

FORMATIVE ASSESSMENT OF PHYSICAL EDUCATION TEACHERS AND SELF-CONCEPT LEVEL OF PRIMARY SCHOOL CHILDREN

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Abstract This study aimed to analyse the relationship between the formative assessment (FA) of Physical Education teachers and the level of self-concept of primary school students. In this descriptive cross-sectional study of 122 schoolchildren, self-concept was assessed using the Piers-Harris Self-Concept Scale and the teacher's formative assessment practices through the teacher performance questionnaire associated with formative assessment practices whose scores were validated. The analysis of bivariate correlations showed that higher values in proactive FA correlated with lower values in physical self-concept and higher values in behavioural, intellectual, and social self-concept ($p < 0.05$, for all) and interactive FA with higher values in social self-concept ($p < 0.05$). The simple analysis of variance detected statistically significant differences in proactive and interactive FA ($p < 0.05$, for all) in favour of those who had a higher level of self-concept. In turn, the linear regression test indicated that higher values in retroactive FA are associated with higher values in social self-concept ($p < 0.039$) and, that higher values in proactive FA are associated with lower values in physical self-concept ($p < 0.023$). It can be concluded that the FA of the Physical Education teacher can be a differentiating element in the development of self-concept.

Key words: self-concept, cognitive health, assessment, schoolchildren

Introduction

The construct of self-concept is at the centre of the positive psychology revolution (Marsh et al., 2019). Historically, as one of the fundamental constructs in the social sciences, the self-concept approach has been adapted to focus on how people can thrive in life through balanced self-concept development understood as a person's self-belief about themselves and about aspects they consider transcendental to their life (Piers & Herzberg, 2002).

From a social development approach, the current literature shows that schoolchildren construct their self-concept as a function of the social relationships they have, the social comparisons they make, the cultural values that support them, and the feedback they receive. These findings underscore the deeply social nature of self-development to succeed in life (Brummelman & Thomaes, 2017; Gong et al., 2019).

In this regard, Wong & Vallacher (2018) note that there are reinforcing feedback loops for self-concept and determination, such that fluctuations in self-knowledge are associated with fluctuations in goal solving, and vice versa. Specifically, McConnell et al., (2009) demonstrate that affective experiences resulting from self-reinforcing feedback are not determined by the representation of the self-concept as a whole, but rather, by the impact of that feedback on activated aspects of the self. Currently, the most suitable multidimensional model of self-concept in

schoolchildren according to the scientific literature is composed of academic, emotional, physical, social, family, and behavioural dimensions (Shavelson et al., 1976; Piers & Herzberg, 2002).

These aspects can be evidenced in the educational context where, Bahrami, (2019) has pointed out that students in schools moderating descriptive qualitative assessment exposed by the teacher experience more creativity and self-esteem compared to students in schools with a traditional assessment by the teacher. In this regard, López-Vásquez, (2019) points out that standardized evaluative practices still predominate in schools, which lack contextualization, enhance rote learning and seek to measure knowledge quantitatively, cataloguing students according to their results and excluding those who present lower grades. In turn, Condemarin (2000) emphasizes that traditional assessment practices tend to compare students' results, distributing them on a scale of good, fair and bad, which can generate labels that will be difficult to eliminate in students' beliefs later on.

On the opposite side of the traditional assessment is formative assessment (FA), understood as a process in which teachers and students share learning goals and constantly evaluate their progress about these objectives (Carrillo-López & Hortigüela-Alcalá, 2022). Therefore, it helps students to correct their mistakes and learn more, and is a very useful tool for teachers to improve their teaching practice, and for this interaction to result in a link in the teaching/learning process between students and teachers, as well as the constant review of objectives pursued and progress achieved (Gallardo-Fuentes et al., 2020).

From a vision of the students themselves, they point out in their field notebook the advantages and disadvantages of using a FA (Fraile-Aranda, 2015). The results found in this study reflect the importance of this experience for students, as a formative process that requires teamwork and collaborative work. However, among the disadvantages, the demand for continuous and daily work stands out.

