

Reliability and Validity of the *Achievement Emotions Questionnaire*. A Study of Argentinean University Students

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Abstract

Introduction. This paper aims at describing the psychometric features of the Achievement Emotions Questionnaire -AEQ-, focusing specifically on the section that measures class emotions. From a theoretical perspective, this instrument was designed based on the control-value theory of achievement emotions. Therefore, a description of the psychometric features of the questionnaire could pave the way for discussions about the underlying theory. From a practical perspective, it is important to highlight that there is no documented literature in our country about the technical advantages and benefits that the instrument has. Thus, the description of the instrument could represent important contributions to the field.

Method. The section of the AEQ that assesses class emotions consists of 80 items grouped into eight scales: enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. We based the reliability analysis on the responses obtained from a sample of 450 students who attend the School of Engineering at Universidad Nacional de Río Cuarto (Argentina). For the analysis of content validity, we considered 11 experts' responses to a questionnaire specifically designed to this end.

Results. The results obtained indicate acceptable reliability levels both for the use of the questionnaire as a whole and also for the individual use of each scale, except for 'hope', for which future analysis and reformulations are needed. The inter-rater reliability test allowed us to confirm the content validity of the instrument, as 80-100% of the raters showed agreement in indicating high or moderate relevance for 79 of the 80 items in the questionnaire.

Conclusion. The reliability and validity indices obtained in this study provide evidence to conclude that the Argentinean Spanish version of the Achievement Emotions Questionnaire (AEQe) can be used reliably with groups of students in our context. In addition, the results suggest alternatives that could increase the levels of reliability and validity obtained in this study.

Keywords: Achievement Emotions Questionnaire, reliability, validity, university students.

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Confiabilidad y Validez del *Achievement Emotions Questionnaire*. Un Estudio con Alumnado Universitario Argentino

Resumen

Introducción. Este trabajo se orienta a describir propiedades psicométricas del *Achievement Emotions Questionnaire* -AEQ- para la sección que mide emociones relacionadas con las clases. Desde el punto de vista teórico, el instrumento fue diseñado en base a la teoría del control-valor de las emociones de logro. Así pues, los hallazgos obtenidos habilitan reflexiones sobre la teoría de base. Desde un punto de vista práctico, no contamos en nuestro país con registros documentados acerca de las bondades técnicas del instrumento, por lo que los resultados al respecto se valoran como muy importantes.

Método. La sección del AEQ que valora emociones relacionadas con las clases, consta de 80 ítems agrupados en ocho escalas: disfrute, esperanza, orgullo, enojo, ansiedad, vergüenza, desesperanza y aburrimiento. Para los análisis de confiabilidad, nos basamos en las respuestas de una muestra de 450 alumnos efectivos de la Facultad de Ingeniería de la Universidad Nacional de Río Cuarto (Argentina). Para los análisis de validez de contenido, consideramos las respuestas de 11 expertos a un cuestionario elaborado a tal fin.

Resultados. Los resultados obtenidos indican niveles de confiabilidad aceptable tanto para el uso del cuestionario en su conjunto como para las escalas consideradas independientemente -a excepción de 'esperanza', que ameritaría análisis y reformulaciones subsiguientes. Por su parte, el procedimiento de acuerdo entre jueces, permitió probar la validez de contenido del instrumento; así, entre el 80% y el 100% de los jueces acordó en indicar pertinencia alta o moderada para 79 de los 80 ítems que conforman al cuestionario.

Conclusiones. Los índices de confiabilidad y validez obtenidos por medio de este estudio, permiten concluir que el instrumento, en su versión traducida al español de Argentina (AEQe), puede ser utilizado con confianza con grupos de estudiantes de nuestro contexto. Los resultados sugieren además, alternativas que podrían elevar incluso los índices de confiabilidad y validez obtenidos.

Palabras Clave: Achievement Emotions Questionnaire, confiabilidad, validez, estudiantes universitarios.

