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The BRUMS Method and Emotional Design: Profile of the Mood States of Undergraduate Students in Higher Education

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Abstract. The comprehension of the human being in its extent, including the emotions, moods, the promotion of pleasure and the efficiency of the objective proposed by a product or service, are points of analysis of design, mainly of emotional design and positive design. In the academic universe, emotions interfere with learning. The BRUMS self-report tool uses a unipolar scale to assess six subscales of mood swings (vigor, tension, anger, depression, mental confusion, and fatigue). Therefore, the possibility of using this tool in higher education was seen, contemplating students, graduated students and teachers, and therefore understand if there are variations in moods between the groups analyzed. In total, 256 students, 81 former students and 47 teachers participated in the survey. The survey was applied in November, in the final stage of the academic semester, before the last annual exams. The main result was the presence of the moods 'fatigue', 'vigor' and 'tension'. It was noticed that some parameters of experiences interfere with the mood perception, such as the person's time before the service or previous experiences. Finally, the BRUMS methodology satisfactorily measured the moods of those involved, corroborating it as a good self-report tool for understanding the user from the emotional design and positive design perspective, but leaving something to be desired in further analysis.

Keywords: Emotional Design, Brunel's Mood Scale, emotional assessment method for students.

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1 Introduction

The positive design is seen by Jimenez *et al.* [1] as a way of stimulating subjective well-being, in the face of personal meaning and pleasure. Therefore, emotional design arises beyond the solution of functional problems. It can be defined as: "an attempt to explore the emotional relationship and affective properties of the interface with the design with the user's needs and desires" [2].

Human responses to interactions are complex and determined by several factors, shaping experiences, and requiring different approaches. For Damásio and Santos [3], feelings are related to decisions and emotions regulate actions. This is an emerging area, even without mastering the way products and systems evoke emotions in people and how these emotions can be understood, measured and accessed [4].

Self-report questionnaires are a type of tool that help in measuring these emotions. The POMS (Profile of Mood States) methodology analyzes the mood state. In its initial version, it consisted of 65 words analyzed, divided into six subscales, resulting in a general measure of mood [5, 6]. Over time, some variations have been tested, such as the POMS-ex, which analyzes data on a large scale, or the BRUMS (Brunel Mood Scale), which has its version reduced to 24 words [7, 8].

It is noteworthy that 'mood' can be defined as a temporary phenomenon, lasting from hours to weeks. Generally, with low intensity, without a clear understanding of what was the cause of the stimulus and without clarity of its beginning and end state [9]. Mood is also understood as a more prolonged effect of the central affection, it is constituted by the most elementary elements of the accessible conscious affective feeling [10]. However, the 'mood state' is understood as a positive or negative disposition of a person with themselves or with others, being something subjective [11].

The National Association of Directors of Federal Institutions of Higher Education [12] studied the mental health of 424 thousand students in 2018 and compared it with a similar study from 2014, the data pointed to an aggravation in the scenario, highlighting that 83.5% of students had some type of emotional difficulty and 63.3% are anxious, this being one of the moods analyzed in BRUMS.

The research by Tavares [13], with 423 medical students from the Federal University of Pernambuco, converges to the data, verifying the anxiety in the students. The suggestion to minimize this scenario was to increase subjective well-being and/or decrease anxiety symptoms.

This data shows the emotions involved in the academic universe and the need to understand the user's perception becomes relevant to the appropriation of external stimuli and how the user perceives these stimuli, this includes the relationship between the perception of quality and the student's performance and their satisfaction with the experience [14]. Emotions interfere in decision making and in the teaching and learning process [15]. Reinforcing the importance of the emotional state before cognition.

Therefore, the present work aims to apply the BRUMS methodology in the higher education universe, contemplating students, alumni and professors, for a statistical validation of the method and an emotional analysis centered on the user, as a possible user analysis tool in the face of the service.

2 BRUMS

The POMS (Profile of Mood States) methodology analyzes the mood state. In its beginning it was called Ambulatory Psychiatry of the Mood State [16], it was developed in 1971, in the psychiatric outpatient clinic. Initially composed of 65 items for analysis and used with the Likert scale of 5 (five) points, which range from "not at all" to "extremely", analyzing six subscales: tension-anxiety, depression-discouragement, hostility-anger, activity-vigor, fatigue-inertia and confusion-disorientation. These subscales, when analyzed separately, assist in the study of specific mood changes. This score can form a general measure of affection, which is Total Mood Disturbance (TMD) [5, 6]. The method has been used successfully to measure mood and this instrument [17] and it has the advantage of being self-applicable [18]. Sibold and Berg [19] add that the method can use the following questions: (1) how the participant was feeling at the time of the test or (2) how he has been feeling. In other words, a possible question would be: how have you been feeling (in the space of time), including today?

