribute to an upward cycle of better learning" (Rolheiser & Ross, 2001, p. 47).

Nevertheless, there are some drawbacks when preparing our students in order to become autonomous learners. As researcher Ingrid Bueno (2021) presented, there may be complications while working these cognitive levels with students since not all levels may be accurate to be used. Also, the perspective of using rubric terminology and the methods to guide to evaluate one's work might go beyond the expected.

Besides, the problem with self-assessment is that it is not auto explained. For authors Jamrus and Razali (2019, p. 71), students need constant supervision and guidance in the use and understanding of criteria, rubrics, and other techniques that help them progress towards independence. Certainly, this is a limitation for teachers who always rush against the clock. Last but not least, time is highly relevant in designing our students towards self-assessors. It requires a lot of guidance, clarifications, and extra sessions where learners and educators can work together for the autonomy of the former to be achieved.

Enhancing Writing in Self-assessment

One excellent example of the effectiveness and application of self-assessment with students is the involvement in the process. Rolheiser and Ross (2001) recalled from their experiences and research, one model for implementing this evaluation form is negotiation with the class. There should not be ways of imposing the parameters in mind, but neither leaving them too simple for them to evaluate poorly. Working in collaboration with the class in designing the rubric or checklist can be a way for satisfaction and goal accomplishment.

Once prepared, it is time for the teacher to show and explain the *how*. How will students evaluate their work? Through models or examples, they will understand what the criteria mean to them. In the next stage, the class will be receiving feedback upon their assessments. “Teachers need to help students recalibrate their understanding by arranging for students to receive feedback—from the teacher, peers, and themselves—on their attempts to implement the criteria” (Rolheiser and Ross, p. 7). Finally, goals and action plans will be set. The most troublesome aspect of showing students how to assess their work involves planning ways of offering them help as they utilize self-evaluative information to lay out new objectives and levels of exertion.

Innovation

The type of instruction that is used relies on McTighe and Wiggins' Understanding by Design (2011). While assembling the innovation through the backward design process (Appendix 1), the goal established was that learners would be able to write down scientific reports based on chemical and nuclear reactions, and use factual information and evidence to note how these events take place in the real world.

Science classes were received 3 times a week, with 30-minutes periods. No counterpart in Spanish was seen, which demanded a covering of skills not only in the second language, but as planned by the Ministry of Education as seen in the National Curriculum (2019).

While implementing the backwards design innovation, students were working through a hybrid model of classes due to the progressive return for schools due to the COVID-19 pandemic: few attendants —between 5 to 10— were in live classes, while the rest were connected to the same via Google Meet. This last factor created a lack of motivation for learners to be fully engaged in the classes and the way they presented tasks or class activities. This also created academic dishonesty and many works were evidenced to be plagiarized or copied. Through the innovation weeks, it was also promoted original work and to cite references properly.

At the beginning of the innovative design, the project was set to last 5 weeks. However, the execution relied on the chronological development of the school year, and in the end, the innovation lasted 10 weeks (time for an Academic Partial in this virtual model). By the beginning of week 3, the content and topics of the innovation were shared with the students, same as a checklist with criteria, which they will use to assess their work.

The lesson plan included activities to enhance vocabulary skills, and master the content. The resource to use was the Science Fusion textbook series (DiSpezio et al., 2011) the institution applied for Science classes, and writing workshops targeting scientific papers and inquiry skills. All of these materials and resources were shared and shown to the students progressively in the virtual sessions via Google Meet, where they would receive their synchronous classes. Later, this same information would be supported through Moodle, the virtual classroom for learners to check recorded classes, submit homework and access class documents and files. In the same way, parameters and descriptions, rubrics and checklists were socialized with the class in order to review and reflect upon their work before submission.

Referring to the roles of the participants, the teacher must be only a facilitator of the content and instructional activities that learners would manage individually and independently. Since the focus of this innovation falls into self-assessment, a type of autonomy was also wanted to be prompted to the class. By the time the implementation of the instructional design was set, it was shared with the students the rubric with the criteria to be applied. Similarly, the use of the checklist as a filter prior to submission was always reminded. Furthermore, students were always invited to revise the Moodle Platform for resources, further details and information about activities, and other checklists and criteria of how their work would be graded, in a way to scaffold their independent learning.