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Introduction

The field of psychoeducational research invests important material and human resources to improve the quality of education for a larger number of citizens. In this context, interest in teaching and learning has been, and continues to be, an issue of concern which has triggered the attention of scholars and researchers in the field of Educational Psychology (Donolo & Rinaudo, 2008).

The last fifty years have witnessed important advancements in the understanding of teaching and learning processes and of the contexts where these processes become meaningful. However, a review of the literature suggests that until very recently -about a decade ago- the cognitive approach overshadowed the affective dimension in the study of learning processes (Mero, Caballero Carrasco, Bermejo García, & Mellado Jiménez, 2009). In fact, the field offers a variety of concepts, methods and instruments in order to study, understand and assess the more cognitive aspects involved in the process of academic learning. Different developments related to learning strategies, background knowledge, cognitive styles, information processing or knowledge construction led to a remarkable methodological and conceptual evolution in the field.

In Schutz and Pekrun's view (2007), there has been a notable increase in educational researchers' interest in emotions during the last ten years, 2005 being the first year in which the term 'emotions' was included in the list of interesting areas to be considered important research avenues in the field of Educational Psychology. In this respect, at the beginning of this decade Zeidner, Boekaerts and Pintrich (2000) emphasized a need to advance in areas that could guide researchers to discuss emotions and affect in educational settings, which leads us to consider research on emotions a current need in the field. What do we know about emotions? Which instruments are available to study and assess emotions in the contexts where we exercise our professions? How can we get to know our students' emotions in real academic settings? How can we favor the emergence of beneficial emotions for the learning process or prevent the development of harmful emotions for our students' benefit? These are some of the questions that pose a challenge in the psychoeducational research agenda for the next decades.

Towards integrative and situated approaches for the study of emotions in education

A review of the relevant literature reveals a diversity of approaches and perspectives in the study of emotions in the field of education. On the one hand, there is a robust body of seminal studies that represent the more traditional lines of research in the study of emotions. On the other hand, we can also identify the recent emergence of different studies integrating emotions as an issue of concern in relation to other important variables which are present in the academic learning processes (Paoloni, 2014).

As for the more traditional studies on emotions, two main lines of research are identified (Paoloni, 2014; Pekrun, 2005). One integrates research on the anxiety associated with students' achievements, a research tradition followed in a wide range of empirical studies (Hembree, 1988; Zeidner, 2007). The other line of research is represented by different studies on attributional antecedents of emotions related to success and failure, a research tradition initiated by Weiner in the 1970s (Weiner, 1992, 2005).

Schutz and Pekrun (2007) and Pekrun, Frenzel, Goetz and Perry (2007) note that in the most recent psychoeducational studies, emotions begin to take an important place and are gradually integrated into the study of other important variables which are present in teaching and learning processes: studies on personal character, research on achievement motivation and, more recently, studies focused on a variety of personal and contextual features related to the emergence and development of achievement emotions (e.g. Boekaerts, 2007; Elliot & Pekrun, 2007; Linnenbrink, 2007; Meyer & Turner, 2007).

Research focused on emotions as an area of interest has brought about important developments related to students' and teachers' emotions. However, as observed by Pekrun et al. (2007), at present these lines of research seem to develop separately from other research areas. Therefore, as claimed by Pekrun et al., research on emotions in the field of education, and on achievement emotions in general, is currently in a state of fragmentation. There seems to be a lack of integrative frameworks, a fact that restricts theoretical and empirical development (Pekrun et al., 2007, p. 14).

In order to provide an integrative framework and favor theoretical and empirical developments in relation to academic emotions, Pekrun developed the control-value theory of achievement emotions (Pekrun et al., 2007), which offers a sociocognitive perspective of stu-

dents' and teachers' emotions and represents an integrative alternative to the theoretical fragmentation and dispersion currently pointed out as a characteristic of the research field on emotions in education.

