

**Students' Experiences in Self-Assessment: Training, Processes and Feedback Use  
in Secondary and Higher Education.**

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### **Abstract**

Self-assessment is a widely explored topic in educational research. However, more research is needed on some of the self-assessment practices and their relationship with academic performance. This study aims to fill the research gap by analysing students' self-assessment training, what type of self-assessment processes they report, and how they use feedback when self-assessing. These were explored through interviews with 65 secondary education and 122 university students. Participants reported (1) to self-assess frequently, (2) to prefer different feedback sources with secondary education participants preferring learning materials over agents, (3) to use different self-assessment processes with higher education participants using more advanced strategies and a wider variety of criteria, (4) to enact different self-assessment processes depending on the task characteristics, and (5) there were differences between reported vs. performed self-assessment processes. Our results lead to more insight into the self-assessment experiences and emphasise the need to strengthen self-assessment practices in the classroom.

*Keywords:* self-assessment; feedback; academic performance; secondary education; higher education

## **Students' Experiences in Self-Assessment: Training, Processes and Feedback Use in Secondary and Higher Education.**

Self-assessment is one of the main topics in assessment research because of its influence on learning outcomes and its relationship with self-regulated learning (Harris & Brown, 2018). The field of self-assessment has reached a certain maturity in recent years, as shown by the number of reviews published (e.g., Andrade, 2019; Brown & Harris, 2013; Yan et al., 2022). However, there are still gaps in the research about how students acquire, develop and enact this skill (for a review, Panadero et al., 2016).

Questions such as how students learn to self-assess, or who helps them, remain unanswered. As these seem essential for designing more successful interventions, this study explored some of these aspects. Thus, our aim was to understand how students learn to self-assess, how frequently they do it, how they gather and use feedback for self-assessment and what strategies and criteria they report using. We explored this with secondary and higher education students to investigate if there are changes across educational levels and employed interview data to understand students' own perspective.

### **Definition of Self-Assessment and Its Influence on Academic Performance**

Before moving further, it is important to define our main construct. Self-assessment involves “a wide variety of mechanisms and techniques through which students describe (i.e., assess) and possibly assign merit or worth to (i.e., evaluate) the qualities of their own learning processes and products” (Panadero et al., 2016, p. 804). This definition encompasses different types of approaches to self-assessment, as this can be implemented with formative and/or summative purposes (Andrade, 2019; Sánchez et al., 2017). It also outlines different actions that can take place (e.g., describe, assign merit). It is relevant to start our exploration from a wide enough understanding of

self-assessment, because students can have different perceptions of what constitutes self-assessment (Cowie, 2009; Harris & Brown, 2013). Our intention is to understand how students experience self-assessment so as to have an accurate picture of the phenomenon.

Understanding self-assessment will provide clearer guidelines for how to implement it, which is crucial due to the positive impact of self-assessment on academic performance. This has been attested in two meta-analysis: Brown and Harris (2013) found a median effect size between .40 and .45, while Yan et al. (2022) found an effect size of .585. Additionally, self-assessment has also proven to have positive effects for self-regulation (e.g., Kostons et al., 2012). All in all, self-assessment is a key skill for students to develop.

### **Differences among Educational Levels and Academic Performance**

Educational level and academic performance have been identified as influential variables on self-assessment. There is previous research that has shown a tendency for students with higher academic performance to be more accurate self-assessors (Barnett & Hixon, 1997); younger students tend to overestimate their self-ratings (Frey & Ruble, 1987; Kaderavek et al., 2004; Ross et al., 2002) while older students' ratings tend to be more aligned with the scores given by the teacher (Bradshaw, 2001; Butler, 1990; Elder, 2010). Regarding educational level, it has been argued that self-assessment ability is influenced by students' age or educational experience (Bradshaw, 2001; Brown & Harris, 2013; Ross et al., 2002). It has also been suggested that students in lower years in elementary education tend to focus more on superficial features in contrast with students in higher levels, who tend to report more complex judgements (Elder, 2010). Similarly, Harris et al. (2015) indicated that primary and secondary education students made comments about their performance based more on their effort, perceived task

difficulty and interest than on the qualities of the task. Kostons et al. (2009) found that expert participants tended to use more criteria and establish more positive statements, while novices perceived self-assessment as more complex. As can be seen, the tendency seems to be that younger or less experienced students deploy simpler self-assessment criteria or experience more challenges.

Importantly, to our knowledge, there has been no previous research exploring the differences among students in different year levels except for our own work. In three studies, we explored differences among three year levels in secondary education and three year levels in university students (Panadero et al., 2020, 2023, in press). We found that, in secondary education, there were differences in the type of criteria deployed across year levels (first-year level of high school, final year of high school, first year of the two preparatory levels for the university entry exam). However, we did not observe such differences within higher education. Notably, the present study new unexplored data coming from the sample of those studies combining the two data collections, one from secondary education and the other from higher education, to obtain a bigger picture.

Understanding the differences between year levels can help us to better understand why novices struggle more with self-assessment. Additionally, the particular data analysed in this study, self-assessment practices, will help us to understand the how students get acquainted with and use self-assessment from their point of view.

It has been argued that previous academic performance levels could influence the strategies used for self-assessment (Panadero et al., 2016). To address this, Yan (2020) delved into the relationship between academic achievement and self-assessment practices, and the results revealed that three self-assessment practices (i.e., seeking external feedback through inquiry, monitoring and self-reflection) during the

performance phase had a significant impact on academic achievement. However, to our knowledge, there are no further studies that have explored how students' previous academic achievement affects their self-assessment practices and how they use feedback. We thus investigated this aspect by analysing our data using groups arranged by academic achievement.

### **What Aspect of Self-Assessment Is Explored Here and Why?**

In this section, we present the main aspects explored in this study and why these are important based on previous research.

**Learning to Self-Assess.** Considering the benefits of self-assessment in students' learning, several authors have discussed how to promote it effectively so as to ensure students learn to self-assess (Harris & Brown, 2018). Some conditions and instructional scaffolds need to be met to increase the chance of a successful acquisition of the skills: for example, students should be aware of the value of self-assessment; have access to clear assessment criteria, direct instruction and help with self-assessment; and opportunities to revise and improve the task (Andrade, 2019). Most of these requirements are common classroom practices (Andrade & Valtcheva, 2009), but others cannot be taken for granted, such as sharing assessment criteria. Importantly, teachers can implement an array of instructional strategies, but do students perceive that they are learning from their teachers? Or do they perceive other sources to be more important in learning to self-assess? By identifying the moments that students perceived to be important for their self-assessment development, teachers can make the best use of those opportunities and improve the design of self-assessment interventions (Brown & Harris, 2014). Additionally, knowing how students learn to self-assess helps us to determine when they are more receptive to self-assessment and whether those pivotal

moments change among educational levels (Panadero et al., in press; Yan, 2017). This is our first research question.

**Frequency of Self-Assessment.** It is also important to explore the frequency at which students report engaging in self-assessment. To our knowledge, only Ibabe and Jauregizar (2010) have explored the frequency of self-assessment from the point of view of students. Their findings demonstrated a positive correlation between self-assessment frequency and academic performance. However, most studies on this topic have primarily examined student self-assessment frequency from the teachers' viewpoint. As found in self-report studies, teachers from all educational levels claim to implement self-assessment frequently in their classroom (Panadero et al., 2014). Indeed, Kasanen and Rätty (2002) observed life in a primary education classroom and found that self-assessment was a repetitive everyday practice consisting in a teacher-led framework. Interestingly, the situation in higher education studies using different data collection methods is the opposite. Another study, based on an analysis of the syllabi from first year courses of higher education, found that only 9 and 14 syllabi instances included self- and peer-assessment in US and Spain, respectively (Lipnevich et al., 2021). These findings illustrate the incongruence in the frequency as reported by teachers in the above mentioned studies, which employ different methods, and the scarcity of evidence from the students' perspective. It is therefore crucial to explore and understand students' experience with self-assessment frequency. This is our second research question.