Several investigations have analysed the relationship between assessment and the formation of self-concept. López-Vásquez (2019) points out that previous research has questioned whether traditional assessment practices, which prioritize rote learning and closed questions, allow students to learn in a meaningful way and understand assessment as a fundamental process for the improvement of learning through the recognition of their strengths and weaknesses, thus allowing the creation of a positive self-concept of themselves. In turn, this author indicates that from the discipline of special education, it is particularly interesting to analyse FA about self-concept because most of the students with whom we usually work have experienced difficult school trajectories that have been marked in one way or another by their performance in the evaluations and have caused an acceptance or rejection of these, emphasizing their punitive nature, and also having an impact on their self-concept, seeing themselves in a certain way as a result of their results.

In turn, it has been pointed out that peer feedback improves the academic self-concept of students in secondary (Street, 1988) and higher education (Simonsmeier et al., 2020). Given the nuclear role of self-concept in human behaviour and the importance of peers and school experience in its formation and development, it is possible to think that feedback can be a good resource to improve self-concept (Machargo Salvador, 2001).

In elementary school children, it has been studied whether positive feedback is an adequate means to improve self-concept. Machargo Salvador (2001) proposed an experiment lasting five months, with a sample of 48 students in the 4th grade of primary education. These students were selected for their negative self-concept and low academic performance. Three experimental groups and three control groups of eight students each were formed; one group in each class. The teachers who had an experimental group in their class had to give the students in the group a series of positive written feedback. The results only showed mean differences between the experimental

group and the control group in self-concept scores in one of the three cases; adding to this study the need for further research in this regard.

Another study was provided by Craven et al. (1991) who investigated the effectiveness in improving the academic self-concept of elementary school children who scored at the bottom of their class. The intervention was a combination of internally focused performance feedback and attributional feedback. The assessment treatment produced modest self-concept improvement in the target facets (reading and math) and related facets (scholastic and general) but did not affect the other dimensions of self-concept.

However, no studies have been found in the scientific literature that analyses the relationship between FA and the formation of self-concept in elementary school students from the viewpoint of an area, Physical Education, which has as an intrinsic characteristic the FA of the teacher given the motor nature of the area, that is, in a certain sense the use of summative assessment aimed at the motor area brings with it some incoherence since one of the hallmarks of a FA model is self-regulation during the development of the teaching and learning process (Cordoba et al., 2020; González et al., 2021; Hernán et al., 2019; Herranz & López-Pastor, 2017; Molina-Soria et al., 2020).

In this line of argument it is worth asking: how does the FA of the Physical Education teacher contribute to the formation of the self-concept of elementary school students, and do those who receive more formative assessment have a higher self-concept?

Based on these precedents, the main objective of this study is to analyse the relationship between the formative assessment of the Physical Education teacher and the self-concept of elementary school students. To achieve this main objective, four secondary objectives have been established:

- I. To analyse the formative assessment practices of the Physical Education teacher and the dimensions of self-concept considering gender (*males v. females*).
- II. To study the relationship between the student's perception of the formative assessment practices of the Physical Education teacher and the different dimensions of self-concept (*Behavioural, Intellectual, Physical, Lack of anxiety, Social, Life satisfaction, and global self-concept*).
- III. To determine the relationship between the student's perceptions of the formative assessment practices of the Physical Education teacher as a function of his/her level of self-concept (*higher v. lower*).
- IV. To establish the predictive value of the formative assessment practices of the Physical Education teacher on the dimensions of self-concept (*Behavioural, Intellectual, Physical, Lack of anxiety, Social, Life satisfaction, and global self-concept*).