The control-value theory of achievement emotions

Schutz and Pekrun (2007) refer to 'achievement emotions' as those emotions which are related to academic settings, and conceptualize them as complex psychological processes having affective, cognitive, motivational and expressive components. These academic emotions are largely based on the way in which teachers and students perceive what is happening in the context of a specific activity (Meyer & Turner, 2007).

Pekrun's model classifies emotions based on three central dimensions: *object focus*, *valence*, and *activation*. As for the *object focus* dimension, the theory considers two main aspects: when the object focus is placed on the achievement activities and when it is placed on the outcomes. In Pekrun's view (2006), research on achievement emotions was generally centered on emotions related to outcomes -such as studies on anxiety in examination settings (Zeidner, 2007) or studies on emotions activated in relation to attributional outcomes (Weiner, 1992, 2005). However, in the definition presented in his theory, Pekrun (2006) highlights the fact that emotions related to achievement activities should be also considered achievement emotions in a strict sense. Thus, the joy experienced by students when they understand the teachers' explanations, their frustration or embarrassment when they are found cheating in an exam, or the students' pride experienced when they advance successfully in doing a required task would all be examples of emotions related to achievement activities (Pekrun et al., 2007).

In relation to *valence*, like emotions in general, achievement emotions in particular can be also grouped into positive or pleasant and negative or unpleasant. Among the former, for example, we can refer to enjoyment, hope, pride, happiness, satisfaction, relief; among the latter, we can refer to anger, hopelessness, anxiety, sadness, shame, to mention some.

Finally, the degree of *activation* of emotions -the third dimension proposed by Pekrun et al. (2007) for the classification of emotions- refers to the state of singular activation or emotional arousal that conditions a person physiologically in response to the emotions experienced by the person. Among the activating emotions -both positive and negative- we can

mention happiness, hope, pride, anxiety, anger, shame, etc. Among the deactivating emotions we can identify relief, hopelessness, boredom, satisfaction, etc.

In summary, the dimensions proposed by the authors to study academic emotions comprise a three-dimensional taxonomy, a conceptual model which can help to explain the emotional dynamics in relation to features that characterize learning settings. This model shows a thorough level of analysis and development captured by the items that constitute one particular instrument for measuring and assessing academic emotions. This instrument, known as AEQ (Achievement Emotions Questionnaire) and developed by Pekrun, Goetz and Perry (2005), has succeeded in triggering the attention of scholars and professionals working in different educational levels.

Considering the potential inherent in the theory proposed by Pekrun et al. (2007) for the psychoeducational field and bearing in mind the challenge that the research field has in advancing on knowledge about academic emotions by using more integrative frameworks, this paper aims at offering methodological contributions for a better understanding of the emotions experienced by university students in real learning settings. Specifically, we will describe some psychometric features of the Argentinean Spanish version of the Achievement Emotions Questionnaire (AEQe). The results reported in this paper provide interesting and illuminating information both from a theoretical perspective and from an applied perspective.

From a theoretical perspective, the instrument was designed and built based on the central principles and assumptions underlying the control-value theory of achievement activities proposed by Pekrun et al. (2007). Therefore, the findings obtained through the use of the instrument allow us to turn our attention again to a model that has a well-known potential for the design of educational settings capable of encouraging the emergence of beneficial emotions for learning processes (Paoloni, 2014). From an applied perspective, it is important to highlight that there is no documented literature in our country about the technical advantages and benefits that the instrument has. Thus, the findings obtained from a translated version of the questionnaire into Argentinean Spanish may have important contributions for future research studies on the academic emotions experienced by undergraduate Argentinean students.