Mohammad [20] reinforced that this methodology is a psychometric instrument that measures six mood states: tension, depression, anger, vigor, fatigue and confusion, exactly the six subscales mentioned above. There is the original unipolar (the original) and bipolar version of the method, however, this last one, instead of targeting the six states of mood, analyzes bipolar factors, such as a hostile and pleasant example [16]. The original bipolar method contains 72 items [21] and both are criticized for their delay in responding [22].

The main advantage of POMS is the detection of mood fluctuations, with an emphasis on sports, but also analyzed in adults and university students. Other advantages are: subscales measure mood subcomponents and statistical analysis. The disadvantages are: (1) five of the six subscales measure the negative mood value, making it difficult to conceptualize that the decrease in the negative scale beneficially interferes with mood; (2) because it was initially developed for use in clinical populations, expanding its usefulness to a healthy and physically active population; and, finally, (3) because it is long, requiring a response time [5]. Ekkekakis and Zenko [16] reinforced that their results are unquestionable, however, the disadvantage of the inadequate extrapolation of the six analyzed states can result in bold and unproven conclusions.

Lorr, McNair and Fisher [23] tested the tool in a bipolar manner and with more positive subscales, namely: tension, anger, fatigue, depression, confusion, sympathy, euphoria and vigor. The result is that the use of POMS in a bipolar way is also consistent and converges to the Likert scale.

The POMS methodology has already been used by several authors. Sibold and Berg [19] used it in the mood analysis with aerobic exercises, with men and women between 18 and 25 years old. At the end of the research, negative correlations between exercise and mood are correlated, as well as exercise helps to improve mood within 12 hours after its completion. Berger and Motl [5] also analyzed mood with physical activities, and concluded that POMS has a powerful, reliable and valid measure of physical activity, especially in the subscales of tension, depression, anger and confusion.

Inoue *et al*. [17] used POMS together with ECG (electrocardiogram) to see how jasmine tea interfered with nervous and emotional responses (mood) and concluded that emotions are beyond the aroma or flavor of the tea, but there is a link on whether the respondent likes the product. Another point of emphasis is that the more concentrated (strong) the product, the stronger the emotional effect.

In relation to university students, Pilcher and Walters [24] analyzed the POMS, cognitive questionnaires and with psychological variables before students with and without sleep deprivation. Also using the scale of 0 to 4, the results were that people with sleep deprivation had worse performance than those without deprivation, significantly interfering in cognition. In another study, Pilcher [25] used the POMS, the Bradburn Affect Balance Scale (ABS), Pittsburgh Sleep Quality Index (PSQI) and the Cornell Medical Index (CMI). The POMS stood out as variables that correlated with the Satisfaction with Life Scale (SWLS). Also measured with five points, ranging from 0 to 4. For Waldo and Friedman [26], the POMS study with students resulted in only one significant scale, that being tension-anxiety.

Regarding its applicability, Sibold and Berg [19] used 30 items that assessed six subscales of mood, namely: tension, anger, depression, vigor, fatigue and depression. With the scale ranging from 0 (zero), related to nothing, to 4 (four), related to extremely, with the question: "how do you feel now". The analysis was done with the sum of the classifications in each subscale, and the POMS through the sum of the five negative scales and subtracted from the positive (vigor) scale. Inoue *et al*. [17] translated into Japanese with 65 questions, in 6 subscales, ranging from 0 (zero) meaning "without any mood state" to 4 (four) "extreme mood state". Lorr, McNair and Fisher [23] used 72 adjectives, varying by 5 points on the Likert scale, with 0 (nothing), 1 (a little), 2 (moderately), 3 (a lot) and 4 (extremely).

King and Meiselman [27] used the emotion list based on both the POMS method and the MAACL-R, being validated in focus groups and tests with consumers. They used the Likert scale, with 5 points, ranging from 1 (one), in no way, to 5 (five),

extremely. Johansson, Hassmén and Jouper [6] used the method that was proposed initially: 65 items, in six subscales, ranging from 0 to 4 and with the question "how are you feeling now?".