Material and Method

Participants

A total of 122 schoolchildren (65 boys and 57 girls) belonging to the Autonomous Community of the Canary Islands (South of Tenerife), aged 10–12 years ($M \pm SD$: 10.50 \pm 0.78 years) participated in this empirical descriptive and cross-sectional *ex post facto* study. The sampling was non-probabilistic, chosen non-randomly and by convenience. A public centre in the district of Arona was selected. This centre had a medium socioeconomic level. In previous meetings with the representative of the educational centre, she was informed of the study protocol and informed consent was requested from the parents or legal guardians so that the schoolchildren could participate. Inclusion criteria were considered to be between 10 and 12 years of age and regular school attendance (90% of classes

during the months of the current academic year). Exclusion criteria included not meeting any of the aforementioned inclusion criteria, incorrect or incomplete completion of any of the tests, having a medical contraindication that prevented normal activity or being in a process of dietary or food restriction.

It should be noted that after estimating the relevant statistics (units of variables = 6 and effect size = 0.15 (f^2)) for the calculation of the sample size, it was obtained that the minimum sample should be a total of 98 subjects to ensure that the results of the study are robust (Quispe et al., 2020), something that is fulfilled since there is a total sample of 122 participants.

Variables and instruments

Criterion variable

As a criterion variable, self-concept is considered, measured by means of the Piers-Harris Self-Concept Scale (Piers & Herzberg, 2002), elaborated to be administered to subjects aged 7 to 12 years and adapted to Spanish by Cardenal & Fierro (2003). The instrument is composed of a total of 80 items on a dichotomous response scale (Yes/No) organized into six dimensions: (i) behavioural (18 items), which describes the degree to which the individual affirms or denies behaviours of a problematic nature; (ii) intellectual (17 items), which measures the child's self-evaluation in relation to academic tasks, including a general perception towards the educational institution; (iii) physical (12 items), which asks about behaviours related to their physical characteristics (appearance and physical attributes), and aspects such as leadership and the ability to express their opinions; iv) lack of anxiety (12 items), which describes an altered mood and includes different emotions related to worry, nervousness, sadness or fear; v) social or popularity (12 items), which assesses how the individual values his/her relationship, popularity and acceptance among his/her peer group; vi) subjective happiness-life satisfaction (9 items), which describes the general feeling of being happy and content with life. With respect to psychometric properties, high internal consistency ($\alpha = .91$) was found for the total score ((Piers & Herzberg, 2002; Cardenal & Fierro, 2003).

The confirmatory factor analysis with varimax rotation confirmed the six subscales into which the instrument is structured. The sub constructs and the global scale explain a variance that offers consistency to the applied instrument. The percentages of variance explained in the different sub constructs were as follows: behavioural (16.12%), intellectual (13.77%), physical (12.97%), lack of anxiety (14.21%), social or popularity (10.63%) and happiness and life satisfaction (2.96%). The total variance explained was 79.69%. The scale used in the present investigation is a valid and reliable instrument to evaluate the self-concept of the subjects in the sample.

The scale showed good reliability as measured by Cronbach's Alpha test ($\alpha = 0.892$); the reliability of the different sub constructs was as follows: behavioural ($\alpha = 0.921$), **intellectual (0.935)**, **physical ($\alpha = 0.845$)**, **lack of anxiety ($\alpha = 0.901$)**, **social or popularity ($\alpha = 0.856$)** and **subjective happiness-life satisfaction ($\alpha = 0.845$)**.

In addition to defining cut-off points useful in the pediatric context, participants were intuitively classified into two groups: lower self-concept (< 50th percentile) and higher self-concept (\geq 50th percentile); as has been done in previous studies (Rosa-Guillamón et al., 2019). For males, the 50th percentile of 62.50 was recorded at 10 years. In 11 years the 50th percentile of 62.00 was obtained and in the 12 years of 65.00. In females, the 50th percentile of 64.00 was obtained in 10 years. In 11 years the 50th percentile of 68.00 was obtained and in the 12 years of 63.00.