**Feedback and Self-Assessment.** Self-assessment requires students to monitor their work against their own standards and criteria, but also to seek and use feedback. In particular, seeking feedback is crucial, as it connects students' learning to external inputs (Butler & Winne, 1995; Narciss, 2008; Yan & Carless, 2021). From a self-regulated learning perspective, feedback seeking is divided between two different



strategies: inquiring and monitoring (Butler & Winne, 1995; Leenknecht & Carless, 2023; Yan, 2020). Students obtain information from others about their performance (inquiry) as well as comparing that information with the assessment criteria, resources or their own performance (monitor). When this information comes from external feedback sources (teachers or peers), self-assessment can be more powerful, as it can be used to correct individual bias (Boud, 1999; Butler & Winne, 1995). In particular, with the use of external references during direct instruction and learning activities, students can learn to create self-feedback (Narciss, 2008). However, when the feedback is provided prior to self-assessment, the repertory of self-assessment strategies and criteria is reduced among secondary education students (Panadero et al., 2020). A similar decrease was found in higher education, except for participants who received either a rubric or a combination of a rubric with instructor feedback (Panadero et al., 2023). Indeed, these participants performed a higher number and more advanced types of criteria.

Given that feedback can help students to close the gap between their current performance and their desired goals, it makes sense to explore how it is gathered and used by the students. This would allow us to discover if students really engage in an active process of feedback seeking that leads to self-assessment. This is our third research question.

**Self-Assessment Process.** Historically, self-assessment has been conceptualised as a unified skill or strategy, without exploring the specific actions performed by the students when asked to self-assess (Panadero et al., 2016, 2020). However, recent studies have opened the black box of self-assessment. Yan and Brown (2017) interviewed 17 university students about their self-assessment practices and proposed the cyclical self-assessment process, which starts when students determine the

performance criteria and, afterwards, seek feedback if needed to continue to the last phase, where they make an evaluative judgement about their learning. In a similar line, we (Panadero et al., 2020, 2023, in press) have investigated how students perform self-assessment using a mixed-methods design that included thinking aloud protocols, video observation and self-report. In 2020, we (Panadero et al., 2020) identified differences in self-assessment strategies and criteria between subjects; we found that their participants used more different strategies in a Spanish task, but a wider range of assessment criteria in a mathematics task. A crucial finding was that, once the participants had received external feedback, the strategies and criteria decreased. In a continuing study with higher education students and different sources of feedback (Panadero et al., 2023), we argued that the provision of rubrics has the greatest potential to increase positively the quality of student self-assessment behaviours. Nevertheless, in the present study, we explore students' perceptions about their self-assessment processes (i.e., strategies and criteria) to contrast this data with our previous studies. Our fourth research question thus explores the self-reported processes when students are asked about self-assessment in general. In contrast, our fifth research question explores those processes in a specific context related to a written task (i.e., domain specific). As the data came from a larger study, a section is included in the discussion to integrate the reported data from this study with the process data analysed in a previous article.

### **Aim and Research Questions**

We sought to investigate key aspects of self-assessment practices as reported in interviews with secondary and higher education students while comparing their responses with their educational and academic performance levels. The study was organised around five research questions (RQs):

RQ1. How do students report learning to self-assess?

RQ2. How often do students report engaging in self-assessment?

RQ3. How do students report gathering and using feedback for self-assessment?

RQ4. What strategies and criteria do students report using for self-assessment?

RQ5. What strategies and criteria do students report using for self-assessment on a specific (written) task?

## Method

### Participants

A total of 187 students participated in this study, 65 (35%) from the secondary education level and 122 (65%) from higher education. There were two participating state-based institutions located in (NAME OF THE REGION AND COUNTRY). Secondary education students were from low–medium socioeconomic status (SES) and with intermediate academic achievement scores on the university entry exam. In higher education, participants were from the psychology faculty with intermediate–high overall academic achievement scores on the university entry exam. The distribution per year level was 28 (15%) students from the first-year level of high school (K7), 25 (13%) from final year of high school (K10), 12 (6%) from the first year of the two preparatory levels for the university entry exam (K11), 41 (22%) from the first year of university, 40 (21%) from the second year of university and 41 (22%) from third year of university. It should be noted that the university year levels followed a consecutive progression, whereas in the secondary education students, there was a difference between the year levels (i.e., the 3-year gap between K7 and K10). Information regarding the students' gender distribution and academic performance can be found in Table 1. While it would have been interesting to explore gender differences, given the low number of male participants at the university level, this was not feasible.

**Table 1.** *Characteristics of the sample.*

Sample characteristics	Secondary education		Higher education		Total sample	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	36	55	107	88	143	76
Male	29	45	15	12	44	24
Academic performance						
Low achievers (1-5)	12	18	27	24	39	22
Middle achievers (6-7)	26	40	40	35	66	37
High achievers (8-10)	27	42	46	41	73	41

The recruitment method was convenience sampling, and participation was voluntary. For secondary education students, parental permission was required. There was no reward for participation at the secondary education level, but for the higher education students, participants received credits (ECTS).

## **Materials**

### ***Interview***

A semi-structured interview (See script in Appendix 1) was created for the study with eight questions exploring three main themes: (a) self-assessment training, (b) self-assessment processes and (c) use of feedback for self-assessment. The first section included two questions regarding the frequency and type of educational training students received about self-assessment. The second section included three questions about students' use of self-assessment (frequency, strategies and criteria) both when assessing general and domain-specific activities (i.e., written tasks). Finally, the third section included three questions exploring the type and use of feedback sources for self-assessment.

**Procedure**

The second author presented the study to 12 classroom groups in a high school and four calls via official channels were issued to attract higher education students. The data presented here are part of a larger data collection, which was also the source of the data for our previous studies (Panadero et al., 2020, 2023). Before the interview, participants in secondary education level performed a set of Spanish and mathematics tasks, while those from the higher education level attended a seminar on academic writing and wrote an essay. Some days later, participants went individually to a quiet room with one of the members of the data collection team, who explained the study and asked them to sign an informed consent form. The same interview schedule was followed by all of the participants; first, they were interviewed, and afterwards, they were asked to fill in a self-efficacy questionnaire. The participants were told that there were no correct or incorrect answers, and that the aim of the interview was just understanding what activities they performed in their daily educational practice. In total, the interviews lasted an average of 15 minutes, and each interview was video recorded. The study continued with the experimental phase in which the participants self-assessed the classroom activities they performed in the first step. Results from the experimental phase have been presented in previous publications (Panadero et al., 2020, 2023, in press).

**Data Analysis**

The research design followed a mixed methods approach that included qualitative data collected through structured interviews and quantitative data collected through academic grades obtained from the task performed for the study. In this study, we focus on the interview data exclusively, which were transcribed and coded using content analysis. An open-coding process (e.g., Bazeley, 2013) was followed for the

interview responses; the first author read the transcripts and created categories according to the participants' points of view. These categories were then discussed them with another member of the team. For RQ4 and RQ5, we used a coding scheme derived from students' real self-assessment actions in a previous study (See Panadero et al., 2020, 2023), which we modified with new categories. Regarding the coding process, two researchers independently coded the transcriptions of 30 cases, with an initial agreement percentage of 90%. In the case of discrepancies, they discussed the cases until agreement was reached.

Descriptive statistics were performed to answer all five of the research questions. For comparisons by educational level and academic performance, non-parametric tests such as Mann–Whitney's U and Kruskal–Wallis analysis were used for RQ2, RQ3, RQ4 and RQ5. The significance levels of these analyses are presented in the tables, together with descriptive data for each group. For analysing the differences in academic performance levels, secondary and higher education participants were assigned to three groups according to their grades: low achievers (1–5), middle achievers (6–7) and high achievers (8–10; see Table 1). This scale was the same for both educational levels and was based on the common grading system implemented by the teachers in the country. Atlas.ti 9 and SPSS 24 were used for the data analysis.