Peluso [18] analyzed POMS in his doctoral thesis in psychiatry using 65 analysis variables in Portuguese, 10 (ten) of which were switched from the original version. The methodology used the 5-point Likert scale, varying between: "nothing", "a little", "more or less", "a lot" or "extremely". The question asked was: "Indicate how much you have been feeling this way during the last week, including today".

It should be reinforced that all of those mentioned so far have used the six subscales of the POMS.

It is possible to see other ways of using the tool, such as POMS-ex or POMS-1. With 793 terms, including synonyms and related word constructions, this method emerged to fill a gap in the original, which was not suitable for large-scale textual analysis. It has been developed and validated in literature for this type of analysis [7, 8].

There is also POMS-A, initially developed for teenagers. This has its big difference in the amount of items analyzed. Unlike the original, it contains 24 items that provide a less clinical/psychiatric analysis, for example, analyzing the depressed mood state and not the clinical depression state. It has its validation proven and its results also validated for teenagers, adults, athletes and students. Therefore, becoming an appropriate instrument and easier to apply due to the brevity of responses [22]. Terry *et al.* [21] criticizes the original POMS for taking too long. This factor is influenced not only by the excessive quantity of items, but also by the comprehensibility of their respondents and, for this reason, they created and validated the POMS-A.

Terry *et al.* [21] were the first to propose POMS-A, using and validating the 24 items of analysis for young people from ages 11 to 18, under the six subscales of the original POMS structure: anger, depression, confusion, fatigue, tension and mood . The questionnaire was applied to 1,693 young people, including athletes and students. The study was again tested and validated a few years later, for athletes and students, adults and adolescents, with a total of 2,549 participants and resulted in evidence that not only supports the psychometric integrity of this reduced tool, both for adolescents and as for adults [28].

Because it can be applied to adults, the model is also known as BRUMS (Brunel Mood Scale) [22], POMS-A for adolescents and adults has the definition of the six mood states (Table 1).

Table 1 BRUMS' six mood states

Subscale	Analysis
Tension	State of musculoskeletal tension and concern. May have psychomotor manifestations such as agitation, restlessness, among others
Anger	State of hostility towards others. The mood state is related to antipathy (with others and with oneself) and the emotional state varies from feelings of mild irritation to changes associated with stimuli of the autonomic nervous system
Depression	Emotional state of discouragement, sadness, unhappiness. Represents a depressive state, with personal restlessness, depressed mood (which differs from clinical depression). Contains feelings such as: negative self-worth, emotional isolation, sadness, difficulty in adapting, depreciation or negative self-image
Mental Confusion	Stunned state, instability in emotions. Has characteristics such as dizziness and feelings of uncertainty, instability to control emotions and attention
Fatigue	Tired state, low energy. Has states of exhaustion, apathy and low energy level. As symptoms can present chronic fatigue, with gradual changes in attention, concentration and memory., and mood disorders, resulting in irritability and sleep changes, physical tiredness, affecting the initiation process of psychosomatic, physiological and psychological problems.
Vigor	Energy state, physical vigor. States of energy, liveliness and activity, essential elements for the good performance of an athlete, since it indicates a positive mood aspect. Characterized by feelings of arousal, disposition and physical energy, it is inversely related to other factors

Source: Rohlfs [29] e Brandt et al. [30]

Rohlfs [29] and Rohlfs *et al.* [22] applied BRUMS in Brazil with scales in Portuguese and had their results "sensitive and reliable". The questions for the interviewees was similar to the original POMS, and it could have been "How have you been feeling this past week?" or "How do you normally feel?", but in both surveys the question was "how are you feeling now?" They also used the five-point Likert scale, with their options between: 0 (nothing), 1 (a little), 2 (moderately), 3, (a lot), 4 (extremely).

Brandt *et al.* [30] also used BRUMS in Brazil satisfactorily, with 18 sailing athletes. The method used was with the 24 items previously suggested, ranging from 0 (nothing) to 4 (extremely), following the six scales. At another time, it was applied to adult women with fibromyalgia, also with validated and consistent results [31]. BRUMS was also applied by Marques and Brandão [32] for swimmers in training, Sties *et al.* [33] for cardiovascular rehabilitation (including verified with other scales, such as Kaiser-Meyer-Olkin - KMO), and Leite *et al.* [34], for Brazilian para-athletes, including the use of comparative cardiac exams (biofeedback). Both had valid studies. Under the bias of students, there is also the study by Coutts, Gilleard and Baglin

[35], who analyzed, in the same premises already mentioned, the humor in the face of the incentive to self-determination of 137 students with the BRUMS method, even demonstrating their psychological impacts. The authors suggest future research on further exploration of student perceptions to better understand the quality of individual assessment and its impact on skills.