Methods

Participants

During the 2013 academic year we collected data from a convenience sample of 450 regular students at the School of Engineering, Universidad Nacional de Río Cuarto (Argentina). The sample represented 40.1% of the total student population at the School of Engineering (N=1123). Although it is a convenience sample, the distribution of students into careers and academic years was intended to be proportional to that of the total student population. Thus, in relation to careers, the sample consisted of 32.2% of the total number of students enrolled in Mechanical Engineering (N=145), 32% of Chemical Engineering (N=144), 21.8% of Telecommunications Engineering (N=98), and 14% of Electrical Engineering (N=63). As for academic years, the sample included 37.3% students attending the first year, 18.2% attending the second year, 14.2% the third year, 12.9% the fourth year, and 17.3% the fifth year.

In relation to gender, of the 450 participants, 76.7% were male students (N=345) while 23.3% were female students (N=105). As for the participants' age, the sample consisted of young students, the majority of them being 18-21 years old.

Instrument

The *Achievement Emotions Questionnaire -AEQ-* (Pekrun et al., 2005) is a self-report instrument consisting of three sections. The first section assesses class-related emotions. The second section considers emotions associated to learning processes in general; the third section assesses emotions that emerge in exam situations.

For the present study, we used the first section, i.e., the section about class-related emotions. The section consists of 80 items, which must be answered on the basis of a 5-point Likert scale. The lowest value stands for total disagreement with the statement, whereas the highest value (5) represents total agreement with the statement. The items represent eight scales: enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. We provide details of each in the following paragraphs.

Enjoyment. The ten items representing this scale refer to enjoyment, understood as a pleasant feeling of joy and delight triggered by a certain stimulus that is perceived as enjoyable. Then, in the questionnaire, 'enjoyment' refers to the delight experienced by university students when attending classes (examples: "I enjoy being in class", "After class I start looking forward to the next class").

Hope. This scale consists of eight items and refers to a pleasant emotion associated to the feeling experienced when we perceive something we wish or intend to be possible. The students who have hope for classes are the ones who believe they are able to perform correctly in class and attain the goals they seek to achieve (examples: "I am hopeful that I will make good contributions in class"; "My confidence motivates me to prepare for class").

Pride. This scale includes nine items and refers to a high level of self-esteem. The students who experience the feeling of pride are those who feel satisfied in relation to their performance and goals attained (examples: "I think that I can be proud of what I know about this subject"; "Because I take pride in my accomplishments in this course, I am motivated to continue").

Anger. The scale consists of nine items associated to the unpleasant emotion of anger with someone or something. Then, the students who experience anger in relation to the classes they attend are those who are irritated or get angry as a result of some characteristics of the classes (examples: "Thinking about the poor quality of the course makes me angry"; "I wish I didn't have to attend class because it makes me angry").

Anxiety. The twelve items included in the *anxiety* scale refer to a state of restlessness, concern or stress. Students who experience anxiety before, during or after attending the class, are worried or disturbed by different thoughts which distract them (examples: "Thinking about class makes me feel uneasy"; "I get tense in class").

Shame. The scale has eleven items referring to an unpleasant emotion associated to bashfulness or shyness feelings that a person experiences under certain circumstances. Students who experience shame are those who feel inhibited in class due to shyness or the sensation of having done something inappropriate (examples: "When I say anything in class I feel

like I am making a fool of myself”; “If the others knew that I don’t understand the material I would be embarrassed”).

Hopelessness. This scale includes ten items associated to the lack of hope. Students feeling hopelessness are those who do not expect with optimism to attain or achieve the desired goals in class (examples: “I have lost all hope in understanding this class”; “I feel hopeless continuing in this program of studies”).

Boredom. The scale consists of eleven items referring to an unpleasant feeling of tiredness or tediousness generally experienced in situations perceived as being meaningless, which makes it difficult to pay attention or participate in the required tasks. Students who get bored in class have problems in paying attention, concentrating, finding tasks meaningful, working hard, and overcoming difficulties (examples: “I’m tempted to walk out of the lecture because it is so boring”; “I start yawning in class because I’m so bored”).

At present the academic community in the field is using the instrument extensively. The instrument has been used in research studies carried out in different countries, such as Belgium (Mouratidis et al., 2009), China and Germany (Frenzel et al., 2007), United States (Berg, 2008), Philippines (Matti et al., 2009), and Spain (González-Fernández et al., 2010).