Research Methodology

Action research is considered for the description and analysis of this project. As Mills (2011) defined, this type of research makes educators continuous learners in their classrooms and institutions. Simultaneously, action research is an excellent way to keep

on teaching and detect problems that may occur in the class, finding a plan for improvement. For the present paper, quantitative data is going to be considered.

In order to measure the progress of students towards self-assessment instruction, both a pretest and a posttest were implemented as instruments of data collection. Since the present author was the teacher in charge, no external evaluations were applied: instead, graded activities from the class instruction were used. A first pre-discussion forum was set in the Virtual Classroom for students to fill in, and the posttest was held as their Second Term Final Project. The pre and posttest were graded using a rubric, which contained three criteria that evaluated the quality of the writing piece. These same were shared to the class in the form of a checklist for self-assessment. The numbers obtained will be later analyzed.

Participants

The participants were 35 students —ages 14-15— from 10th Grade, class “B”, from a private high school in Daule, Ecuador. This class was composed of 13 boys (representing 37,1%) and 22 girls (62,9%). Being a private school, the socioeconomic status of the students can be assumed as medium/high level. Many of these students live around the area, where private citadels with an added value are emerging, or both parents are providers of economical incomes.

The school manages an English curriculum in 5 different subjects in middle high school years; and by the time these learners have arrived at 10th Grade, a B1 English level —as established by the CEFR (2018) is expected to be managed. Many of these students have also been in this institution since elementary, adding to that the factor of immersion in English oral and written skills as expected by the school’s

standards.

Instruments

Discussed previously, the instruments for measuring an improvement in writing skills through self-assessment techniques relied on a pretest and a posttest. They ensure to answer the research question: Does self-assessment influence writing scientific reports in 10th grade students of a bilingual school? This would be achieved by the use of an instructor-graded rubric to qualify these tests. The rubric was adapted from the ScienceFusion program (2011) to assess indicators in elements, research, and language.

During week 3, the first test was administered as a pre-discussion forum. Learners had to research and add information in the panel about chemical and nuclear reactions. At the same time, it was shared that this activity would be graded by the standards that the rubric presented, as well as a checklist for prior revision (Appendix 2). Weeks passed by and the second test was taken, represented by the Final Project of the II Term. This time, students were to compare and contrast nuclear and chemical reactions, with examples of how they are present in everyday situations. The same rubric and checklist were socialized in the virtual session.

The applied rubric (Appendix 3) was constructed on the basis of the checklist previously described. It contains three assessment indicators: *Required Elements*, *Scientific Research and Content*, and *Scientific Language*. The first criterion, judges up to 3 marks, the organization of the report into an introduction, body and conclusion, the use of transitions and supporting details as requested in the guidelines of the Project. The second criterion, grading the Research and Content over 3 marks, involved the adding of relevant topics and supports of trusted references and proper citation. Finally, the parameter of Scientific Language (4 marks), invited learners to vary their sentence

structures, logical connection between ideas, key vocabulary and real-life evidence related to the instruction of the assignment.

Data Analysis

Being a type of quantitative research study, the pre and post evaluations were graded and analyzed as by the three criteria the rubric presents. These numbers were registered using Google Spreadsheets, a data analysis software for large amounts of data; which gives the option of representing them with graph bars and other representation types. In the same way, a descriptive statistical analysis was run (mean, mode, median, minimum, maximum, and standard deviation). Inferential statistics, through a paired *t*-test were also calculated.

Ethical Considerations

One of the ethical considerations that author Jane Zeni (1998) mentioned relates to the impact the study provokes on participants' lives. For this reason, the present author considers that students should not be advised they are being participants in a controlled research study. This would conclude in unreal results due to the intervention. At the same time, the group may feel the pressure of succeeding for their own benefit, or limiting the researcher's implementation.

Another ethical consideration targets other actors of the educational community. For many educators, a new type of accustomed methodology can be overwhelming, and implementation may cause discomfort, provoking a rejection of the innovation. Therefore, technical difficulties and observations should be registered, including qualitative data to the study for more appropriate comments on the impact.