Causal variable

The questionnaire: *teaching performance associated with formative assessment practices* (Cerón et al., 2020) was used to assess the student's perception of the teacher's formative assessment practices. This instrument is composed of 21 items grouped into six subscales. Each sub-scale refers to formative assessment associated with grading (summative) (items 1–3), proactive formative assessment (items 4–6), interactive formative assessment (items 7–10), metacognitive formative assessment (items 11–14), retroactive formative assessment (items 15–18) and adjusted formative assessment (items 19–21). The overall scale score is obtained from the average obtained for each subscale. The higher the score, the higher the level of formative assessment practices of the teacher. The response alternatives were through a Likert-type scale where: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequent, and 5 = Very Frequently. The estimated response time was between 10 to 15 minutes. The psychometric analyses carried out on this formative assessment questionnaire at the classroom level corroborated the degree of reliability of this instrument, which obtained per se scores making this questionnaire a valid (CIF 0.88; RMR 0.03; RMSEA 0.044) and reliable instrument (Cronbach's alpha: .89).

Specifically, in this research, internal consistency indexes (Cronbach's alpha) of 0.88 (summative), 0.92 (proactive), 0.84 (interactive), 0.84 (metacognitive), 0.88 (retroactive) 0.89 (adjusted) and 0.92 (Global Evaluation Index) were obtained in the following dimensions, which are considered adequate (George & Mallery, 2003); as has been done in another study (Carrillo-López & Hortigüela-Alcalá, 2022).

Procedure

This study was carried out during February of the 2020/2021 academic year. School heads and representatives of parents' associations were informed of the purpose and protocol of the research at a meeting in September. The study was carried out by a single researcher, who was also the physical education teacher at this school (PhD in Education with special mention in Physical Education). A theoretical session was held with each study group in order for the participants to understand the test questionnaire (six classes of 20–25 students each). The teacher administered the test in the natural class groups following the given protocol, i.e., prior to the completion of the test, the questionnaire was explained again and all doubts were resolved so that all students understood all items perfectly. All questionnaires were administered during the first three school sessions in order to avoid the possible fatigue of the school day and to interrupt the school dynamics as little as possible.

The teacher's training to apply formative assessment was at an advanced level in research, innovation, evaluation and quality of educational and/or training centres, people, institutions, services and organisations, both in formal and non-formal contexts. In this sense, in order to obtain more precise data, a formative assessment was carried out during the course of the school year, which implies understanding that the students have a full academic year to develop the learning of the assessment criteria. In this way, up-to-date and valuable information is obtained on the students' level of achievement, as it enables learning difficulties to be detected and redirected, and the teaching process to be improved.

It should be noted that formative assessment was carried out in all its dimensions by the teacher who taught Physical Education throughout the course. That is, proactive formative assessment (e.g., before working on an activity, written instructions were given with what was to be achieved in the task); interactive (e.g., when working on an activity, the teacher reviewed the work for immediate feedback); metacognitive (e.g., when formatively assessing by means of a formative evaluation, the teacher gave the students feedback); and metacognitive (e.g., when

formatively assessing by means of a formative evaluation, the teacher gave the students feedback on their work). When students were evaluated formatively through open-ended questions or problem solving, they were given the reason or the reason for the answer); retroactive (e.g., when answering incorrectly, the teacher helped them to find the correct answer through other questions that guide them to the solution); and finally, adjusted and associated with the grade (e.g., when a test was given, a brief note was written on the test itself explaining the main errors and difficulties).

The research was developed following the deontological standards recognized by the Declaration of Helsinki (2013 revision), following the recommendations of Good Clinical Practice of the EEC (document 111/3976/88 of July 1990) and the current Spanish legal regulations governing clinical research on humans (Royal Decree 561/1993 on clinical trials).