3   Methodology

The research was carried out at a private Higher Education Institution (HEI), located in Recife, belonging to one of the twelve largest higher education groups in Brazil in 2019. This HEI has the Production Engineering course as its second largest course before the enrollment of students and the most traditional course in the state.

Regarding the method, both POMS and BRUMS have already been validated in the academic world [5, 21, 24, 35]. They are self-applicable instruments [18], which allows a greater range of data.

For the present study, the BRUMS style was adopted since it is more compact and gives results similar to the original, also because it has already been validated in Brazil [22, 36]. Composed by 24 items suggested by Brant *et al.* [31], with the following question: "How have you been feeling, including today?" and the five-point scale was used using the following options: 0 (nothing), 1 (a little), 2 (moderately), 3, (a lot), 4 (extremely).

Before the experiment application, a pilot test was carried out with three students. The stopping criterion was the depletion of problems encountered. The students were selected in person for their questioning profile, availability, and interest. The three students took the online test with no difficulty.

With the survey ready, an email was sent to all HEI students with the explanation and an invitation to the survey. In addition, another link with similar instructions was sent to professors and also to the production engineering alumni who graduated in the last five years. The coordinator of the production engineering course was asked to reinforce with his students, to have a more accurate comparison between the mood states of students and former students of production engineering.

The analyzed universe was a total of 256 undergraduate students, representing 5.9% of sampling error, of which 98 were production engineering students, with 7.2% of sampling error. 81 production engineering alumni also participated, with a sampling error of 10% and 47 undergraduate professors, with a sampling error of 12%

At the beginning of the questionnaire, there were a series of questions about the interviewee's profile, such as gender, time of interaction with the service, age, if there was an analysis parameter with another HEI (if they were a transfer student, if they already studied at another HEI) or if they were a professor who taught

at another HEI), area of study and an analysis of consumption and the profile of knowledge (engagement and participation).

The answers were analyzed by the median, because according to Belfiore [37] in this type of scale, the interviewee uses the scale label and not the numbering itself. For data processing, the original SPSS and Excel 2019 software were used.

To measure the answers' reliability, Cronbach's alpha was generated. Lourenço and Knop [38] explain that the Cronbach's alpha coefficient ranges from 0 to 1. Above 0.6 is considered satisfactory, the scale is reliable. For students, Cronbach's alpha was 0.91, for former students 0.90 and for professors 0.88, therefore obtaining good reliability in the three surveys.

It should be noted that the method was applied in the month of November, the penultimate month of the Brazilian academic year and a few weeks before the final exams that include the evaluations and the end of the year. And at the end of the research, it was asked if any item stood out, as an optional question. When mentioned, the respondent was assigned P for professor, followed by the numbering of the answer line and D for student, followed by the numbering of the answer line.

4   Results

This stage analyzed the current students, alumni and professors in relation to the BRUMS methodology. Initially, some stimuli was given about the universe of higher education and, therefore, the interviewees were asked: "How have you been feeling, including today?", Being able to answer on a Likert scale of five unipolar points among the options: 0 (nothing), 1 (a little), 2 (moderately), 3 (a lot) and 4 (extremely), aiming to analyze mood fluctuations.

For students, the moods 'jaded' and 'exhausted' stood out in the most intense bias, with a median of intensity 'a lot'. The items 'sleepy', 'anxious', 'worried', and 'tired' were in the 'moderately' category. 'Angry', 'unhappy' and 'tired' were marked as non-existent ('nothing') and 'terrified', 'depressed', 'irritated', 'sad', 'undecided', 'alert' and 'moody' with the intensity of 'a little'.

'Fatigue' was the subscale that showed the greatest intensity, followed by 'tension'. 'Anger' was the one with the lowest intensity, followed by 'depression'. And it is important to note that 'vigor' was presented with 'moderate' intensity, even at the end of the semester and the year. It also becomes understandable that 'fatigue' is the item with the greatest intensity.

Unlike the students, former students had no feelings with a significant percentage of maximum activation. The mood subscale 'vigor' was the strongest, with the highest affections, in the order: 'willing' and 'with energy", followed by 'excited'.