Finally, the consideration of applying this research relies on each teacher's educational setting: "it may be dangerous for a researcher or a more experienced

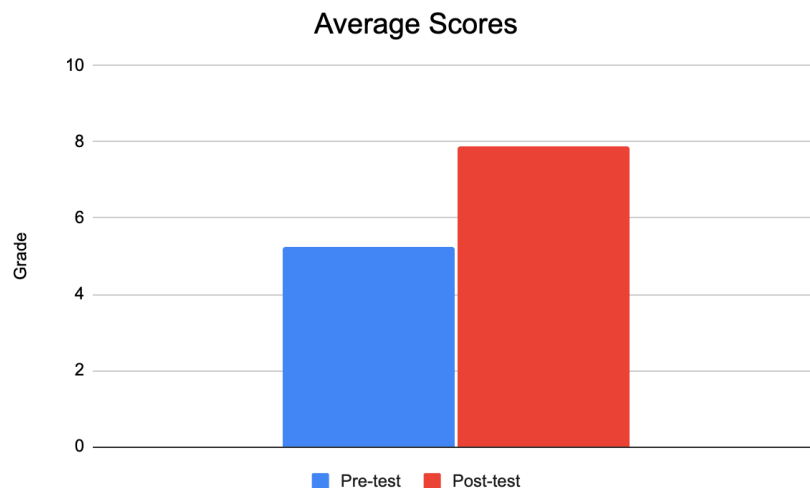
teacher-researcher to impose on colleagues their own innovative, liberating and emancipatory agenda when others involved seem to be content with the professional environment they inhabit” (Banegas & Villacañas de Castro, 2015). This last aspect is further discussed in the Recommendations section.

Results

The implementation of this project set a distinguishable contrast between the pretest and posttest results. During the first intervention, the mean score the group got was 5.11; while the post-test was 7.68. It could be also noticed the improvement in written language and research due to the self-assessment technique, improving grades and students’ achievements while doing so. The graph below shows the average results of both interventions:

Figure 1.

Analysis of Pre-test and Post-test results

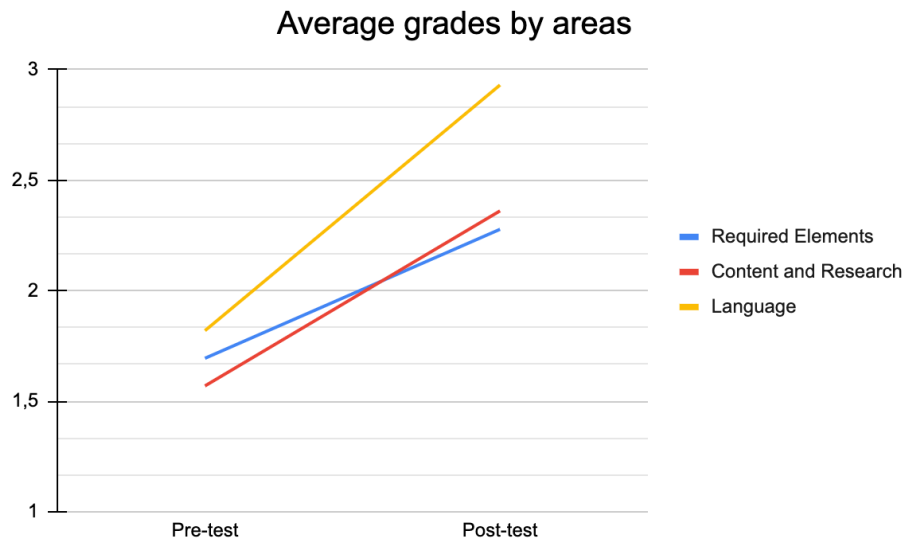


Important to remark, the average of the criteria on Language for both tests changed significantly: the first report had an average score of 1.82. On the other hand, the average result for the final report improved to 2.93. This time, the posttest of the

majority of the class experienced grades from 7.00 to 10.00; as well as a boost in ideas and content of the elicited topics according to the scores in each section (see Figure 2).

Figure 2.

