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Feedforward: practice scenarios and the impact on the cognitive motivation of primary-level students

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Abstract. The study aims to assess the impact that the feedforward has on the cognitive motivation of students, at the level of expectations. Derived from this intention is the methodological design which has as its key approach an experimental path (including a questionnaire and a scale as instruments), completed by the observation method.
This study complements thematic research, as the application of learning experiences adjusted by the principles of the feedforward clarifies students' expectations in several directions (towards assessments, communication, towards the teacher and the self). Furthermore, it outlines an autonomous motivational regime per the dictum `I go to school with pleasure` and fosters independent decisions on current issues, helping the student to anticipate his/ her outcome and the associated emotional taste of it.
Also, the feedforward becomes an instructional routine that promotes meaningful learning and situational optimism (as an adaptive cognitive dimension), facilitating favorable resolutions of future tasks and foreshadowing transversal competencies oriented towards optimal/ transferable solutions; so, focusing on the process (on the road the child is on), the learner will practice argumentation that will guide him/ her in clarifying expectations and will successfully engage in reflective dialogue.

Keywords. feedforward (anticipated retroaction), cognitive motivation, expectations of the learner

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1. The psycho-pedagogical significance of the feedforward (interpretative perspective, qualities, and design elements)

At the level of primary education, the direction `to forward` is the least recorded in practice, as a limited number of assessments include feedforward as an instructional routine (Mulliner and Tucker, 2017). It is about an anticipated retroaction of rhetorical type: What are my next steps to solve this task? What should I do to be successful at school?

Formative evaluation integrates feedforward as part of a complex cyclic assessment process that clarifies `how` learning improves (Abatayo, 2020, p. 75). The feedforward creates substantial teacher-student engagement and maximizes deep-level training (Tai et al., 2017). It is proliferating a dual perspective path, because `people focus on the promises of the future rather than on the mistakes of the past` (Goldsmith, in Elevato, S., 2013, p. 3), as well as `a prior practice in the evaluation to clarify expectations and standards` (Baker and Zuvela, 2013, p.1).

To feel the taste associated with educational success, students must witness individual progress (Deborah-Stipek, 2002), mastering both formal tasks subordinated to their rhythm of psycho-physiological development and those specific to an upper age (Jean Piaget, 1964, pp.176-186); thus, (self)directed learning, adaptable to surprise situations, passes from teacher to student, the feedforward is becoming talent regenerator, `a growth path` and an expansion of critical thinking concerning the proximate development (Hirsch, 2017, pp. 31-34), adjusting even the posterior tasks (by using constructive guidance suitable for reapplication). The attempts of niche literature to define the concept of feedforward have focused on the following directions:

- a modality that reduces the gap between current academic performance and the potential to achieve pre-established class-level objectives (Koen et al., 2012, p. 240);
- a constructive bulk of criticism on how to integrate what is good or wrong regarding the learning process – therefore, a convenience attached to the pertinent answer, designed to overcome fixations associated with the dimensions of the ability – to provide directions that help the student to perceive, in personal cadence, the route of steps in the individual study (Hendry, White and Herbert, 2016);
- a component of a complex three-step process that sets the objective of the lesson (feed-up stage), allows students to know their achievements (feedback stage), being the one that sees forward guides in learning based on performance data (whether it is implemented as the first stage or the last – Hounsell et al., 2008).

According to Hattie (2007), teachers have an imminent duty to create a stimulating learning environment in which students can develop skills to detect errors, and focus attention. A good feedforward should be expansive, dynamic, use data with intention, and be simple to understand and put into practice while having the following characteristics: actuality (must be offered at a beneficial moment); regularity (in time intervals); active character (being a useful pre-element in tasks assigned to the near future); adaptability (to choose the technique suitable for the moment).

According to Dulama and Ilovan (2016, p. 843), there is an exigency to build the context, although the feedforward is offered whenever needed, not being conditioned by a particular dynamic, it is accompanied by a variety of methods and forms, respectively: immediate regulating comment at the point of teaching; written message/ oral type synthesis; as a review; by applying to oneself a form through which it can fix one's objectives (atypical technique – Gambhir, 2015).