As for the technical features, the authors who designed the instrument reported that the reliability of the scales included in the AEQ ranges from adequate to very good (Cronbach’s $\alpha = .75$ to $.93$, with $\alpha > .80$ for 20 of the 24 scales). The internal structural validity of the AEQ scales in terms of emotion component structures has been analyzed by means of exploratory and confirmatory factor analysis, yielding results which were also acceptable (Pekrun et al., 2005).

A German version of the AEQ is available, as well as domain-specific versions to assess emotions experienced in Mathematics -Achievement Emotions Questionnaire - Mathematics, AEQ-M- (Pekrun et al., 2003; as cited in Pekrun et al., 2007) and in subjects associated to Language in high-school students -Achievement Emotions Questionnaire - Language, AEQ-L- (Goetz, Pekrun, Hall & Haag, 2006). At present there are versions of the AEQ-M in English, German and Chinese, and of the AEQ-L in English and German. This highlights the strengths of the instrument for its application in more specific learning contexts.

In our specific context, Vaja and Paoloni (2012) and Paoloni and Vaja (2013) conducted two pilot tests of a version of the questionnaire translated into Argentinean Spanish (hereafter AEQe), administering the instrument first in an intentional sample consisting of 14 advanced students of Telecommunications Engineering at the School of Engineering.

The results obtained from the pilot test did not reveal difficulties from the students to understand the meaning of the items included in the questionnaire (Paoloni & Vaja, 2013; Vaja & Paoloni, 2012). However, despite the findings reported about the psychometric features of the AEQ in different countries, the results obtained in different studies which have used the instrument, and the pilot tests conducted in our country, there are no reliability and validity indices in Argentina. This motivated us to explore the psychometric features of the instrument in Argentina.

Procedures

The study reported in this paper is part of a larger research project funded by Argentina's National Organization of Scientific and Technological Development. The project, carried out at the School of Engineering, Universidad Nacional de Río Cuarto (hereafter FI-UNRC), is an endeavor motivated by institutional interests in furthering the understanding of inter and intrapersonal features that are present in engineering students' learning processes. The project is aimed at collecting data in order to identify possible cases of university dropout in certain groups of students and, therefore, carry out preventive actions. As the study on achievement emotions is one of the aims of the larger project that frames the present study, we had the institution's support to carry out the study reported in this paper.

In order to carry out the study, we first identified the teachers at FI-UNRC who lectured basic and specialized courses in each of the four career programs previously mentioned and in each of the five years corresponding to the career programs. In this way, we identified those classes attended by large groups of students. Then, the teachers were informed about the study we were conducting and they were requested to participate. Specifically, the teachers' participation consisted in allowing us to use some time of their lessons to administer the questionnaire.

Once the teachers had accepted to participate, we went to the different classes. We explained the students the aims of the study and asked them to participate voluntarily. We also informed the students that their responses to the questionnaire were anonymous and confidential and would be used for research purposes. All the students accepted to participate. We gave the students the questionnaire and asked them to respond to those aspects related to their experiences at university: how they usually felt before, during and after class. For each of the items, the students rated their emotional experiences in a scale ranging from 1 (*total disagreement*) to 5 (*total agreement*). During the first semester of the 2013 academic year, we collected 411 responses to the AEQe in 17 classes belonging to different years of the four career programs at the School of Engineering. During the second semester of the 2013 academic year, we collected a total of 450 responses.

In order to assess the validity of the class-related section in the AEQe we used inter-rater methodology (Murat, 1985). To this end, and considering the suggestions proposed by Escobar-Pérez and Cuervo-Martínez (2008), we designed a questionnaire using the items and the scales of the AEQe. Then, we administered the instrument in a group of experts specialized in areas related to psychology and education (all of them holding PhD degrees). These experts were asked to assess whether each of the items in the questionnaire was relevant to measure the emotion it was intended to measure.