Average grades in Rubric areas during interventions



Previously stated, the Research question aimed to prove: “Does self-assessment influence writing scientific reports in 10th grade students of a bilingual school?”. With this in mind, a *t*-test was held to provide support for the hypothesis. Thanks to the results of a paired-sample *t*-test, the null hypothesis was rejected (0.39 in correlation between test results); and a statistically significant difference among the pretest and posttest results was observed ($t=-4.26$, $p < 0.01$). This suggests not only an improvement in students’ grades, but also quantitative evidence of how self-assessment adjusts learners to achieve expected results in linguistic skills.

Discussion

The present study tends to prove as evidence of the positive effect self-assessment has in students when it is applied. The applied techniques, in this case, play an obvious result of how modeling a learner to evaluate their own work can modify their autonomy and the quality of their work, as reflected through the grades obtained.

When compared to other types of strategies, this type of assessment has been tested (Baniabdelrahman, 2010; Micán & Medina, 2017; Chen, 2018; Andrade et al., 2010) with many positive results and outcomes in varied grades and countries, showing its effectiveness. Likewise, making students' own assessment while learning can be applied in other areas of language acquisition, yet the techniques have to be in charge of the teacher and its ability to detect how the class might react to these.

Conclusions

The stated research question prompts if self-assessment influences the way written reports are done in this tenth grade students. Through the analysis of results and descriptive statistics, a conclusion can be drawn: it certainly does. Self-assessment is not only one method for teachers to provide new ways of engaging students into learning, but also a motivational tool for students prior to any type of activity or project that involves the mastery of skills. The hypothesis can be proved in the same way: an increase of grades —considered significantly— was obtained as a result of implementing this innovative design in a bilingual classroom.

Lastly, it should be encouraged to many educators the way self-assessing has displayed valuable results. Society needs to be reminded of the way coming generations will deal with the outside world once high school finishes; and it can be cultured in the coming years, that young learners can also be part of their knowledge and instruction by evaluating and judging their work and actions.

Limitations

There may be few constrictions while planning to design lessons with self-assessment in mind. To begin with, the way students may get familiar with how to judge and criticize their work: “The term self-assessment is not self-explanatory and it needs

time to be introduced to students who are new to this concept” (Banerjee & Alderson, 2001; as cited by Jamrus & Razali, 2019). The teacher has to recognize this is built progressively, and probably will not work at once.

Also, learners may get biased in how their work looks “nice”, and not properly as it must be. The design of instruments to measure this assessment need to be shown and applied scaffolded. Once the teacher has truly assured the student knows how a checklist works, or the way a rubric differs their job from the expected, then true results will be obtained and self-assessment will be interiorized.

Finally, “criteria-referenced self-assessment can ensure that all students get the kind of feedback they need in order to achieve success in their learning” (Jamrus & Razali, 2019, p. 71). Not designing the established parameters or evaluation criteria will fail in providing proper judgment for learners, even when self-assessing their work is promoted. There was the option to consult students’ experiences regarding the process of evaluation of their work —qualitative data—, yet times were not in favor of doing so.

Recommendations

While there may be a lot of other studies in English as a second/foreign language class, it is strongly recommended to try this type of assessment in other disciplines that go beyond the expected. Across the Literature review of this paper, almost no information was found on how students improved mathematical, historical or artistic skills by using self-assessing techniques. This may be an indicator for researchers and pedagogists that learners can keep on being autonomous and their own assessors when working or studying.

Also, time should be a variable to pay attention to. For the present project, only 10 weeks of the self-assessment innovation came out with these results. It was mentioned before that it may not always work at once, so consider a long-term

application of techniques that involve more the participants in self-assessment. If possibly, make it a class culture. Remember this will also enhance learners in their lives to be autonomous and work-independent.

Finally, backwards design was a collateral milestone to achieve. As part of the innovation, it was prompted to be used. However, during the execution of the same, it turned out to be a fantastic and accurate tool to change the teaching experience and be more goal-oriented. The present author noticed that, having the evaluation designed first can have teachers and students going to the specific target, rather than teaching something that will not be of use later. For these reasons, future researchers may have in mind to plan their lessons going backwards.

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Appendix 1

Lesson plan

Available upon request.

Appendix 2

Checklist

Available upon request.

Appendix 3

Rubric

Available upon request.

Appendix 4

e-portfolio Link

Available upon request.