And in the sequence 'anxious' and 'alert'. The mood with the least activation was 'unhappy'.

From the professors' perspective, the biggest moods were: 'willing' and 'with energy', followed by 'excited' and then 'alert'. The moods with the lowest activation, with practically nonexistent activation, were: 'terrified', 'depressed', 'huffy', 'disoriented','angry' and 'moody', followed by sad.

For better visualization, Figure 1 was created, which presents an intensity graph of each of the subscales from BRUMS, before each of the groups. The graph was created by counting the number of responses from each subscale.
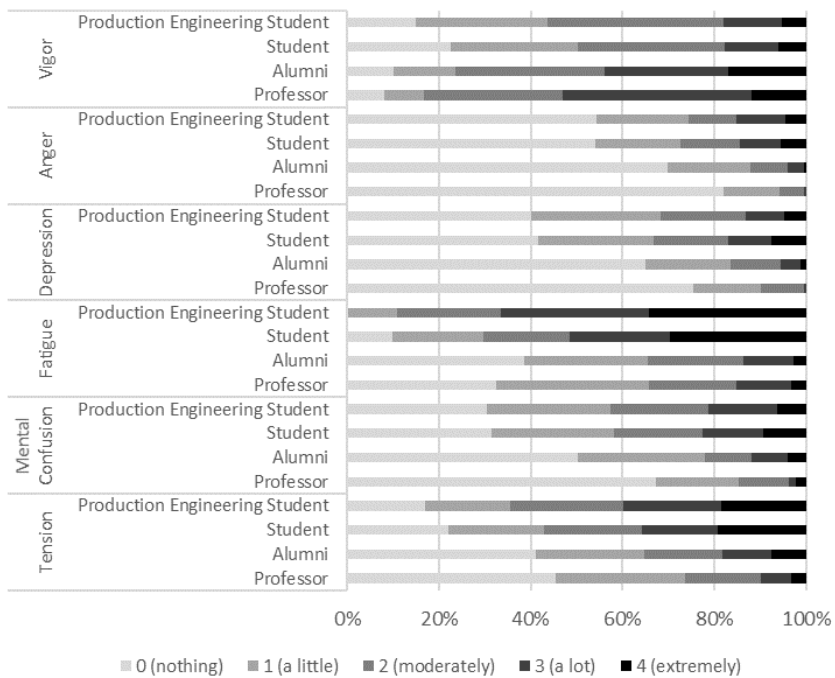

Fig.1 Comparison of the intensity of the BRUMS subscales with the analysis groups

In this comparison, it is evident that 'fatigue' is more present in students, and 'vigor' in professors and alumni. It is also possible to note the convergence of the responses from former students with professors. In addition to these two subscales, the 'tension' also had a moderate activation. It is possible to notice the low activation of 'anger' and 'depression' moods.

In the analysis of perceptual graphs, the professors are the one with the least activation of negative moods and the one with the most positive activation. The

students are the one who has the worst BRUMS picture within the comparison of the three groups. The professors have more vigor and the students have a higher activation of the negative subscales than the other two groups.

The analysis was also stratified by time, analysis parameter, experience, course and age, and it can be concluded that:

- Time: time interferes with the mood scale, namely:
  - Students: the time of the course was analyzed and it was noticed that the student at the end of the course tends to have a higher 'tension', 'fatigue' and 'vigor' activation and the beginning of course students tend to be less 'tense' and a mild picture of greater 'depression' and 'confusion';
  - Former student: it was analyzed that the BRUMS framework improves (this implies that it decreases the negative charge and increases the 'vigor'), according to time;
  - Professor: the parameter was teaching time and professors with less experience tend to have more 'fatigue'.
- Parameter with another HEI: BRUMS improves with an academic experience in different institutions.
  - Student and professor: tend to have a better BRUMS;
  - Former student: has more 'vigor' and less 'tension'.
- Second degree:
  - Students: improves negative BRUMS, but does not affect positive mood;
  - Former students: those who only completed their first degree tend to have a more negative BRUMS and, also, without interference in the positive picture.
- Gender and sex:
  - LGBT students and former students: they have the most intense moods and a tendency to a worse BRUMS;
  - Male students and alumni: tend to have a slight improvement in the BRUMS, for alumni, they interfere more in vigor.
- Study area:
  - 'Health' and 'exact' students have a worse negative activation, but exact students have better vigor and health students have a greater activation for depression and anger;
  - Technological students tend to have a better BRUMS-negative picture, but a low activation in vigor;
  - Professor: professors who teach graduates from more than one area tend to have better 'vigor' and to be less 'confused'.
- Age range:
  - Students and alumni: young age tends to have a worse BRUMS activation and tends to improve with the years;
  - Professors: between 40 and 54 years old tend to have less 'fatigue'.