## Results

### RQ1. How Do Students Report Learning to Self-assess?

Participants' responses to this question were organised in two parts: (a) who taught them to self-assess and (b) through which activities were they taught to self-assess. Regarding the first, the data fell into three categories (Figure 1), as participants mentioned that they learned either through *Personal experience* or with the help of a *Teacher* or *Family*. Most participants reported having learned by *Personal experience* (53.13% in secondary and 82.05% in higher education; 75.68% low achievers, 67.19% middle achievers and 72.60% high achievers), through actions such as identifying the most usual mistakes or using the teacher's assessment criteria. Some excerpts from the interviews are: "I revised my mistakes so that in the next exam I could correct them" (Juan,<sup>1</sup> K10); "[I learnt to self-assess] by simulating how teachers assess us" (Laura, 1<sup>st</sup> year university); or "by knowing what my weaknesses and strengths are" (Ana, 3<sup>rd</sup> year university). Only 29.69% secondary education participants and 14.53% higher education participants reported having been taught to self-assess by a *Teacher*, percentages that were even lower for *Family* (23.44% in secondary and 3.42% in higher education). Similarly, middle (26.56%) and high achievers (21.92%) mentioned *Teacher* instruction more than low achievers (5.41%) did. *Family* was slightly considered by low achievers (21.62%) and was even less reported by middle (6.25%) and high achievers (8.22%). Those who referred to their *Family* mainly mentioned their parents or siblings, who either advised them on how to proceed or helped them in identifying mistakes. Some excerpts from the interviews are: "My parents have always told me that I have to review exams, because it is important to check the mistakes and to

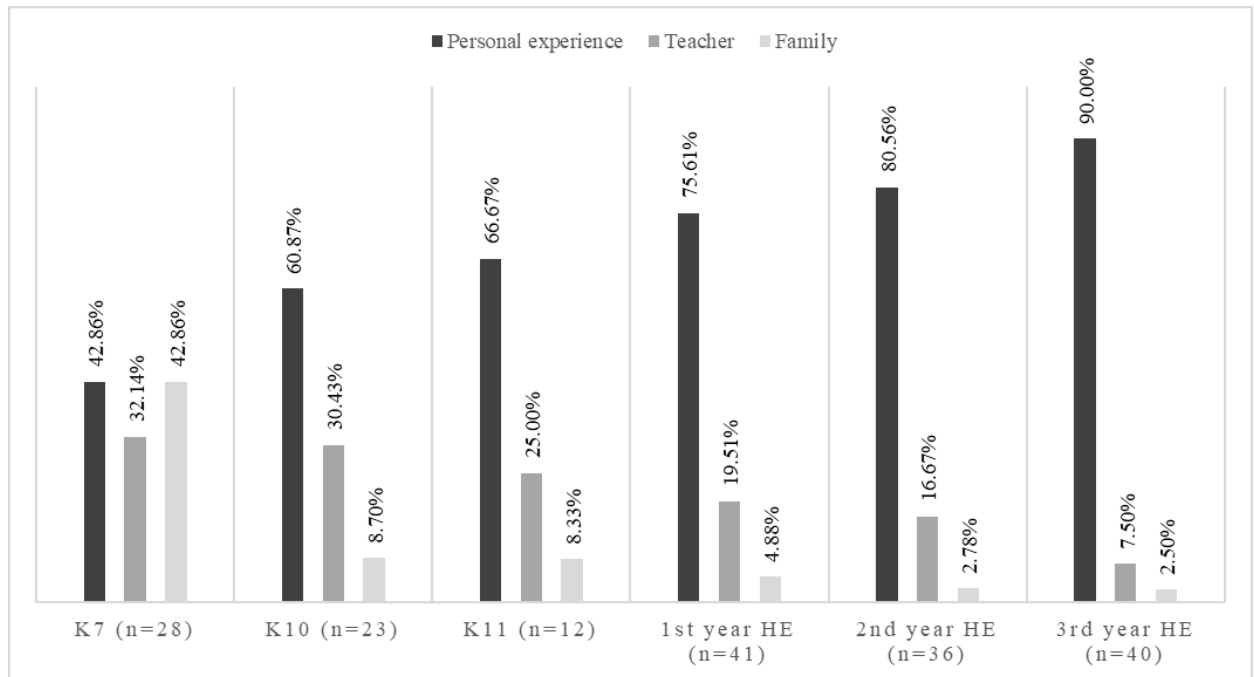
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<sup>1</sup> Note: Names are fictional.

try always to improve my work” (Luna, K7), or “my brother taught me how to do it correctly in order to identify the mistakes” (Ariane, K10).

**Figure 1**

*Participants’ responses on “Who taught you to self-assess”*



*Note:* Percentages were calculated based on the total answers for each educational level.

To address the second part of this research question, we further explored the activities through which the participants who declared they were taught to self-assess (26.66% of the total sample) had learned to do so. The data are summarised in Table 2. Among secondary education participants, the most reported activities were *Self-grade* and *Revise before submitting the assignment*. Notably, most secondary students who reported revising were from first year (5 out of 6), and they were instructed to revise with the aim of identifying errors: “The teacher told me that (...) after finishing the exam, I should review it because people make mistakes and I could have some errors” (Ana, K7); “My teacher would tell me that if you have even a small mistake, think about it, consider what you can do (...)” (Luis, K7). However, other secondary education participants noted that the teachers neither offered any guidance nor provided



instructions on how to perform self-assessment; instead, they merely asked students to self-assess independently (*Only ask for it*).

Conversely, higher education participants reported the use of various *Instruments* (e.g., rubrics) more frequently. For instance, they mentioned the use of rubrics: “We had a rubric to assess specific criteria (...). You self-assess certain criteria and then, you assign a grade to yourself” (Ainhua, 1<sup>st</sup> year university); and “Using rubrics made us self-assess. It helped because it forces you to stop and think about the work you have done” (Ana, 2<sup>nd</sup> year university). They also referred to the use of questionnaires: “Sometimes, they give you questionnaires (...) and it prompts you to think about how you approached tasks, the process, and whether you made any mistakes along the way” (Elena, 3<sup>rd</sup> year university). Participants also mentioned the availability of other documents and aids: “They give us documents containing tips for revising and self-assessing” (Naia, 1<sup>st</sup> year university); and “They instructed us to set both short-term and long-term goals, and then to start a feedback process by asking ourselves ‘Am I achieving this?’ If yes, I can continue; if not, I need to make changes” (Olatz, 2<sup>nd</sup> year university).

There were not any remarkable differences in academic performance. However, middle and high achievers tended to prefer *Instruments* in contrast to low achievers, whose answers were fewer and referred to a variety of categories (*Self-grade, Revise before submitting the assignment* and *Family suggestions on how to self-assess*). For example, low achievers’ mentioned that they learn from their parents when discussing advice from their families: “I saw my parents solving mathematics problems during an interview, and they had to assess their performance and I learned by observing them” (Jon, K7); and “My parents are university teachers, and they often provide me with tips for assessing my work” (Paula, 2<sup>nd</sup> year university).

**Table 2***Self-assessment training activities by educational level and academic performance*

Self-assessment training	Educational level				Academic Performance					
	Secondary ed.		Higher ed.		Low AP		Middle AP		High AP	
	N=27	%	N=20	%	N=8	%	N=18	%	N=17	%
Self-grade	6	22.22	3	15.00	2	25.00	5	27.78	2	11.76
Revise before submitting the assignment	6	22.22	3	15.00	2	25.00	2	11.11	5	29.41
Corrections during classroom time	5	18.52	0	0.00	0	0.00	4	22.22	1	5.88
Only ask for it (no instructions)	5	18.52	1	5.00	1	12.50	2	11.11	3	17.65
Instruments (e.g., rubrics)	3	11.11	7	35.00	0	0.00	5	27.78	5	29.41
Redo the exercise with a teacher	3	11.11	1	5.00	1	12.50	2	11.11	1	5.88
Peer-assessment activities	3	11.11	0	0.00	0	0.00	1	5.56	2	11.76
Family suggestions on how to self-assess	2	7.41	1	5.00	2	25.00	0	0.00	1	5.88

*Note:* Percentages were calculated based on the total answers for each educational level and academic performance.