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Failure becomes a natural part of the growth mindset, as long as students see tasks as work in progress, not as an immutable statement of their value, and teacher guidance becomes the foothold for proximal development. So, the feedforward has been used to train the sense of detail, that allowed learners to apply useful knowledge: i. prior to the assessment (by understanding correctly the requirements of the training exercises); ii. during it (by acquiring increased skills, and obtaining better grades); iii. after evaluation (by developing future work following the expectations of the teachers, and transferring solutions).

Anticipated retroaction as (self-)query is a form of reflective thinking that helps teachers reorganize content so that it is comprehensible and easily prognosticated (e.g., algorithmic teaching of a handwritten letter), based on particular situations seen as `depth centers of human experience` (Cresswell, 2004). The dialogical feedforward involves a socio-participative approach, and cognitively-emotionally developed students, who: reflect on their work (with revised standards or criteria); embrace the arisen challenges; co-create positive actions (as promoters of independent learning); clarify their confusion by means of effective two-way communication. Verbal feedforward can be done informally, through classroom observations, and by assisting students while engaging in daily tasks and solving problems afferent to everyday life.

Regarding the elements of design and implementation, from one educational unit to another, there are various ways to mark the progress of a student, via: a) the achievement of a score that, by cumulation, is metamorphosed into a grade; b) placing a mobilizing comment describing the degree of completion of work according to the level of effort; c) a direction describing a tangible change proposed for implementation; d) a question relating to the task in progress; e) the use of marking conventions of correct segments or various errors (by graphic signs, or, peculiar colors – mostly green, even purple, avoiding the classic red).

Over the past two decades, many education systems have embraced modular school programs to give students flexibility. Moreover, Reimann et al. (2019) recommended classifying the effects of the feedforward in three directions: within the module, beyond the module, and within the program. Modularization itself may limit reflux opportunities, as each module contains a single evaluation and feedback cycle, thus missing feedforward opportunities that address long-term goals. Improvement or ameliorative activities become the lifelines (Hughes, G., Smith, H., Creese, B. f.d., pp. 5-6, pp. 15-18), being difficult to resort to future evaluations of the same content because the module has ended (Higgins et al., 2002).

2. Double psycho-pedagogical status of cognitive motivation (resource and finality)

The challenge of increasing the level of cognitive motivation of students is a constant for a primary education teacher, through the process of anticipated retroaction, whereas the reality in the class takes the silhouette of a positive message with the help of the metacognitive interrogation (a regulatory discussion that proposes alternative routes equipped with optimal, transferable solutions).

In the Great Dictionary of Psychology (2006) the motivational process is described as a bi-phased one, insofar as the search for tension occurs in the ascending stage because in the descending phase, its reduction occurs. Human motivation is considered antagonistic to instinct, because `the human mind can unconsciously distort impulses, turning them into a multitude of conscious manifestations` (Levine, 1976, in Buzea, C., 2010, p. 36). Cognitive motives are placed

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on the first rung of the hierarchy, cultivating the `enigma of science` by satisfying epistemic curiosities.

By moving on the empowerment-responsibility axis, Argyris (1973) sees the transition from immaturity to maturity through seven stages, in the form of a continuum, as follows: moving to activity; giving up addictions; overcoming routine activities; having deep and stable concerns, not having superficial and erratic interests; nurturing long-term perspectives; changing the social status of subordinate to the role of equal; the preference for self-control.

Negovan (2010, p. 103) argues that recent meta-analyses have demonstrated that cognitive abilities are the main predictor of performance in activity by enhancing self-motivation ability, and intentional action. Thus, three directions (prospected by assignment theory, expected value theory, and objective theory) can be profiled, including `causal attributions, expectations regarding the results and objectives that are brought into consideration` (Bandura, 1991, p. 71).

Why is going to school not pleasant for many? Cognitive motivation has its roots in exploratory situations, having the typical layout of curiosity for the new, energizing the mental experience from near to near (Zlate et al., 2005). From exploration, it reaches comprehension and synthesis, fostering scientific interest, to the attainment of the creative ideal, and the need to solve materializes as an end in itself. In case of impossibility to create, young people will turn to the requirements to make connections with a deep socio-affective foundation (for example, the unity of the collective and the approvals obtained from it). Seeking to optimize exchanges with the environment, the constructivist-orientated teacher incites the student to face challenges in the form of open tasks. It is considered that students with a high curiosity are more successful, compared to peers who show a low level of curiosity (Schiefele et al., 1992).