The instrument was sent via e-mail in an Excel file to 20 raters. Of the 20 raters, 11 sent their responses back in the time required and following the instructions detailed in a guideline. The guideline consisted of three sections: a) a heading or introduction that stated the aim of the study, the future applications of the data to be collected and the procedures to be considered for the responses; b) a section containing examples, which aimed at facilitating the experts' understanding of the procedures to be followed in order to respond; c) a section including a definition of each of the scales of the AEQe and a transcription of the corresponding items.

The experts were required to answer the following question for each of the scales: *To what extent do you think the following items are relevant to measure the emotion they refer to?* The answers had to be provided based on a 4-point Likert scale, in which the lowest value (1) indicated null relevance between the item and the emotion measured; the second value (2) indicated low relevance between the item and the emotion assessed; the third (3) indicated

moderate relevance between the item and the emotion evaluated; and the fourth (4) indicated high relevance.

Data analysis

In order to assess the instrument's reliability, we used a statistical procedure that allows calculating *Cronbach's Alpha* coefficient. The data obtained from each of the participants were input and codified into SPSS (version 17.0). Then, we calculated *Cronbach's Alpha* for the whole instrument and for each of the individual scales included in the class-related section of the AEQe: enjoyment, hope, pride, anxiety, shame, hopelessness and boredom.

In order to assess validity, the scores reported by the raters who responded to the instrument designed, were input into SPSS (version 17.0). From these data we calculated Kendall's agreement coefficient.

Results

Reliability

The results obtained from the analysis conducted to assess the instrument's reliability are synthesized in Table 1.

Table 1. Number of items and Cronbach's Alpha for each scale and grouping of scales according to valence and activation in AEQe. Data for 450 students of Engineering Careers at Universidad Nacional de Río Cuarto, 2013.

AEQe Scales – Class-related section	Items per scale	Cronbach's Alpha
Enjoyment	10	.78
Hope	8	.69
Pride	9	.77
Total positive activating emotions	27	.88
Anger	9	.76
Anxiety	12	.81
Shame	11	.83
Total negative activating emotions	32	.90
Hopelessness	10	.81
Boredom	11	.88
Total negative deactivating emotions	21	.90
Total AEQe scales	80	.88

Source: the authors

As observed in Table 1, the data indicate an adequate level of reliability of the whole instrument (.88). Considering the results obtained individually for each scale, we can identify that 4 of the 8 scales included in the class-related section of the AEQe yielded reliability indices that were assessed as being very good in those cases in which *Cronbach's Alpha* was higher than .80 (anxiety= .81; hopelessness= .81; shame= .81; boredom= .88). The scales associated to anger yielded .75, and the scales related to enjoyment and pride yielded .77, both values being considered acceptable scorings. The scale 'hope' yielded the lowest value (*Cronbach's Alpha*= .69). Although this value is not completely inappropriate, the scale and the way it is worded could be reconsidered in subsequent analyses. With respect to this, the tests that revealed the weight of each item in relation to the total scale suggest that either the wording of item 4 could be revised or the item could be eliminated so that the reliability level of both the scale and the whole instrument is increased ("*I am motivated when I feel confident about understanding the course topics*").

Finally, following the suggestions proposed by the authors of the instrument (Pekrun et al., 2004, as cited in Mouratidis et al., 2009) -as can be observed in Table 1- we created three aggregated categories of emotions, regrouping the original scales according to the *valence* and *activation* of the emotions represented by them. In agreement with the authors of the original version of the instrument, we obtained highly adequate reliability indices for the following items: a .88 *Cronbach's Alpha* for items assessing positive activating emotions (hope, pride and enjoyment), a .90 *Cronbach's Alpha* for items measuring negative activating emotions (anger, anxiety and shame), and a .90 *Cronbach's Alpha* for items evaluating negative deactivating emotions (hopelessness and boredom).