Statistical analysis

A descriptive analysis was performed and the normality of the study variables was analysed using the Kolmogorov-Smirnov test. The variables showed a normal distribution. The differential analysis on the teacher formative assessment practices scale according to sex (male vs. female) was carried out using the Student's *t*-test. The effect size was calculated using Cohen's *d* (0.20 = small; 0.50 = medium; and 0.80 = large effect). In addition, a simple analysis of variance (one-way ANOVA) was used to analyse the values of each subscale and the overall scale of the teacher formative assessment practices questionnaire as a function of the level of self-concept (minor v. major). The effect size was calculated using η^2 (0.01 = small; 0.06 = medium; and 0.14 = large effect) (Cumming & Calin, 2016). Inferential analysis was carried out using an analysis of bivariate correlations between the study variables (Pearson's test). Likewise, a linear regression analysis was performed to study the dependency relationship between self-concept and the teacher's formative assessment practices. It should be noted that the other dimensions of self-concept are not reflected since no significant differences were found. Statistical significance was set at a *p*-value < .05. Statistical analysis of the data was performed with Statistical Package for Social Science® software, (v.30.0 by SPSS Inc., Chicago, Illinois, USA).

Results

When analysing the differences in the responses to the formative assessment dimensions and self-concept considering gender (Table 1), the Student *t*-test did not yield significant differences for any of the variables ($p > 0.05$).

Table 1. Basic descriptive data of the study sample according to sex

Variables	Males (n = 65)	Females (n = 57)	<i>p</i>	<i>d</i>
	M ±SD	M ±SD		
FA associated with the qualification (summative) (3–15).	9.75 ±1.49	8.96 ±1.48	0.107	0.16
Proactive FA (3–15).	11.61 ±1.42	11.67 ±2.45	0.898	0.04
Interactive FA (4–20).	15.16 ±3.10	15.21 ±2.15	0.884	0.05
Metacognitive FA (4–20).	15.00 ±2.07	14.02 ±3.04	0.127	0.15
Retroactive FA (4–20).	15.13 ±2.01	15.40 ±2.37	0.632	0.10
Adjusted FA (3–20).	10.56 ±1.58	10.44 ±1.90	0.804	0.05
The global index of FA (21–105).	77.17 ±8.18	75.70 ±7.69	0.508	0.10
Behavioral (0–18)	14.87 ±2.78	14.71 ±3.25	0.777	0.09
Intellectual (0–17)	11.04 ±2.34	11.47 ±3.84	0.515	0.08
Physical (0–12)	9.21 ±1.57	8.59 ±1.70	0.198	0.15
Anxiety (0–12)	6.35 ±1.35	5.64 ±1.52	0.112	0.15
Social (0–12)	9.37 ±1.56	9.49 ±1.10	0.787	0.09
Life satisfaction (0–9)	7.21 ±0.99	7.29 ±0.44	0.833	0.04
Global (0–80)	58.09 ±11.47	57.22 ±12.77	0.695	0.10
Age (years)	10.48 ±0.75	10.52 ±0.80	0.341	0.17

FA: formative assessment; M ±SD = mean ± standard deviation; * *p* < 0.05; calculated with the Student's *t*-test.

For the inferential analysis, a Pearson's *r* test was applied to analyse the possible correlation between the study variables. The analysis of bivariate correlations showed that higher values in the proactive formative assessment correlated with lower values in physical self-concept and higher values in behavioral, intellectual, and social self-concept (*p* < 0.05, for all). Likewise, interactive formative assessment correlated with higher values on social self-concept (*p* < 0.05).

Table 2. Bivariate correlations between teacher formative assessment practices and self-concept dimensions