The first motivator of the realization behavior is the desire to prove a top skill (to show competence) in order to perpetuate the sense of self-worth. A student who feels competent shows genuine motivation, being self-determined to regulate learning through personal goals and aspirations. Expectation theory (Vroom, 1964) sees motivation as closely related to the premise that people believe a lot in what they will get, at the level of expectation, regarding the performance or the valence of results, and involves both individual factors (needs, skills, experiences, values) and organizational factors, people being mobilized by the results expected from their action.

Expectations or the level of aspiration, partially dependent on material, environmental, and cultural conditions, are closely related to the motivation to achieve, as ambition contributes to multiplying the efficiency of the motion-directing psychic activism. Regarding ambition, it is recommended that the desire to be among the first in school is not oriented in the direction in which colleagues become rivals, but towards the competition with oneself (according to the Yerkes-Dodson Law, in Pânișoară, I.-O., 2017, pp. 80-81).

3. Research methodology

3.1 Objectives of the work

Operationalization of independent and dependent variables, namely feedforward and cognitive motivation.

Configuring and implementing a pedagogical program adjusted by the principles of the feedforward.

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Conducting evaluative steps, initially and finally, associated with the dependent variable, cognitive motivation, to evaluate the impact of the implementation of the independent variable, the feedforward (as an anticipated retroaction).

3.2 Research hypothesis

Involving students in learning situations in the form of feedforward generates optimizations at the level of cognitive motivation, by clarifying their expectations on several potential directions.

3.3 Batch of participants

The research batch was formed by a convenience sample that was not probabilistic nor random. It consists of 16 schoolchildren from the lower primary cycle (rural area, 7-9 years of age), this being the class to which I teach; the gender distribution is uniform, ensuring the representativeness of each entity, being 8 girls and 8 boys (according to the structure diagram).

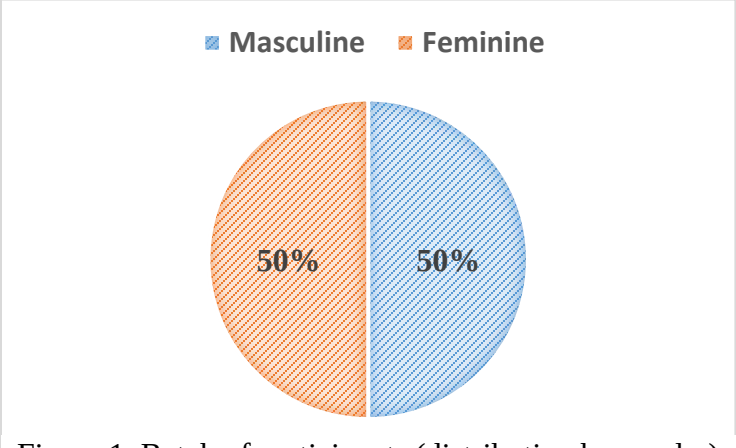

Figure 1. Batch of participants (distribution by gender)

4. Methods and applied tools

The applied investigation utilizes a questionnaire-based survey, an observation scale, and direct observation as methods and tools. Experimental research allowed:

- operationalization of the independent variable in the discerning of forming the specific pedagogical program;
- operationalization of the dependent variable was achieved through a set of behaviors as the basis for conversion into items/ indicators linked to research instruments, segmenting itself into two great directions, expectations of a personal-relational nature (projection of students regarding themselves or the others), and, as well as outlooks regarding the stages of an effective decision-making process (expectations accompanying communication and those concomitant to evaluation), retrieved/ clarified in educational contexts.

The purpose of the questionnaire is an investigative approach that provides a rational, replicable, reproducible, robust path to the true objectives. The questionnaire `Expectations of pupils from primary classes` also requests socio-demographic data, being organized into two sections: I. `About me` (including 4 questions with the possibility of ticking multiple answers, by coloring the boxes in the preferred color); II. `My expectations` with 42 unique responses,

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dichotomic items, centered around the following key themes – expectations about teachers (part A - 10 indicators), and, on the replies given by them in dialogue (B/ 12), the expectations associated with school assessments (C/ 9) and expectations about themselves (D/ 11) – taking tabular form and having the estimated duration of 30-35 minutes. Applied after the course of the pedagogical program, it becomes a diagnostic questionnaire.