- Consumption: People who consume more tend to have a better activation of 'vigor', but also 'tension' and 'confusion' and a lower activation of 'depression' and 'anger'.
- Engagement and participation: more engaged and participative people tend to have a better BRUMS scale.
  - Students: do not interfere with 'tension';
  - Professors: do not interfere with 'fatigue';
  - It was not possible to analyze alumni.
- Enjoy learning - students: what differs from the previous item is that it does not interfere in 'fatigue' too, it was not possible to analyze the other groups.

Therefore, changes in the mood activations can be found through profiles, preferences, characteristics and experiences. There is a difference between the profile of people and it stands out that a more positive activation (engagement, enjoying learning, participating) interferes in the BRUMS subscale, as well as how much the person consumes.

Figure 2 shows the mood comparisons by group of respondents, by means of the median, in which it is possible to perceive that a production engineering student has the worst BRUMS-Negative activation scenario, however, students in general, have a high activation of 'Fatigue'. On the other hand, the 'former students' section is very similar to the 'professors', differing only in that the professor is more 'vigorous'. Thus, changes in the activation of moods by means of profiles, preferences, characteristics, and experiences can be verified. There is divergence between people's profiles, and it stands out that a more positive activation (engagement, like to learn, participate) interferes with the BRUMS subscales, as well as how much the person consumes.
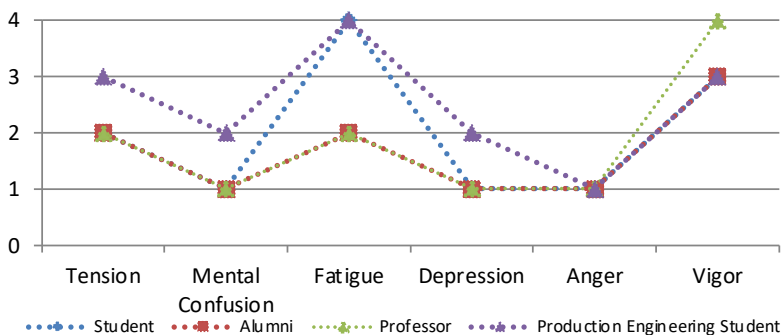

Fig.2 BRUMS moods condensed and analyzed by the median

Seeking to understand the answers a little more, an open, optional question was added, where the interviewees could explain if any of the moods stood out. There were 23 comments from professors, 33 comments from alumni and 117 comments from students.

For students, the subscale that most appeared was 'fatigue' and 'tension', followed by 'confusion'. 'Anger' was the one that appeared the least. Some students mentioned more than one mood, for example, "exhausted and anxious", which refers to the subscales "fatigue" and "tension", or "depressed and disoriented", which refers to 'depression' and 'mental confusion', respectively. A student even addressed the topic when he mentioned that he had "fluctuations in feelings during the year. But I'm fine. It was a difficult year"(D254). The term that came up the most was 'anxious', followed by 'tired', 'worried' and 'exhausted'. The reasons for the responses were varied, but generally related to the universe (such as deadlines and schedule) and academic performance, expectations and family or professional pressure. The main words by the students were 'work', 'course' and 'me', converging the three pillars. An observation is that the test weeks were highlighted with a problem that increases the negative feelings.

One of the comments is evident, which demonstrates the importance of understanding the mood state, when a student says "my heart cries after every class I have, it is totally discouraging. And as I have no support from my family to go after my dream, here I am, I'm taking this survey on a very depressing day for me, I don't even know how many times I asked God to die today or thoughts on killing myself." (D18). This was not the only one, the student D24 said "I even wanted to kill myself, especially after low grades." Another mentioned that he had a gastritis crisis: "The tests are coming and the intensity in which I study is larger, I have already had several gastritis attacks (emotional gastritis)" (D139). For alumni, 'tension' was the most mentioned subscale. The most spoken terms were 'anxious', 'worry', 'tired' and 'confused'. For professors, 'vigor', followed by fatigue, were the most mentioned subscales. A professor apologized when she said "I'm tired but excited. I believe it is a common feeling when getting to the end of the semester" (P7). The reason for the "confusion" and the "tension" were linked to the acquisition of the HEI by another group" or due to the lack of values of the students. The most spoken words were 'tiredness', 'worried' and 'disposition'.