Variables	Behavioural <i>r</i> (<i>p</i>)	Intellectual <i>r</i> (<i>p</i>)	Physical <i>r</i> (<i>p</i>)	Anxiety <i>r</i> (<i>p</i>)	Social <i>r</i> (<i>p</i>)	Life satisfaction <i>r</i> (<i>p</i>)	Global <i>r</i> (<i>p</i>)
FA associated with the qualification (summative)	0.054 (0.558)	0.051 (0.575)	0.146 (0.109)	-0.027 (0.785)	0.083 (0.361)	-0.014 (0.876)	0.069 (0.453)
Proactive FA	0.179 (0.049*)	0.188 (0.038*)	-0.243 (0.016*)	-0.103 (0.261)	0.207 (0.022*)	0.044 (0.631)	0.095 (0.297)
Interactive FA	0.040 (0.659)	0.070 (0.445)	0.030 (0.743)	0.065 (0.487)	0.221 (0.015*)	0.066 (0.469)	0.104 (0.525)
Metacognitive FA	0.082 (0.370)	0.092 (0.315)	0.068 (0.454)	-0.032 (0.726)	0.073 (0.421)	0.033 (0.720)	0.076 (0.407)
Retroactive FA	0.048 (0.597)	-0.042 (0.648)	-0.030 (0.701)	-0.047 (0.433)	-0.032 (0.723)	-0.111 (0.224)	-0.048 (0.601)
Adjusted FA	0.080 (0.382)	0.060 (0.511)	0.014 (0.881)	-0.054 (0.551)	0.007 (0.847)	-0.055 (0.547)	0.016 (0.863)
Global index of FA	0.113 (0.217)	0.098 (0.289)	0.025 (0.781)	-0.049 (0.404)	0.131 (0.150)	-0.009 (0.925)	0.075 (0.412)

FA: formative assessment; * *p* < .05.

Table 3 shows the analysis of formative assessment practices as a function of self-concept level. Simple analysis of variance (one-way ANOVA) detected statistically significant differences in proactive (*p* < 0.05; $\eta^2 = 0.08$) and interactive (*p* < .05; $\eta^2 = 0.10$) formative assessment in favour of those who had a higher level of self-concept.

Table 3. Differential data between teacher formative assessment practices and level of self-concept

Variables	Lower Self-Concept	Higher Self-Concept	F	p	η^2
	n = 95 M \pm SD	n = 27 M \pm SD			
FA associated with the qualification (summative) (3–15).	9.25 \pm 1.60	9.96 \pm 1.91	1.022	0.260	0.03
Proactive FA (3–15).	11.19 \pm 1.33	12.74 \pm 1.76	2.840	0.047*	0.08
Interactive FA (4–20).	14.80 \pm 2.13	16.30 \pm 2.22	1.020	0.038*	0.10
Metacognitive FA (4–20).	14.35 \pm 2.59	15.15 \pm 2.21	1.070	0.272	0.04
Retroactive FA (4–20).	15.11 \pm 2.40	15.74 \pm 2.06	9.234	0.234	0.04
Adjusted FA (3–20).	10.38 \pm 2.59	10.89 \pm 3.15	3.357	0.447	0.03
The global index of FA (21–105).	75.47 \pm 11.87	79.78 \pm 12.54	1.422	0.119	0.05

FA: Formative assessment; M \pm SD = mean \pm standard deviation; F = F-Snedecor. η^2 = eta squared. * $p < .05$; calculated with one-way ANOVA test.

Finally, to perform a predictive analysis of the teacher's formative assessment practices on the physical and social self-concept, a linear regression analysis test was performed (see Tables 4 and 5). It should be noted that the other dimensions of self-concept are not reflected since no significant differences were found.

Table 4 shows that higher values in proactive formative assessment are associated with lower values in physical self-concept ($p = 0.024$). The model yielded R^2 values = 0.089. The ANOVA yielded F values = 1.847, $p = 0.037$.

Table 4. Association between teacher formative assessment practices and level of physical self-concept

Model B	Unstandardized coefficients		Standardized coefficients	t	p LL	95% confidence interval	
	EE	Standardized beta				LU	
(Constant)	9.268	1.562		5.933	0.000	6.174	12.363
FA associated with the qualification (summative) (3–15).	0.046	0.138	0.046	0.329	0.742	-0.228	0.320
1 Proactive FA (3–15).	-0.430	0.186	-0.393	-2.307	0.024*	-0.799	-0.061
Interactive FA (4–20).	-0.580	0.214	-0.415	-1.478	0.142	-0.860	-0.044
Metacognitive FA (4–20).	-0.073	0.134	-0.096	-0.541	0.589	-0.339	0.193
Retroactive FA (4–20).	-0.231	0.157	-0.276	-1.476	0.143	-0.541	0.079
Adjusted FA (3–20).	-0.092	0.149	-0.094	-0.614	0.541	-0.388	0.204
Global index of FA (21–105).	0.128	0.098	0.585	1.307	0.194	-0.066	0.322

FA: Formative assessment; Note: * $p < .05$.