The goal of the scale is targeted observation of research participants that provides an opportunity to learn and understand aspects that cannot be revealed just by testing itself. Subsequently, a two-pronged observation scale was created and completed, both on the expectations of the students regarding their performances (direction that tracks the frequency of 6 behaviors), and on the expectations of the student, as well as items regarding relationships with others or about the reactions of colleagues or teachers (direction that tracks the frequency of 5 behaviors). The systemic observation is made by the teacher, for each student, in the two distinct evaluative moments, the initial and the final one, using a Likert scale, with values from 1 (Never), at 2 (Rather rare), 3 (Not infrequently, not frequently), 4 (Rather frequent), and 5 (Always).

Respectively. from the point of view of the processual details, the experimental approach based on the independent variable (feedforward) and the dependent variable (cognitive motivation of primary-level students) was staged as follows: the design, development, and application of instruments; registration of answers and verification of data; (after each evaluation stage) the statistical processing of the collected data took place (percentage values, amounts, arithmetic averages, standard deviations) and interpretation of results (both quantitatively and qualitatively).

The entire period of the experimental research was 10 weeks. In the pre-experimental phase, we carried out an initial evaluation, on February 5-16, 2024. From March 4th to April 12th, 2024 (module IV) the pedagogical program was adjusted according to the principles of early retroaction, providing students with relevant learning experiences consisting of routines and activities. The final evaluation was carried out during the periods: of 15-19 April (diagnosis questionnaire) and 8-10 May 2024 (observation scale).

The pedagogical program contains 7 routines adjusted according to the principles of implementation of the feedforward (as activities carried out with weekly frequency), respectively a number of 4 occasional activities (as singular experiences). Routines list: 1. front/ individual oral or written commentaries used to class with a mobilizing role with explanatory-interrogative valences, which may include rhymes and, conferring a direction `to forward`; 2. an atypical notation and marking legend; 3. The humming groups; 4. One minute cards; 5. Questions swamp; 6. Resummation by one statement; 7. Here and there.

The titles of the occasional activities are:

- Do I expect from others, what I expect from myself?
- Why do I learn what I am learning?
- Choose and you will find your tribe!
- Hour of genius.

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Results

The implementation of the pedagogical program has generated in the re-evaluation phase of the dependent variable the following data: results associated with the questionnaire-based investigation; and results associated with the observation scale.

The aggregate amount between the four sections of the questionnaire (A, B, C, D) is 501 when reapplying the questionnaire, compared to the initial value of 429, noting an increase in positive responses by 72 points (approx.17%), in tandem with the decrease of negative ones by approx.30% from 243 records (initial application), to 171 points (diagnosis questionnaire).

So, the dynamics of the incidence of additional positive responses are segmented into the four dimensions, exposed in descending order: expectations related to assessments (27 points difference between the values related to the initial and those linked to final evaluation); anticipations for trends of relations with teachers (20 points difference); pending regarding communication (13 points difference); self-oriented expectations (12 points difference).