## **RQ2. How Often Do Students Report Engaging in Self-Assessment?**

We asked our participants how often they performed self-assessment in their daily academic life. In secondary education, 60.94% of the participants reported they *Always self-assess*, 23.44% reported they *Sometimes self-assess* and 15.63% declared that they *Never self-assess*. In contrast, 86.07% of the higher education participants reported that they *Always self-assess*, 9.02% of students *Sometimes* and 4.92% stated they *Never self-assess*. When we compared the answers by academic performance (Table 3), the three groups showed very similar percentages for *Always self-assess*, but

higher achievers tended to report *Sometimes self-assess* more often than *Never self-assess*.

Next, we analysed how participants expanded their replies. The ones who answered that they *Always self-assess* justified their responses with reasons such as the perception of being critical of oneself, constant revision and improvement of their mistakes and assessment based on their own or the teacher's standards.

Yes, I'm very demanding of myself and when I finish an exam I revise the answers in my mind and, if I realised that I have made a mistake, I think about how to correct it though the exam is not in my hands anymore. (María, K10)

I always self-assess, especially when I have to submit an exercise or exam to the teacher. I'm self-assessing on a daily basis, thinking about how I have done it and holding expectations about how should be done. (Laura, 1<sup>st</sup> year university)

I try to be demanding of my work. The result can be better or worse, but I know when I'm doing it well or not. If I work hard I often do well on the tasks, but I'm also aware when I made less of an effort just to reach the minimum standards.

(David, 3<sup>rd</sup> year university)

The participants who reported that they *Sometimes self-assess* referred more to summative aspects. These participants described the conditions which lead them to self-assess the task and discussed the best moment to do it (before vs after the grade). These students made comments such as: "When I failed and I have less than a six, yes. If not, I just have a quick look and check if the corrections are well done" (Daniel, K7); "It depends: I self-assess more when I get the exam grade, because it is when I can better self-assess. It doesn't make any sense if I self-assess before, when the exam is not corrected" (Edward, K10); and "[I self-assess] only when the task is submitted to the teacher and I care about the grade" (Marta, 3<sup>rd</sup> year university).

**Table 3**

*Self-assessment frequency by educational level and academic performance*

Self-assessment frequency	Educational level						Academic Performance						H	p	
	Secondary ed.		Higher ed.		U	z	p	Low AP		Middle AP		High AP			
	N=64	%	N=122	%				N=39	%	N=65	%	N=73			%
Always self-assess	39	60.94	105	86.07	2923.00	-3.88	<b>.000***</b>	31	79.49	47	72.31	58	79.45	1.17	.555
Sometimes self-assess	15	23.44	11	9.02	3341.00	-2.68	<b>.007**</b>	3	7.69	10	15.38	12	16.44	1.72	.422
Never self-assess	10	15.63	6	4.92	3486.00	-2.46	<b>.014**</b>	5	12.82	8	12.31	3	4.11	3.65	.160

*Note:* Percentages were calculated based on the total answers for each educational level and academic performance. \*\*\* indicates p <.001, \*\* indicates p <.01, \* indicates p <.05.

There were no detailed responses among participants who reported that they *Never self-assess*. Only 2 out of 16 provided a reason related to their lack of reflection about their work, as the following excerpts illustrate: “No, I’m not a person who is constantly reflecting” (Lucía, K10); and “I don’t think too much about what I do” (Javier, 3<sup>rd</sup> year university).

### **RQ3. How Do Students Report Gathering and Using Feedback For Self-Assessment?**

Two themes emerged in the participants’ answers: (a) the sources of feedback and (b) how they used such sources. Regarding the first, the participants reported sources as *Books, Internet, Teacher, Peers* or *Grade*. Importantly, there were considerable differences between educational levels (Table 4). In secondary education, the tendency was to seek feedback through learning materials, especially *Books* (including notes, classroom materials and notebook), and to a lesser extent, the *Internet*. In higher education, feedback was sought mostly from their *Grades*, other educational agents (e.g., *Peers* or *Teachers*) or from students’ own perceptions (e.g., *Hindsight*). Regarding academic performance, low achievers reported asking for considerably more feedback from *Teachers* compared to middle and high achievers.

Regarding the second theme, how students used the feedback sought, the information obtained was mainly used by participants to *Redo the task*. However, there were differences by educational level, as shown in Table 5. Specifically, the use of feedback to *Compare previous answer with the feedback* was mostly reported among secondary education students. On the contrary, the use of feedback to *Apply it in the future* (i.e., transfer new knowledge to future tasks) was more popular among higher education students. Regarding academic performance, the answers were distributed in a balanced way among the three levels.

**Table 4**

*Feedback sources by educational level and academic performance*

Feedback sources	Educational level				Academic Performance										
	Secondary ed.		Higher ed.		U	z	p	Low AP		Middle AP		High AP		H	p
	N=65	%	N=121	%				N=39	%	N=65	%	N=73	%		
Book	46	70.77	30	24.79	2124.50	-6.06	<b>.000***</b>	16	41.03	25	38.46	33	45.21	.65	.722
Internet	28	43.08	28	23.14	3148.50	-2.81	<b>.005**</b>	15	38.46	21	32.31	19	26.03	1.89	.387
Teacher	10	15.38	40	33.06	3237.50	-2.58	<b>.010**</b>	15	38.46	13	20.00	17	23.29	4.65	.098
Peers	8	12.31	40	33.06	3116.50	-3.07	<b>.002**</b>	12	30.77	16	24.62	19	26.03	.48	.783
Grade	2	3.08	26	21.49	3208.50	-3.33	<b>.001***</b>	4	10.26	7	10.77	15	20.55	3.38	.184
Hindsight	0	0.00	24	19.83	3152.50	-3.83	<b>.000***</b>	5	12.82	9	13.85	8	10.96	.26	.874
Family	9	13.85	11	9.09	3745.50	-.99	.319	2	5.13	7	10.77	11	15.07	2.52	.284
Task' requisites	1	1.54	17	14.05	3440.50	-2.74	<b>.006**</b>	5	12.82	6	9.23	7	9.59	.38	.824
Previous knowledge	4	6.15	12	9.92	3784.50	-.87	.384	5	12.82	4	6.15	7	9.59	1.35	.508
Others	1	1.54	4	3.31	3863.00	-.70	.479	0	0.00	1	1.54	2	2.74	1.15	.562

*Note.* Percentages were calculated based on the total answers for each educational level and academic performance. \*\*\* indicates p <.001, \*\*

indicates p <.01, \* indicates p <.05

**Table 5**

*Type of use of feedback sources by educational level and academic performance.*

Feedback sources	Educational level							Academic Performance							
	Secondary ed.		Higher ed.		U	z	p	Low AP		Middle AP		High AP		H	p
	N=64	%	N=121	%				N=39	%	N=66	%	N=73	%		
Redo the task	30	46.88	51	42.15	3775.00	-.52	.600	18	46.15	27	40.91	34	46.58	.39	.820
Compare previous answer with the feedback	35	54.69	30	24.79	2790.00	-3.95	<b>.000***</b>	13	33.33	24	36.36	26	35.62	.13	.934
Apply it in future task (transfer knowledge)	5	7.81	36	29.75	3065.00	-3.45	<b>.001***</b>	6	15.38	15	22.73	16	21.92	.94	.624
Rate	9	14.06	12	9.92	3806.00	-.82	.409	5	12.82	7	10.61	9	12.33	.14	.929
No changes	4	6.25	7	5.79	3918.00	-.10	.919	2	5.13	3	4.55	6	8.22	.86	.650

*Note.* Percentages were calculated based on the total answers for each educational level and academic performance. \*\*\* indicates  $p < .001$ , \*\*

indicates  $p < .01$ , \* indicates  $p < .05$ .