Table 5 shows that higher values in interactive formative assessment are associated with higher values in social self-concept ($p = 0.039$). The model yielded R^2 values = 0.127. The ANOVA yielded F = 2.977, $p = 0.023$.

Table 5. Association between teachers' formative assessment practices and level of social self-concept

Modelo B	Unstandardized coefficients		Standardized coefficients	t	p LL	95% confidence interval	
	EE	Standardized beta				LU	
(Constante)	7.242	1.372		5.280	0.000	4.525	9.959
FA associated with the qualification (summative) (3–15).	0.140	0.121	0.160	1.149	0.253	0.120	0.380
1 Proactive FA (3–15).	0.046	0.164	0.048	0.282	0.778	-0.170	0.378
Interactive FA (4–20).	0.288	0.137	0.389	2.093	0.039*	0.160	0.215
Metacognitive FA (4–20).	0.142	0.118	0.213	1.201	0.232	0.075	0.192
Retroactive FA (4–20).	0.381	0.214	0.154	1.078	0.107	0.050	0.451
Adjusted FA (3–20).	0.239	0.131	0.279	1.825	0.071	0.199	0.320
Global index of FA (21–105).	0.170	0.086	0.880	1.976	0.067	0.000	0.341

FA: Formative assessment; Note: * $p < 0.05$.

Discussion

The main objective of this study is to analyse the relationship between the formative assessment of the Physical Education teacher and the self-concept of elementary school students. The main findings obtained reveal that those schoolchildren who have a higher level of self-concept perceive a higher proactive and interactive FA on the part of the Physical Education teacher. Specifically, higher values in proactive FA correlated with higher values in behavioural, intellectual, and social self-concept and lower values in physical self-concept. In turn, higher interactive FA was related to higher values in social self-concept. In the linear regression test, this statistically significant relationship between interactive FA and social self-concept was maintained. However, proactive FA was only related to physical self-concept.

Interactive regulation has been described as assessments that occur fully integrated into the teaching process. It is performed when it is intended to help the student to overcome an obstacle or difficulty. Unlike interactive regulation, proactive regulation is a deferred way of providing regulation concerning the initial situation and the time of assessment (Cerón et al., 2020). Proactive regulation is aimed at foreseeing future instructional activities for students, with one of the following two intentions: to achieve the consolidation or deepening of learning, or to seek the opportunity to overcome in the future the obstacles that could not be overcome in previous moments of instruction. Proactive regulations are adaptations on what follows; that is, they operate “forward”. In the case of students who had no problems in the immediate previous sequence, new activities can be reprogrammed to expand on what was learned; and for those who encountered certain obstacles, special activities can be proposed that do not offer additional difficulties (especially if they are related) so that they can progress more easily (Díaz & Barriga, 2002).

In this sense, during the learning situation, additional activities were planned aimed at achieving the learning contents set at the beginning of the situation. Hence, it is possible that students with greater involvement in the task have obtained greater feedback from the teacher and, consequently, reach a higher degree of development in their self-concept by feeling a sense of achievement in the task; as indicated by the study provided by Hortigüela-Alcalá et al. (2016), which points out the importance of the methodology used to generate a perception of achievement

in students, concluding that the methodological approach used in the classroom has a direct impact on the self-concept of the students. Likewise, Márquez-Medrano (2011) points out that during the educational process the person is susceptible to interacting with others and live experiences that on the one hand feed their self-esteem and motivation, or on the other hand, devalue it. Being evaluated and how one is evaluated is one of the experiences that generate different perceptions in the individual regarding the way he/she values and appreciates him/herself (Carrillo-López & Hortigüela-Alcalá, 2022).