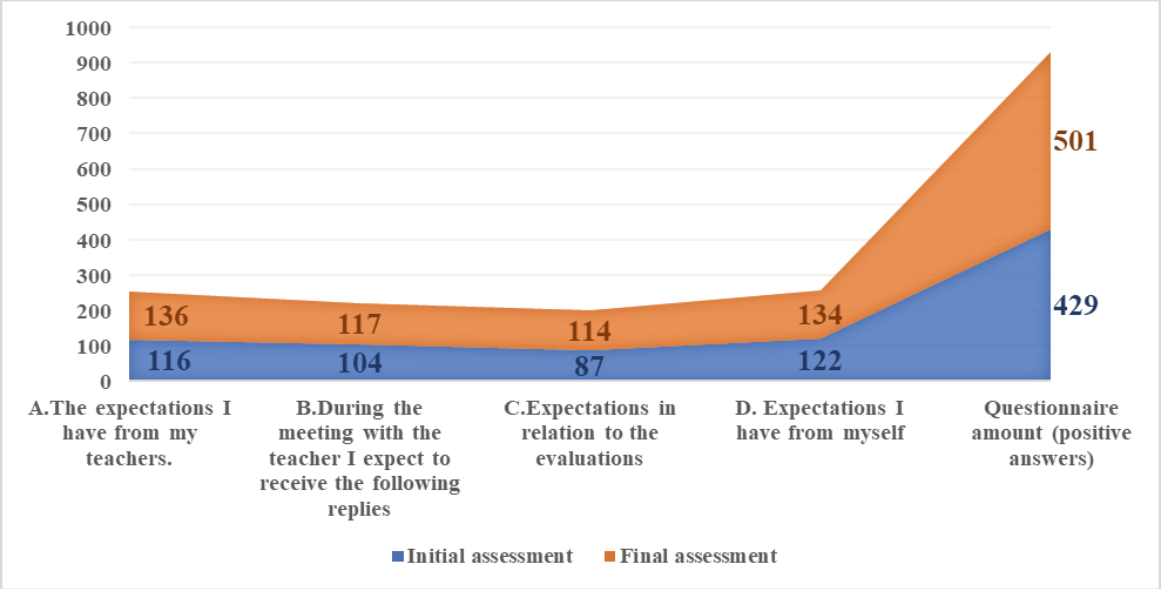

Figure 2. The positive results of the questionnaire - Amounts

Further, the indicators that have been used to measure the type/ frequency of expectations related to school assessments are graphically exemplified, including the specific values of the final evaluation. The patterns that were drawn by the highest three scores are extremely intriguing. Students want, ahead of a test, to know exactly what content they need to recapitulate (with a score of 16 responses out of the total of 16), and that the given tasks necessitate containing extremely clear requirements or guidelines (16/ 16), to receive honest comments on their own inaccurate answers (15/ 16), and, when he/ she receives any mark he/ she opts not to be compared with other colleagues, but only with his/ her previous results in order to monitor his/ her progress (15/ 16). Students anticipate tests enclose more thought-provoking exercises and tasks, but they prefer the ones that they have practiced extensively, in class or at home (14/ 16), while during the test, they expect to be notified about the time they have left to decipher the tasks mysteries (14/ 16).

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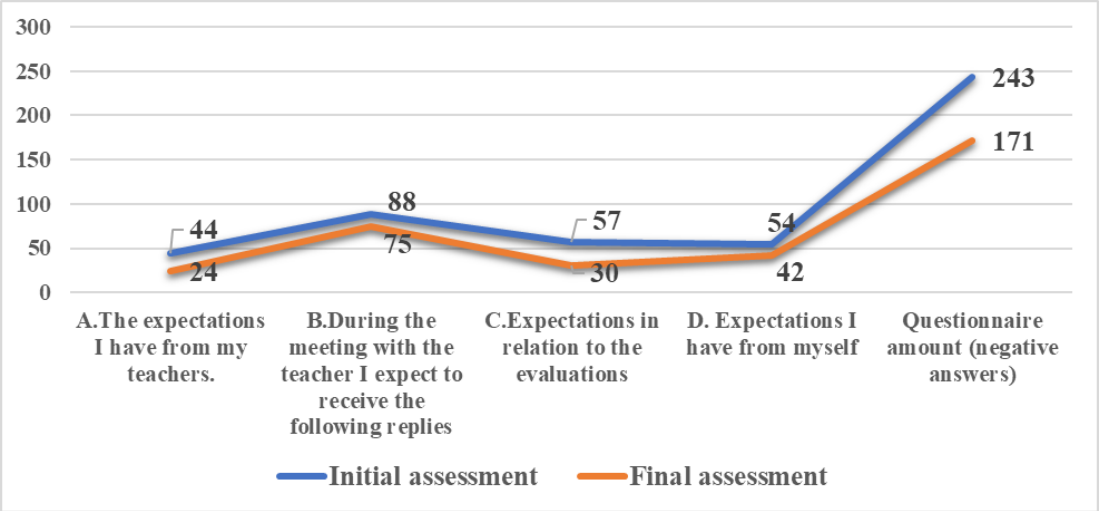