**RQ4. What Strategies and Criteria Do Students Report Using for Self-Assessment?**

The strategies and criteria reported by students are presented in Table 6. In all groups, the most reported strategies were *Read*, *Rate*, and *Think in different answers*. *Read* is considered a strategy necessary for self-assessment process because students need to retrieve information about their performance to be able to self-assess. Regarding differences by educational level, higher education participants reported more strategies and criteria and were most likely to report the use of *Read* and *Assess*, which implies the use of one or several assessment criteria to perform an evaluative judgement. The reported use of criteria was generally low, with higher education participants reporting a higher use of *Hindsight* and *Goals accomplished* as assessment criteria.

Regarding differences by academic performance, low achievers reported the strategy of *Self-grade* more frequently than their peers. They were also less prone to use the strategies of *Assess* or *Redo*, which are more complex and demanding strategies and were more common among middle and high achievers. However, these differences did not reach the level of significance.

Next, we examined how participants elaborated on their responses and how they combined the different strategies and criteria. For some participants, *Reading* was considered the phase that initiates their self-assessment process, which is then complemented by the *Rate* and *Assess* strategies.

If I have finished an assignment, I read through it, review it and assess whether I have done it very well, poorly or fairly well, because the required concepts appear in the assignment. I check if I have met the requirements, if the concepts are correct, if I have the images and so on. You have to ask yourself, even if you have the sheets in front of you to help, do you know if most of the exercises have gone well? (Zoe, K10)



If it is an assignment, I usually read it quite a bit. Once it is finished, I think about whether it is better or worse than the previous version. Also, my self-assessment can be biased sometimes, because it often depends on the time and effort you have put into it and how you perceive your progress. But overall, I assess the final result and see what I think about it. (Nerea, 2<sup>nd</sup> year university)

The *Redo* strategy was also reported as occurring when participants encountered mistakes or entertained doubts about a particular answer. For example, “If I have any doubt (...) I redo the exercises to assess if the answer is correct or incorrect” (Bea, K7); “I read it again, and if there is something I see that the teacher might not understand, I cross it out and rewrite it” (Carlos, K10); and “(...) In psychology exams, it is more mathematics oriented, so it is clear when I have errors. If I did not get it right, I redo the task or find another approach” (Carla, 2<sup>nd</sup> year university).

Additionally, among participants who reported using internal criteria such as *Hindsight*, there were cases who combined that approach with external criteria for calibration:

[I self-assess] based on the hindsight I had at that moment. I read it, and if I see that I like how it turned out, if it is well-written, if I understand it, I can tell that it is correct. I do not give an exact score like 5, but I do say to myself that it went well, or I say, “who knows”. (Sandra, 1<sup>st</sup> year university)

I mainly review what I have done and if it feels good, I say, “this is fine”. If not, I try to look at it again, approach it differently. When I am not entirely sure about my work, I also ask my classmates for help. (Raquel, 2nd year university)

It also depends on how I feel in the moment, because if I am stressed, things tend to go wrong and I assess myself negatively. However, I also assess myself by

considering factors like my progress in terms of time spent, whether my current actions are effective, if there is room for improvement or if it is turning out better than expected. (Marina, 2<sup>nd</sup> year university)

**Table 6**

*Strategies and criteria of self-assessment.*

Type	Educational level				Academic Performance										
	Secondary ed.		Higher ed.		U	z	p	Low AP		Middle AP		High AP		H	p
	N=55	%	N=116	%				N=36	%	N=57	%	N=69	%		
<i>Strategies</i>															
Read	16	29.09	53	45.69	2692.00	-2.14	<b>.032*</b>	15	41.67	26	45.61	24	34.78	1.37	.502
Rate	15	27.27	44	37.93	2886.00	-1.43	.150	13	36.11	18	31.58	23	33.33	.25	.879
Think in different answers	11	20.00	37	31.90	2850.00	-1.67	.094	9	25.00	14	24.56	23	33.33	1.54	.462
Assess	5	9.09	38	32.76	2474.00	-3.37	<b>.001***</b>	6	16.67	17	29.82	16	23.19	1.97	.373
Seek feedback in external sources	11	20.00	12	10.34	2946.00	-1.67	.094	3	8.33	8	14.04	9	13.04	.67	.713
Compare	3	5.45	8	6.90	3198.00	-.38	.700	2	5.56	2	3.51	5	7.25	.86	.649
Redo the task	6	10.91	3	2.59	2984.00	-2.23	<b>.025*</b>	0	0.00	4	7.02	5	7.25	2.69	.260
Self-grade	4	7.27	3	2.59	3100.00	-1.41	.158	5	13.89	1	1.75	0	0.00	13.75	<b>.001***</b>
Self-questioning	3	5.45	3	2.59	3158.00	-.92	.355	1	2.78	2	3.51	3	4.35	.17	.915
<i>Criteria</i>															
Based on the Effort required	2	3.64	14	12.07	2972.00	-1.79	.073	2	5.56	3	5.26	9	13.04	3.01	.222
Based on Hindsight	1	1.82	13	11.21	2942.00	-2.11	<b>.035*</b>	0	0.00	4	7.02	8	11.59	4.66	.097
Based on the Goals accomplished	0	0.00	11	9.48	2940.00	-2.37	<b>.018*</b>	2	5.56	3	5.26	3	4.35	.08	.957
Based on Teachers' grades	3	5.45	8	6.90	3198.00	-.38	.700	3	8.33	2	3.51	4	5.80	1.02	.598
Based on the Teacher criteria	1	1.82	8	6.90	3082.00	-1.40	.160	2	5.56	1	1.75	5	7.25	2.08	.352
Based on Previous experience	1	1.82	4	3.45	3194.00	-.60	.544	1	2.78	2	3.51	1	1.45	.54	.762

*Note.* Percentages were calculated based on the sample of each educational level and academic performance. \*\*\* indicates  $p < .001$ , \*\* indicates  $p < .01$ , \* indicates  $p < .05$ .

### **RQ5. What Strategies and Criteria Do Students Report Using for Self-Assessment in a Specific (Written) Task?**

The participants reported two strategies and ten categories of criteria (Table 7). There were differences in the self-assessment strategies and criteria used by educational level. In higher education, participants almost exclusively reported that they *Read the task*, in contrast with secondary education participants, who focused on *Revise the work*. Indeed, *Revising the work* strategy was often done together with the *Coherence* criteria to compare and assess if the answer aligned with the teacher's provided prompt or instruction. This can be seen in the excerpts from the interviews: "I first pay attention to the question, then I check if the answer makes sense, ensuring that the definition is accurate and finally, I consult the book" (Carlota, K7); "Once I finish the exercise, I revise the text, assess if the answers are coherent with the text and if it makes sense" (Irene, K10); and "First, I checked the instruction and then, the answer and make sure that I provided a correct response" (Alicia, K11).

Regarding the criteria reported, the most frequent one for both levels was *Orthography*. There were other criteria frequently reported, but only by higher education participants, such as *Coherence*, *Comprehension*, *Essay structure*, and *Cohesion*. Some of these criteria (e.g., *Coherence* and *Comprehension*) were often mentioned together in higher education participants' responses, which illustrates their simultaneous use during self-assessment:

(...) It is also important that everything is organised logically, following a clear structure, and that there are no spelling errors. But above all, it is crucial that the message is well understood. (Claudia, 1<sup>st</sup> year university)

(...) ensure that it's understandable, coherent and follows a clear line of argumentation. I avoid having disconnected elements. Then, I pay particular attention

to repeated words (...) and check for commas and connectors. (Julia, 2<sup>nd</sup> year university)

I review the structure, spelling errors, repetition of ideas, any missing content and the length when there are imposed limits or minimums. (Luca, 3<sup>rd</sup> year university)

Regarding academic performance, there were few differences among the three groups. High achievers reported a slightly higher use of the *Revise the work* strategy and *Based on Cohesion* criteria. On the other hand, the use of *Based on Comprehension* and *Based on Coherence* criteria was higher among lower achievers. However, none of these differences reached the level of significance.