In summary, the results obtained for the reliability of the AEQe to be used in the context of Universidad Nacional de Río Cuarto provide illuminating evidence, with *Cronbach's Alpha* generally higher than .80. The scale that yielded the lowest scoring (.69) refers to 'hope' as an emotion, which may suggest the need for future analysis. In addition, considering the high values obtained in the categories created according to valence and activation, we can suggest that it is advisable to use the data obtained from the AEQe by regrouping them according to positive activating emotions, negative activating emotions and negative deactivating emotions.

Content validity

When the technical features of a psychological instrument are evaluated, it is important to ensure its validity, that is, the extent to which it measures what it is intended to assess (Escobar-Pérez & Cuervo-Martínez, 2008). The data obtained in this study indicate that, based on the experts' evaluation, the items included in the AEQe are valid for measuring what they are intended to assess (Kendall=.288; $p<.001$). However, as there was no agreement in all the items, we created categories based on the relevance level (high, moderate, low) indicated by the experts. Table 2 shows the percentage of agreement among the experts in relation to the relevance level of the items in the AEQe.

Table 2. Percentage of agreement among 11 experts in relation to the relevance of 80 items in the AEQe

Number of items	Percentage	Relevance	Percentage of agreement
61 of 80	76%	High	Between 80% and 100% of the raters
18 of 80	23%	Moderate-High	Between 80 % y el 100% of the raters
1 of 80	1%	Low	Between 50% y el 60% of the raters

Source: the authors

As observed in Table 2, the results show the raters' agreement in indicating the validity of most of the items in the AEQe (99%). More than 80% of the raters agreed in considering moderate-high relevance for 79 of the 80 items included in the instrument. We did not obtain expected results for only one of the items. This item, number 28, ("*I am frustrated in class*") was assessed by most of the experts as having low relevance to evaluate the anger experienced in class as an achievement emotion.

Discussion and conclusions

Reliability and validity indices obtained in this study allow us to conclude that the AEQe can be used reliably with groups of students in the context of Universidad Nacional de Río Cuarto (Argentina).

The results obtained from the 450 participants' responses in relation to reliability (*Cronbach's Alpha*) indicate adequate coefficients in order to use the whole questionnaire as well as each of the individual scales. In line with Pekrun et al.'s suggestion (2004, as cited in

Mouratidis et al., 2009), regrouping the original scales into the aggregated categories based on *valence* and *activation* of emotions becomes especially interesting for application purposes, considering the high *Cronbach's Alpha* values obtained: .88 for the set of items assessing positive activating emotions (hope, pride, enjoyment), .90 for the group of items measuring negative activating emotions (anger, anxiety and shame), and .90 for the items evaluating negative deactivating emotions (hopelessness and boredom).

Despite the above mentioned results, which represent very good findings, considering in particular the grouping of the original scales in the three main categories previously referred to, we insist on the possibility of increasing the reliability of the scale 'hope' and, therefore, of the whole instrument, by revising the translation and the subsequent wording of some of the items included in the scale, such as item number 4 ("Being confident that I will understand the material motivates me"). In addition, although the validity of the AEQe was demonstrated in this study, as revealed by the agreement among a group of experts specialized in the field (Kendall=.288; $p < .001$), we consider it necessary to carry out a systematic revision of some of the items. In particular, future studies should revise the translation and wording of item number 28 ("I feel frustrated in class"), which most experts assessed as having low relevance in relation to the emotion it is intended to measure: anger in class.

One of the instructions provided to the raters when they responded to the questionnaire gave them the option to further explain their assessments of the weaknesses and strengths identified in relation to the validity of the whole instrument and/or specific items. Almost all of the raters responded to this instruction and sent their answers in written form in a separate file. These data are very illuminating for guiding future studies on the instrument's validity. For example, especially for item 28 we received responses from most of the raters (8 out of 11), including those raters that assessed the item as having moderate relevance. According to these responses, the raters suggest revising the wording of this item because, as the raters explained, frustration is an emotion which is different from anger. This means that when students are frustrated, they do not necessarily experience anger. Likewise, when students get angry they do not necessarily feel frustrated. These observations made by the raters indicate the need to draw on theory and revise statements about frustration and anger as discrete emotions.