Figure 3. The negative result of the questionnaire - Amounts

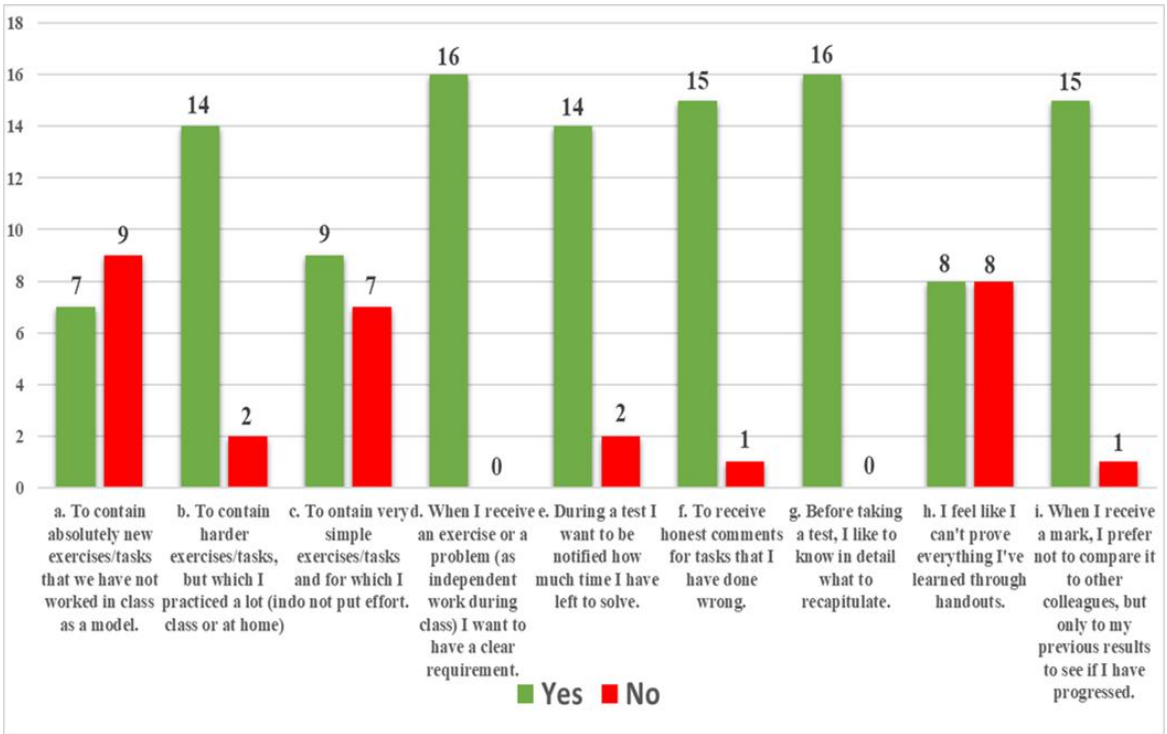

Figure 4. Expectations in relation to evaluation (final assessment)

The total amount between the two dimensions of the scale is 607 at re-completion, contrasted to the initial value of 457, finding an increase in recorded positive behaviors of 153 points, that is, an increase with approximately 30%; concerning partitioned growth, we have the following situations: self-expectations have a quite increased rate of confirmed positive behavioral

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indicators (by 79 points), analogue to indicators associated with expectations regarding the reactions of others (74 points).