**Table 7**

*Self-assessment strategies and criteria for written task.*

Type	Educational level				Academic Performance										
	Secondary ed.		Higher ed.		U	z	p	Low AP		Middle AP		High AP		H	p
	N=64	%	N=122	%				N=39	%	N=66	%	N=73	%		
<i>Strategies</i>															
Read	8	12.50	41	33.61	3080.00	-3.09	<b>.002**</b>	11	28.21	20	30.30	16	21.92	1.21	.544
Revise the work	24	37.50	1	0.82	2472.00	-6.94	<b>.000***</b>	3	7.69	9	13.64	13	17.81	2.24	.325
<i>Criteria</i>															
Based on Orthography	22	34.38	53	43.44	3550.00	-1.19	.232	16	41.03	33	50.00	24	32.88	3.92	.140
Based on Book	6	9.38	2	1.64	3602.00	-2.46	<b>.014**</b>	0	0.00	3	4.55	4	5.48	2.14	.343
Based on Comprehension	4	6.25	32	26.23	3124.00	-3.26	<b>.001***</b>	9	23.08	11	16.67	13	17.81	.68	.709
Based on Grammar	2	3.13	4	3.28	3898.00	-.05	.955	1	2.56	3	4.55	2	2.74	.43	.806
Based on Coherence	7	10.94	46	37.70	2859.00	-3.83	<b>.000***</b>	12	30.77	20	30.30	18	24.66	.63	.729
Based on Essay structure	1	1.56	43	35.25	2589.00	-5.12	<b>.000***</b>	10	25.64	16	24.24	13	17.81	1.14	.566
Based on Hindsight	0	0.0	6	4.92	3712.00	-1.79	.072	0	0.00	1	1.52	5	6.85	4.82	.089
Based on Cohesion	0	0.0	35	28.69	2784.00	-4.74	<b>.000***</b>	5	12.82	11	16.67	17	23.29	2.20	.333
Based on Teacher's instruction	2	3.13	6	4.92	3866.00	-.33	.741	0	0.00	4	6.06	3	4.11	2.37	.306
Others	1	1.56	2	1.64	3901.00	-.03	.969	2	5.13	0	0.00	1	1.37	3.91	.141

*Note.* Percentages were calculated based on the sample of each educational level and academic performance. Some participants reported more than one strategy and/or criteria so they were included in different categories. This implies that the sum of the total strategies and criteria is higher than the number of participants of this study. \*\*\* indicates  $p < .001$ , \*\* indicates  $p < .01$ , \* indicates  $p < .05$



## Discussion

In this study, our aim was to investigate key aspects of self-assessment practices as reported in interviews by secondary and higher education students while comparing their answers with their educational and academic performance levels. Next, we discuss the results organised around the five RQs, followed by two sections in which we compare these results with our previous studies (Panadero et al., 2020, 2023). We also analyse the differences found by educational level and academic performance.

### **How Do Students Report Learning to Self-Assess? (RQ1)**

Most participants reported learning to self-assess by themselves and, in much lower numbers, from teachers and family. To our knowledge, there is no previous research exploring this. However, this result calls for serious reflection: is it really the case that students learned by themselves? In previous research, teachers reported implementing self-assessment activities in their classrooms in higher percentages than the ones found here by asking the students (Hunter et al., 2006; Noonan & Duncan, 2005; Panadero et al., 2014), but other studies have also shown that, in higher education, self-assessment is a minor activity according to the syllabi (Lipnevich et al., 2021). So, what is really happening here? We believe there could be a multicomponent explanation.

First, there could be a mismatch between what teachers and students consider “self-assessment teaching and learning episodes”. Teachers could be trying to implement self-assessment activities that students do not perceive as such. Similar effects have been found when students and do teachers not identifying feedback episodes in the same ways (Winstone et al., 2017). Second, it could be that participants in higher year levels have forgotten how they developed the skill, as shown by how our younger participants were more likely to report that they learned from teachers and

family. Third, it could be that, as students get older, it is assumed they know how to self-assess and teachers do not allocate sufficient classroom time for it, as shown by the decline in the teachers' self-reported implementation of self-assessment (Panadero et al., 2014). Fourth, as university teacher–student ratios are higher, this might influence how students perceive they are more dependent on their own self-assessment as there are usually much fewer opportunities for interaction (e.g., oral feedback on the spot). And fifth, the content also becomes more specific and self-assessment gets more complex as students get older, which might make students more self-aware of their efforts to self-assess.

Regarding differences by educational level, secondary education participants reported simpler self-assessment activities, such as self-grading or self-assessing without further instruction. In higher education, we found a slightly more elaborate self-assessment activities, which included the use of self-assessment tools such as rubrics. A similar pattern was observed when comparing by academic performance. Low and middle achievers reported learning to self-assess via self-grading, while middle and high achievers reported learning through the use of self-assessment tools more frequently. However, these results should be interpreted with caution due to the small sample size.

Considering the participants' responses, it is not surprising that most students are not aware of their self-assessment learning opportunities, as our first explanation suggested. Most of the activities reported include little to no instruction by the teacher, as in the case of asking to self-grade or self-assess without further explanation. In such contexts, it would be easy to imagine a situation in which the teacher considers that they are promoting a self-assessment training activity and the student does not interpret it as such. For the teachers, just providing the classroom time to self-assess with no more

explanation could constitute a self-assessment opportunity, while student might require more explicit and direct instructional scaffolding. In any case, our results are an example of the weak state of self-assessment training in secondary and university classrooms, which is in line with previous research (Lipnevich et al., 2021).

### **How Often Do Students Report Engaging in Self-Assessment? (RQ2)**

Most participants reported that they self-assess on a daily basis. While a frequent use of self-assessment was common in both educational levels, the reasons for such frequencies were slightly different. Among secondary education participants, the reasons for frequent self-assessment were mostly related to double-checking their exam responses and fixing mistakes. Among higher education participants, the reasons for frequent self-assessment were related to a general aim for improvement, perfectionism or self-critique. The tasks which trigger self-assessment were also different depending on the educational level. Secondary education participants reported that they self-assess mostly during exams, probably due to teachers' instructions to double check their responses before submitting. Higher education participants reported that self-assessment occurred for a much wider variety of tasks. A possible explanation for this might be that higher education teachers deliver less feedback on a daily or weekly basis compared to secondary education teachers (Panadero et al., 2022). Thus, higher education students may be more likely to self-assess to gain evidence about their performance not only during exams, but also in their daily work.

Regarding academic performance, Ibabe and Jauregizar (2010) found that when participants self-assess frequently, they tend to attain higher grades, which indicates that frequent self-assessment can be correlated to academic performance. In our study, we found relatively similar answers based on academic performance, but with an interesting difference. Low achievers were the most polarised group, showing the highest

percentages of *Always* and *Never* while having zero cases of *Sometimes*. However, the differences with the other groups were small, especially in the case of *Always*.

Importantly, showing similar percentages of self-assessment use does not mean that the self-assessment processes performed are of similar quality. High achievers are probably performing more effective self-assessment than do low achievers, as proposed by previous research (Panadero et al., 2016).

### **How Do Students Report Gathering and Using Feedback for Self-assessment?**

#### **(RQ3)**

As mentioned previously, two themes emerged in the participants' answers to this question. First, we asked participants about their preferred sources of feedback, with *Books*, *Internet*, *Teachers*, and *Peers* being the most common. There were interesting differences, mostly when it comes to educational level. Secondary education participants reported that they sought feedback more frequently through materials (e.g., *Books* and *Internet*). Higher education participants, on the contrary, reported to seek feedback mainly from the other active agents (*Peers* and *Teachers*).

This constitutes a surprising finding, as more dependency on teachers' feedback from younger students would be expected. However, differences among the preferred feedback sources may be related to the differences in task requirements and difficulty at the two levels, with older students requiring more expert judgement. This has been found in previous studies, where higher education students considered the instructor's detailed comments as the most effective feedback source that leads to improvements in performance (Lipnevich & Smith, 2009).