In addition to the suggestions previously pointed out in order to increase the reliability and validity of the AEQe, we suggest that future studies should focus on the following: a) analyze a larger sample that integrates university students from other schools in which, among other aspects, female students are better represented; b) analyze the validity of the content underlying the emotional components regarded by the questionnaire's authors as being predominant for each item (affective, motivational, cognitive and physiological components); c) conduct studies on the validity and reliability of the other two sections included in the original version of the AEQe: emotions related to exam situations and emotions related to learning. The following paragraphs explain each of these three suggestions, which could help to improve the results obtained in this study and in further analyses.

1) Analyze a larger sample so that female students are better represented. Considering the representation of female students when administering the AEQe in future studies is not a minor issue. This is evidenced in the findings reported by other researchers who analyzed gender differences in the study of emotions and emotional skills. For instance, the results obtained by Etxebarria, Apodaca, Eceiza, Fuentes and Ortiz (2003) revealed important differences between female and male participants' emotional world. Although these researchers studied primary school girls and boys and focused the analysis on certain discrete emotions, such as sadness and anger, and on emotional competences, such as emotional control and awareness of emotions, the findings are interesting because they provide evidence about important differences related to gender in the way emotions are experienced. Compared to boys, girls tended to experience sadness, whereas boys, as compared to girls, showed a tendency to experience anger more frequently. From a very different theoretical and methodological perspective, the findings reported by Blázquez and Moreno (2008) indicate differences in basic emotional skills when considering gender violence and its associations to the victims' emotional intelligence (in general, women) and aggressors (the majority of them, men). Beyond the specific characteristics of each study, the results obtained highlight the importance of considering the representation of gender in future studies using the AEQe in order to reveal possible differences.

2) Analyze the validity of the content underlying the emotional components regarded by the questionnaire's authors as being predominant for each item. The AEQ is a self-report instrument which considers achievement emotions from a multidimensional perspective. Therefore, the authors of the instrument understand academic emotions as an interrelated set

of psychological processes including motivational, affective, physiological and cognitive dimensions or components (Pekrun et al., 2005). The AEQ manual clearly specifies the component or dimension which predominates in each item (for example, the cognitive component predominates in “I take pride in being able to keep up with the material”; the physiological component predominates in “When I do well in class, my heart throbs with pride”; the affective component predominates in “I feel scared”; the motivational component predominates in “I think about what else I might be doing rather than sitting in this boring class”). However, despite these explanations in the AEQ manual, it seems necessary to carry out further studies to validate these assumptions. For instance, in the present study, we analyzed the experts’ opinion about the components or dimensions which, according to Pekrun et al. (2005), predominated in each of the items of the section considering emotions related to classes. Based on preliminary analyses, there seemed to be little agreement among the experts who participated in this study on the relevance of some of the items included in the AEQe in relation to the emotional component they are intended to measure. We are currently working on these analyses, which we expect to report soon.

3) *Administer AEQ using simultaneously the three scales included in the questionnaire.* In relation to this, Pekrun, Goetz, Frenzel, Barchfeld and Perry (2011) published an interesting study in which the AEQ was used in a comprehensive way for the first time. The authors succeeded in including simultaneously the three scales contained in the instrument - emotions related to classes, emotions related to learning and emotions related to exams. The items were responded by the same group of university students. The data collected allowed furthering the analysis of the psychometric quality of the instrument as well as the general structure and the role that emotions have in different academic settings. Considering the importance of the present study for the analysis of the internal and external validity of the instrument and its relation to the underlying theoretical framework, we believe it is important to highlight the need to replicate the study in our academic context.

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