This aspect is highlighted, in turn, in the results obtained by Márquez-Medrano (2011) after analysing the impact of summative and summative FA on the motivation and self-esteem of first-grade students. In this study, it is indicated that there are factors that affect self-esteem during FA, factors that affect self-esteem during the summative assessment, factors that affect motivation during FA, and factors that affect motivation during the summative assessment. Given that assessment implies a judgment regarding a person's performance and this influences the image that the individual creates of him/herself, it is essential to be cautious and empathetic with the students in the assessment process. It is natural for managers, teachers, and parents to be expectant of the assessment results that ensure their students' learning. However, the impact of assessment experiences on students' self-esteem and motivation must be taken into account.

In turn, these results are in line with the findings of the study provided by López-Vásquez (2019), which indicates that the sessions show how students begin to improve their self-concept by feeling recognized, capable and intelligent, and by recognizing themselves and being aware of their strengths and weaknesses. About this aspect, they express that the assessment for learning approach helped them to improve their self-concept because this formative process emphasizes the positive aspects and strengths of each person and sees mistakes as opportunities to improve and consolidate new knowledge. These aspects are related to those contributed by López-Pastor et al. (2020), who reflect that the entire teaching-learning process is conditioned by the assessment of the learning of students with and without difficulties.

For their part, Sánchez-Alcaraz & Gómez-Mármol (2014) state that the experiences of success or failure have a significant impact on the self-concept of students. In this regard, they point out that since Physical Education is an area for learning with an approach that focuses on highlighting the positive and not punishing mistakes, students may see this experience as positive, which would explain the results obtained in the improvement of their self-concept.

Another study on schoolchildren was addressed by Burnett (2003), where he analysed the relationships between teacher feedback and students' internal dialogue and self-concepts in the contexts of mathematics and reading were investigated in six rural elementary schools ($n = 747$). The results provided strong support for the model that internal dialogue (positive and negative) mediated between subject-specific teacher feedback (ability, effort, and negative) and academic self-concept (evaluative and descriptive).

In this regard, it is prescriptive to highlight the absence of a relationship between the other dimensions of Formative Assessment and the dimensions of self-concept. To this end, Seo et al., (2019) propose two psychological explanations that can explain this paradoxical phenomenon: the selective devaluation hypothesis (a lower value assigned to schoolwork protects their self-concept) and the external attribution hypothesis (external attribution of low performance protects their self-concept).

Conclusions

On the basis of the results obtained and in response to the objective of the research it can be concluded that: I) those schoolchildren who have a higher level of self-concept perceive greater proactive and interactive FA by the Physical Education teacher; II) specifically, higher values in proactive FA correlated with higher values in behavioural, intellectual and social self-concept and with lower values in physical self-concept; III) in turn, greater interactive FA was related to higher values in social self-concept. It should be noted that the results obtained in this research should be interpreted with caution given the reliability and internal and external validity present in this study. That is, weaknesses in its cross-sectional nature (no causality), sample selected for ease of access, and quantitative approach.

Despite these limitations, in future studies, it is proposed to carry out an experimental (with a control and experimental group and in different learning situations) and/or longitudinal study covering a larger sample and including other educational stages. Likewise, the evidence generated from scientific research confirms that there are six useful dimensions for evaluating teaching performance related to classroom FA practice and that with them it is possible to determine the level of teacher performance. Therefore, these future studies should shed more light on how the different types of FA are related to the different dimensions of self-concept or other psychological variables. Thus, the importance of adequate FA, which is sometimes relegated to the background, should play a more important role in the practical application of curriculum and academic content aimed at a comprehensive education adapted to the students of the 21st century.

In turn, it would be relevant to take into account the self-assessment of people, understood as a fundamental strategy for the assessment of philosophical competencies, which are related to capacity and power as the opportunity to exercise power for a transformation in an object or a disposition to become something. We believe that this manuscript may be of special interest both for teachers (of all areas and educational levels) and for health and family professionals interested in understanding the influence of learning on the psychosocial aspects of students.

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