There were also differences by academic performance, which was expected, as students need different types of feedback based on their previous achievement levels (Brookhart, 2017). For example, trusting and receiving feedback from teachers or tutors

has been associated with lower academic performance (Brown et al., 2016). In our study we found a similar tendency, as low achievers preferred to contrast their self-assessment with feedback from *Teachers* more than did medium or high achievers. This finding is an example of how low achievers seek more personalised feedback, probably with the aim of obtaining clearer responses about where they failed and what they need to do to improve. This preference may be based in part on their inability to self-generate such information from more complex processes, such as comparing their work with a book, extracting meaningful results from internet or successfully interpreting their grades. This lack of skills can create even more challenges in contexts with a large teacher–student ratio, where the teacher is not able to offer constant personalised feedback. It is therefore crucial that teachers at earlier educational levels help students to develop the essential skills to identify correct and incorrect feedback and become creators of their own feedback (Panadero & Lipnevich, 2022).

#### **What Strategies and Criteria Do Students Report Using for Self-Assessment in General (RQ4) and for a Specific Task (RQ5)?**

The fourth research question explored the type of self-assessment strategies and criteria students use for general self-assessment. The main strategies reported were *Read the task*, *Perform an evaluative judgment*, *Think in different answers* and *Assess*, while *Orthography* was the most frequently mentioned assessment criteria. The results of this research question allow us to make some interesting comparisons, and below we compare these results, for both strategies and criteria, by educational level, academic performance and general versus task-specific self-assessment.

First, the differences by educational level were noteworthy. These differences should be approached with caution, as the samples were not equally distributed in terms of educational stages and gender (in higher education, most participants were female).

In general, higher education participants reported a higher use of self-assessment strategies, specially *Assess*. A similar situation was found regarding assessment criteria. While the reported use of criteria was low in both groups, higher education participants described a higher level of use. These results align with the results of Kostons et al. (2009), who suggested that a higher number of criteria was used by expert participants and can be explained by the fact that novices or young learners do not have the ability to apply complex criteria, as they are still developing their competence (Harris & Brown, 2018).

Second, the differences by academic performance were less evident. Higher achievers tended to report more use of some specific strategies, such as *Read* or *Think in different answers*, while low achievers reported a higher use of the *Self-grade* strategy. One hypothesis for this difference is that students with greater ability rely more on their own internal processing due to their successful experiences in the past, whereas low achievers might need more concrete external feedback (e.g., grades, direct feedback from the teacher) to calibrate their self-assessment. In terms of assessment criteria reported, we did not find remarkable differences.

Third, RQ4 and RQ5 allow us to compare a general situation (what strategies or criteria do you use when you self-assess, RQ4) and a task-specific situation (what strategies or criteria do you use when you self-assess on a written task, RQ5). The differences here were striking. Interestingly, the reported use of strategies decreased dramatically in the task-specific situation. In such case, participants only reported the *Revise the work* (in secondary education) or *Read* (in higher education) strategies, which are considered basic information-processing strategies for self-assessment (Panadero et al., 2020). It could be hypothesised that, when the aim of the task is specific, students may prefer to use one strategy that they consider effective, instead of

performing multiple strategies. This aligns with prior research suggesting that, depending on the nature of the task, different self-assessment strategies are required (Panadero et al., 2016) with tasks in science producing more accurate self-assessment (Falchikov & Boud, 1989). However, the situation was the opposite for assessment criteria. In the task-specific situation, participants reported more criteria which were not mentioned in the previous research question, such as *Coherence or Comprehension*. In this case, the specificity of the interview question (i.e., think of how you self-assess on a writing task) might have allowed participants to gain a clear concept of the usual requirements that they would use as assessment criteria. Indeed, Yan and Brown (2017), in their cyclical self-assessment process, defined the phase of determining performance criteria as a pre-requisite action for the subsequent self-assessment processes.

Our participants showed very different results when asked about how they self-assess in general versus on a particular task. This has implications for future research, given that, depending on how we ask the participants about self-assessment, different answers will be received. This is completely logical, but due to the scarcity of previous studies exploring self-assessment via interviews with students, it is very important to emphasise it as critical.

Finally, it is interesting to compare the results of the present study with those of our previous studies (Panadero et al., 2020, 2023) in which we investigated the strategies and criteria that secondary and higher education students use when they self-assess. As this comparison could be insightful, we present it in a separate section.

### **Reported versus Performed Self-Assessment Strategies and Criteria**

As mentioned throughout this paper, the present study presents data from a larger database that included two different data collections. Here we analysed data from interviews that sought to gain participants' description of their self-assessment

processes. Our previous studies (2020, 2023, in press), however, investigated the students' actual self-assessment processes through, mostly, think-aloud protocols. As described in the methods section, we first conducted an interview, which formed the data presented here. After that, we asked them to perform several self-assessments, which were registered using think-aloud protocols and direct observation, along with questionnaires. These self-assessments were the source of the data for our previous studies (Panadero et al., 2020, 2023). Comparing both sources of data, we found important differences between what participants said they do (i.e., the interview data) in the present study and what they actually did (i.e., the process data) in the previous study.

Regarding strategies, the biggest difference was that, during the real self-assessment, almost all of students read the question and their responses before doing anything else. Indeed, the process data revealed reading to be the first action students need to perform to enact the subsequent processes (strategies and criteria). Nevertheless, in the interviews, less than half of the participants reported to use *Read* as a self-assessment strategy. Regarding assessment criteria, we found that, during self-assessment, several criteria such as *Intuition*, *Hindsight*, *Rules* or *Mistakes identified* were frequently used by the participants, while they were barely reported in the interview. Interestingly, one frequently reported criterion in the interview, *Effort required*, was not used at all in their self-assessment.

In sum, the two data collections show that there is a discrepancy between the interview and the experimental data. This was to be expected due to (a) the natural limitations of self-report (Winne, 2020) and (b) the changes in our prompt to the participants (i.e., tell me how you self-assess vs self-assess this task). These results put in context the limitations that interview data have when trying to understand students'



self-assessment. Researchers should be aware that there is a significant distance between what students say they do to what they actually do for such a challenging activity as self-assessment. Obviously, interview data have value, and we do not deny it, as we are presenting it here, but always given the understanding that it only represents the students' "awareness" of very complex and underlying processes. The comparison made in the previous paragraphs should be taken with caution, as the interview data reported students' self-assessment behaviours in the past, whereas the experimental data indicated self-assessment behaviours during a particular scenario.

### **A Summary Of The Differences in the Use of Strategies and Criteria**

The differences between reported and performed self-assessment strategies and criteria, together with the ones presented in the previous section (i.e., by educational level, academic performance and general vs. task-specific self-assessment) offer a new perspective about students' self-assessment reported behaviours in different situations. We summarise the main findings of the comparisons made in previous sections in the next four points:

- Higher education students reported using more self-assessment strategies and criteria.
- Lower achievers reported a higher use of the self-grade strategy.
- Students reported using fewer self-assessment strategies and more self-assessment criteria during task-specific self-assessment.
- Students reported a lower use of self-assessment strategies and criteria in an interview context compared with their actual self-assessment processes in a think-aloud context.

As expected, higher education participants reported a higher use of both self-assessment strategies and criteria. This, in combination with the fact that the

participants consistently reported using fewer strategies and criteria than they in fact used, led us to question the extent to which students are aware of their self-assessment processes. It would be possible that more experienced students were not only performing more self-assessment strategies and criteria, but also being more conscious of those processes and thus better able to detect when and how they use them, which would make them more able to report them in an interview.

To help students gain control of their self-assessment processes, teachers would need instructional scaffolds to develop self-assessment skills. According to previous research (Andrade & Valtcheva, 2009; Panadero et al., 2016; Ross, 2006), some conditions need to be met: students should be aware of the value of self-assessment; have access to clear assessment criteria, direct instruction and help with self-assessment; and opportunities to revise and improve the task. Considering our participants' testimony, not all of those conditions appeared with any frequency in their academic lives. The scarce assessment criteria reported by our participants, especially in secondary education, suggested that there was little access to the more advanced assessment criteria that could be provided by their teachers. Also, a minimum number of participants reported having experienced direct instruction regarding self-assessment or the opportunity to revise and improve their tasks. However, there are ways to prepare teachers to successfully implement self-assessment. Previous studies (Brown & Harris, 2013; McIver & Murphy, 2021; Panadero et al., 2014) have found that factors such as previous positive experiences with self-assessment, endorsement of its advantages and training in assessment courses were related with a higher use of self-assessment by the teachers. Luckily, all of these aspects could be enhanced by educational interventions such as Teacher Learning Communities (Jonsson et al., 2015) and increasing teachers' assessment literacy (DeLuca & Klinger, 2010; Tai et al., 2018).