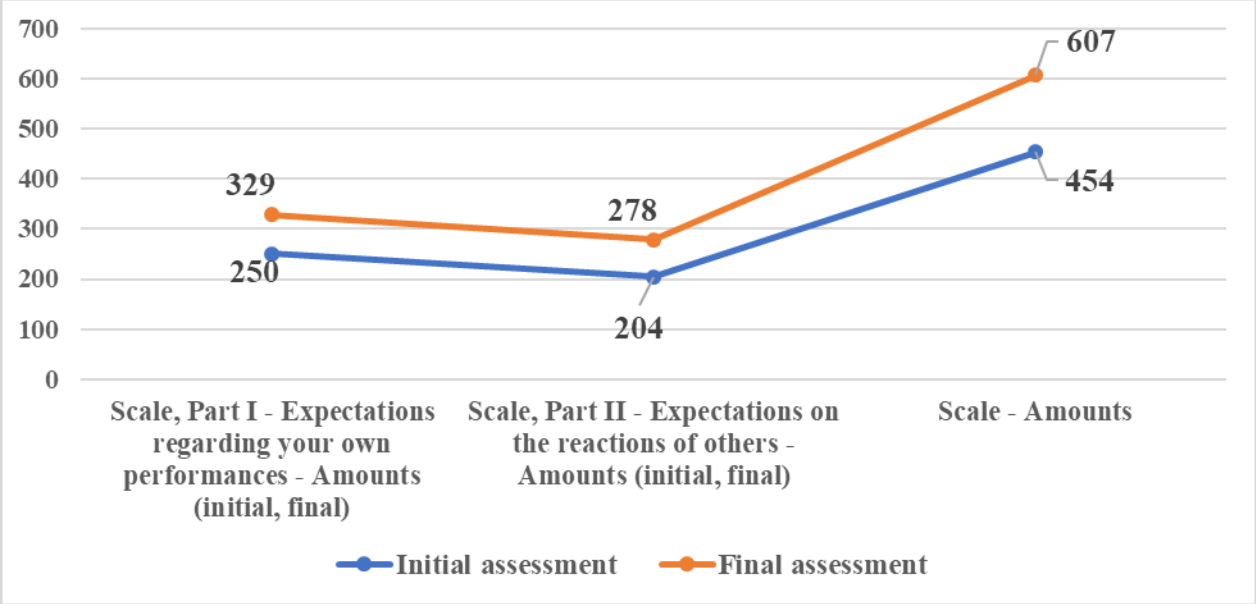

Figure 5. Scale amounts (initial and final assessments)

The final averages of the two dimensions are comparable for both, initial and final observations. Conventional interpretation intervals have the following values: 1 = Never: 1-1.79; 2 = Rather rarely: 1.8-2.59; 3 = Not rarely, nor frequently: 2.6-3.39; 4 = Rather frequently: 3.4-4.19; 5 = Always: 4.2-5.

In the initial assessment, the average associated with the part I of the scale recorded a value at the lower limit of the threshold `not rarely, nor frequently`, with additive approximation by two decimals (2.60). This initial situation indicates that students rarely clarified their expectations relative to personal school performance. Noting also the average associated with the second part of the scale (2.55), in the initial situation, the students rarely clarified their expectations in connection with others.

In the final situation, the whole-scale average has a value close to the lower limit of the `rather frequently` threshold (3.45), indicating that students are beginning to clarify their expectations on both branches, the one corroborating to the personal axis, as well as the other of the relational nature.

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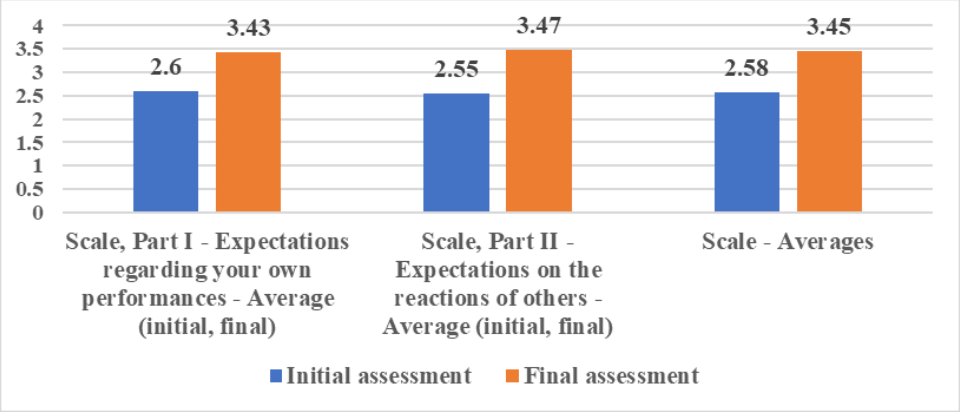

Figure 6. Scale averages (initial and final assessment)