5 Conclusion

In this research, the mood activation of 'fatigue' in students and 'vigor' moods in professors were found. A moderate activation of 'tension' in production engineering students and 'vigor' in students and alumni. The 'anger' mood wasn't activated by

any of the groups, as well as the 'depression' and 'mental confusion' moods in students, alumni and professors. Regarding stratification before the parameters surveyed, it was possible to notice that the time of exposure to the service, experience with the competition and more participative people interfere in the mood scale. In general, the professors and alumni moods converge, except for a greater activation of 'vigor' for professors.

It is noteworthy that the moods, such as the 'fatigue' in students, refer to a state of tiredness, with low energy, which can lead to exhaustion, or even initiate physiological and psychological problems. 'Tension' is a state of concern that can interfere with musculoskeletal tension. On the other hand, 'vigor' is the state of energy and liveliness, with feelings of excitement. The mood state can interfere in several spheres of the human being complex, as an example:

· State and mental health: happiness, sadness, tiredness, energy, irritation
· Social relationship: antipathy, isolation, difficulty in adapting
· Self-image: self-appreciation, depreciation, self-image
· Efficiency and productivity: attention, memory, concentration, energy, exhaustion
· Physical: physical tiredness, sleep, musculoskeletal and psychomotor responses

It is possible to see that the scales are not dependent and that it is possible to have 'vigor' and 'fatigue' activated within the same context. It should also be noted that all subscales differed in some type of profile. The experience, both of age and professional (since graduation) and academic (second degree), in general, improves the BRUMS mood activations.

In the open responses, it was also detected that students are affected by the universe and academic performance and also by family or professional expectations/pressure. professors, on the other hand, demonstrated issues such as the university environment, the values and conduct of students and alumni through the labor market. Alumni and students highlighted 'anxious', 'tired' and 'worried', while professors highlighted 'tired', 'worried', 'mood' and 'energy'.

Finally, suicidal comments or referring to physiological problems in the face of emotional stress were found, which confirms the importance of the user's emotional study.

6   Final Considerations

Regarding the POMS method, it was possible to see in the literature approach that there are several variations regarding its application, such as the one used in the present work: BRUMS. The BRUMS methodology helps in the understanding of the

human being in the emotional aspect. It is a methodology that evidences the perception of reality through mood subscales, which are: 'tension', 'fatigue', 'depression', 'anger', 'mental confusion' and 'vigor'. The method used consisted of 24 unipolar words, in a 5-point Likert rating. Therefore, results are obtained in a more precise perception of the interviewees moods. The reduced self-report methodology had interesting and satisfactory results, with statistical validation, and also with a good Cronbach's alpha, which converges with a simple and effective measurement method for the emotional analysis of the user, as for the emotional design.

The method was applied in the universe of higher education with students, professors and former students of the undergraduate course. The tool made it possible to analyze the interviewees from the dimensions perspective of these moods, which can assist in an emotional parameter of analysis for higher education institutions. These actions can promote well-being and eliminate negative moods, such as 'fatigue' and 'tension' itself. It is also evident that the use of the reduced scale online was satisfactory and that adding the open question helped a lot in the deeper understanding of the reasons.

In this study, it is possible to conclude that the subscales of 'fatigue', 'vigor' and 'tension' are present in this academic universe and that moods interfere in the psychological and physiological part of those involved, deserving attention and analysis from the user in this perspective. Understanding the user from an emotional perspective can help in actions that are more convergent in the emotional relationship, within the stimuli of subjective well-being, meaning and pleasure. Knowing that the emotional state interferes with cognition and learning, the subject gains more relevance.

From a design perspective, the BRUMS model can help find the moods of those involved and thus be a tool to support managers in understanding emotional fluctuations and thus make their decisions more user-focused. As an example from the academic world, knowing that students are feeling fatigued, they can see how to minimize this state to increase academic performance.

This study had the application as a limitation only one single time in the year, in the month of November. It is known that a mood is temporary and that higher education users have a long-term relationship with the service. For this reason, the tool application at different times of the academic semester to analyze the fluctuations in moods is left as a suggestion.

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