### **Educational Level and Academic Performance**

Our sample consisted of students from two educational levels (secondary and higher education) and various academic performance levels (low, medium and high). Importantly, we focused here on comparison of the educational levels instead of going down to the year level, as we did in the previous studies (Panadero et al., 2020, 2023). The reason is that this is the first publication in which we compared secondary education and higher education students from two data collections. Regarding educational level, higher education participants reported less training, but also a more frequent and advanced use of self-assessment. This fact is probably explained by a variety of factors, which have been presented in the previous sections, such as higher education students (a) being more mature and having resources for a more complex judgement; (b) receiving less teacher feedback, which strengthens the need for feedback seeking; (c) needing to enact an advanced use of self-assessment to perform more complex academic tasks; and (d) being more aware of their self-assessment practices.

Regarding differences by academic performance, the first remarkable finding is that such differences are smaller than the ones by educational level. High, medium and low achievers reported self-assessment behaviours that, in general terms, were similar to each other. This constitutes a surprising result, as it would generally be expected that higher achievers would use more strategic self-assessment. Students' self-assessment varies by academic performance level, with low achievers experiencing more problems in calibrating their performance (Dunning et al., 2004). However, it is important to understand that even if they reported similar self-assessment behaviours, that does not necessarily mean that they are performing those behaviours with the same efficacy. In this sense, one significant difference is that low achievers reported being more dependent on *teacher's* feedback. This could imply that, even with similar self-

assessment frequency and processes, they are not obtaining the same meaningful information about their own work. This would not be surprising, as it is known that students with lower levels of ability are less capable of cognitive processing and struggle with assessment criteria (Kostons et al., 2009).

All in all, it seems that we can find more strategic self-assessment among students at higher educational levels, and relatively similar patterns across academic achievement levels. However, as was shown in our results, there are many meaningful differences in specific actions or variables, which should be explored in greater detail. We consider that this study provides valuable exploratory evidence of the self-assessment experiences (i.e., training, processes and feedback uses) of a highly diverse set of students.

### **Limitations and Future Lines of Research**

Our study has limitations. First, the present data came from interviews and were affected by the main flaws of self-report. However, as our aim was to understand the experiences of students towards the self-assessment, the interviews allowed us to collect those internal perceptions. Indeed, as we aimed to gather several experiences through a semi-structure interview, some of the answers lacked specificity (e.g., frequency and agents of training) and it was not possible to perform content analysis in greater depth. Nevertheless, we went one step further with the interview responses and compared them to actual data from the same participants engaged in self-assessing. Future investigations should continue this line of behavioural data collection that makes it possible to capture and analyse in detail the self-assessment process in the concrete moment (e.g., think-aloud protocols).

Second, the sample was not equally distributed in terms of gender and educational stages, as it was based on convenience sampling. Nevertheless, the number

of participants for a study combining interviews and questionnaire data was high (n=187) compared to previous studies, so it is our hope it can still offer interesting insights.

In terms of future lines of research, more studies should be done on the specific patterns of behaviour followed by students when they self-assess. This study used interview data from a large sample, but further research should implement different measures to capture different processes (metacognitive, emotional, among others) when they self-assess as well as how they process feedback for self-assessment. For example, technology such as eye-tracking would help clarify the underlying and precise processes that occur when the students are involved in self-assessment. Additionally, we should explore the self-assessment process with samples from other educational levels (i.e., primary education), contexts and across subject matters, as we found that there might be a relationship between the actions performed and the field.

### **Conclusion**

This study continues the avenue of unpacking the black box of self-assessment by identifying the self-assessment experiences (i.e., training, processes and feedback use) at different educational levels and academic achievement groups. Our results helped us to understand how students perform self-assessment and identify the role of feedback in this process. To summarise our main findings, participants reported that they (1) perform self-assessment frequently; (2) prefer different sources of feedback, with secondary education participants preferring learning materials over agents; (3) use different self-assessment processes, with higher education participants using more advanced strategies and a wider variety of criteria; (4) enact different self-assessment processes depending on the characteristics of the task on which they are being asked to self-assess; and (5) differed in terms of reported versus performed processes during self-

assessment. The strength of this study lies in the large and diverse sample, which enabled us to compare the experiences of self-assessment among different groups of students. We suggest that future research combine different measures such as think-aloud protocols and eye-tracking to examine the questions raised in this study.

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**Appendix 1.***Interview script*

In secondary education, the interview started with the following preliminary question:

“What do you consider self-assessment?”.

## Section A. Self-assessment training

1. Who taught you to self-assess?
2. How did they taught you to self-assess?

## Section B. Students’ use of self-assessment

3. Do you always self-assess what you do?
4. How do you self-assess a task?
5. How do you self-assess a written essay?

## Section C. Type and use of feedback sources for self-assessment.

6. What information do you use for evaluating your work?
7. How do you gather that information or feedback?
8. How do you use that information?

**Appendix 2.***Coding scheme for self-assessment strategies and criteria*

Type	Category	Description
<i>General self-assessment strategies</i>	Read	Read the question, the answer or any other part of the task.
	Rate	Perform an evaluative judgement (e.g., excellent. average. bad) about the quality of the task or their performance.
	Think in different answers	Think on different responses to the exercise, without actively modifying the task or the answer. It can happen after the task is submitted or graded.
	Assess	Assess the quality of the work using different criteria.
	Seek feedback in external sources	Seek feedback in external sources. For example, extracting information from materials (books or notes) or asking for information or feedback to agents (teachers or peers).
	Compare	Compare the task or the answer with other information; feedback, similar tasks done by the student, task of their peers, among others.
	Redo the task	Performing again the task or part of it.
	Self-grade	Assign a grade to the task.
	Self-questioning	Generate and answer questions to themselves in order to determine if they understood the topic or the task.
<i>General self-assessment criteria</i>	Based on the Effort required	Criteria based on the effort required for performing the task (e.g., cognitive effort, time spent in the task).
	Based on Hindsight	Criteria based on hindsight or feelings that the student had during or after the task.
	Based on the Goals accomplished	Criteria based on the accomplishment of the goals established, either by the student or the teacher.

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	Based on Teachers' grades	Criteria based on the grade assigned by the teacher to the task.
	Based on the Teacher criteria	Criteria based on the teachers' assessment criteria or instructions.
	Based on Previous experience	Criteria based on previous experience of the student (e.g., self-efficacy, experience with similar tasks, among others)
<i>Task-specific self-assessment strategies</i>	Read	Read the question. the answer or any other part of the task.
	Revise the work	Revise the answer of the task. It doesn't require a full information processing of the task; student only revise the result.
<i>Task-specific self-assessment criteria</i>	Based on Orthography	Criteria based on orthography rules (verb conjugations, orthographic rules of consonants, among others).
	Based on Book	Criteria based on book information, notes from the lectures, or other materials that provide the information.
	Based on Comprehension	Criteria based on comprehension (e.g., if the content or ideas of the written text are understandable).
	Based on Grammar	Criteria based on grammar rules.
	Based on Coherence	Criteria based on the coherence of the answer or the written text.
	Based on Essay structure	Criteria based on the essay structure (ideas organization by paragraph, presence of introduction, development and conclusion, among others).
	Based on Hindsight	Criteria based on hindsight or feelings that the student had during the task.
	Based on Cohesion	Criteria based on the cohesion of the written text.

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Based on Teacher's instruction	Criteria based on the teacher's instruction (requirements or goals of the task and explanation of the teacher).
Others	Other categories

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