By interpreting the final situation, changes in the profile of the collective subjected to experimental research commence to take shape; by taking as particular examples the impetuses linked to expectations regarding oneself, we get the subsequent descriptions:

•69% of students make autonomous decisions around current issues;
•56% of students anticipate `rather frequently` their own results before starting the tasks;
•42% of schoolchildren express self-assessments during product realization;
•(yet) only 29% of the members of the school flock anticipate whether they will be able to meet the quality criteria of the tasks or products they have encountered;
•only 19% of them manage to assess whether the time allocated to tasks is enough;
•and the vast majority (94%) anticipate the emotional taste associated with the results.

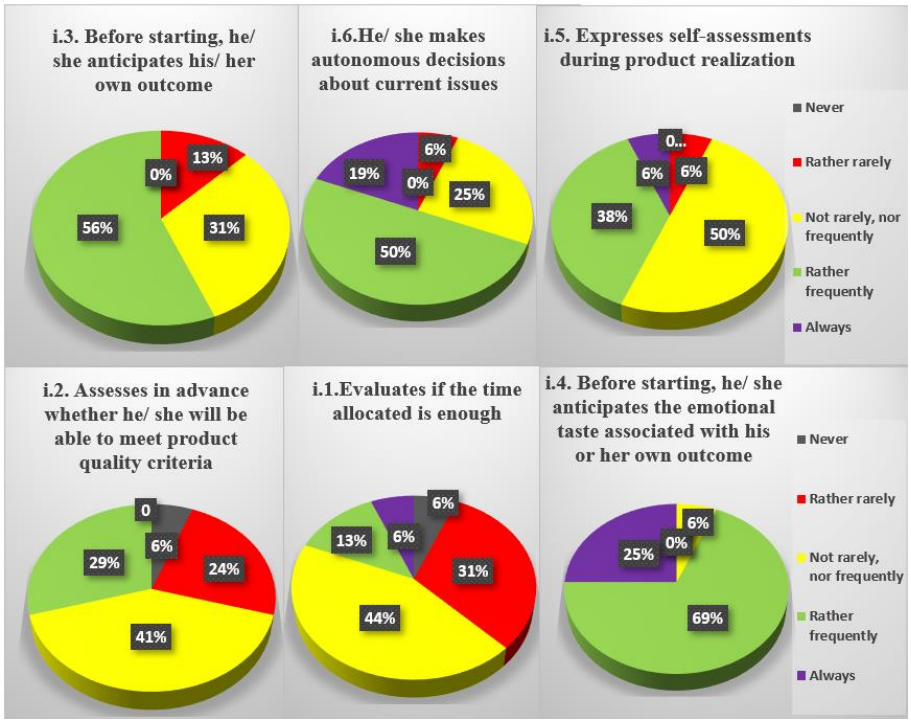

Figure 7. Scale, Part 1 - Expectations regarding his/ her own performances (final assessment)

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Discussions

The feedforward also becomes an instructional routine that promotes situational optimism (merely as an adaptive cognitive dimension), facilitating a favourable context of reutilization of several solutions associated with forthcoming tasks (supported by transversal skills and transferable answers).

Conclusions

The results obtained from the application of the tools point to clarifications at the level of expectations, by involving students in learning experiences adjusted by the principles of the feedforward. The data obtained from the experimental approach indicate optimizations at the level of some aspects specific to the dependent variable (cognitive motivation). This argument is sufficient to consider the hypothesis confirmed.

The ongoing study complements thematic research, as the application of learning experiences adjusted by the principles of the feedforward clarifies students' expectations in several directions (concerning assessments, in relation to communication, towards the teacher, and upon himself). It outlines an autonomous motivational regime following the dictum of going to school for pleasure and it fosters independent decisions on current issues, helping the student to anticipate the outcome and the associated emotional taste. So, focusing on the process (on the road the child goes through), the student will practice the argument that will guide him in the continuous clarification of expectations and will successfully maintain a reflective dialogue, which allows him/her to increase awareness of the opportunities to mobilize the knowledge held (conceptual mind papers, algorithm solutions), in similar contexts, stimulating the post-introspection decision process (as personal epistemology - Hofer, B. K., 2004).

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