Journal of Physical Education and Sport ® (JPES), Vol. 23 (issue 5), Art 139, pp. 1111 - 1118, May 2023
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Pedagogical feedback for group exercise fitness activities

FRANCISCO CAMPOS[1], DANIELA CURADO[2], DUARTE SIMÕES[3], FERNANDO MARTINS[4]
[1,2,3,4] Polytechnic Institute of Coimbra, Escola Superior de Educação de Coimbra, Coimbra, PORTUGAL
[1,2,3,4]Laboratório ROBOCORP, Polytechnic Institute of Coimbra, PORTUGAL
[1,4]Instituto de Telecomunicações, Covilhã, PORTUGAL

Published online: May 31, 2023
(Accepted for publication May 15, 2023)
DOI:10.7752/jpes.2023.05139

Abstract:
In the fitness area, the pedagogical feedback is a determining tool for the teaching-learning process, and principally present three functions: motivation, reinforcement and information. The aim of the present study is to characterize the pedagogical feedback provided by the Aerobics fitness instructor, in a specific phase of the session (warm-up), and compare it according to their training and professional experience. 20 Aerobics fitness instructors participated, 10 male and 10 female, aged between 18 and 42 years old ($M \pm SD$: 23.95 ± 6.49). Data were collected using the Sistema de Observação do Feedback dos Instrutores de Fitness (SOFIF), developed by Simões (2013), specifically for Portugal. The characterization was performed using descriptive statistics analysis ($M \pm SD$). For comparison, several groups were created, according to their training and experience, and the ANOVA one-way test was used. With the characterization it was possible to understand the pedagogical feedback provided by the Aerobics fitness instructors depending on their training and experience, and respective trends (e.g., Positive Prescriptive is the most provided in Purpose dimension, and is higher in Aerobics instructors with training and professional experience). By the comparison, it was possible to verify significant differences in 11 categories (Positive Evaluative, Positive Prescriptive, Interrogative: Purpose; Muscle Action, Spatial Orientation, Rhythm, Body Segment Positioning, Mixed: Content; Mixed Verbal-Visual: Form; Individual, Class: Direction) and in the global provided feedback. Pedagogical feedback of more trained and experienced Aerobics fitness instructors can be a role model, through which technicians could adapt their professional intervention to increase the participants satisfaction and retention.
Key Words: pedagogical feedback; instructor; fitness; training; experience.

Introduction

In Portugal, the study of pedagogical feedback in the field of sport began in Physical Education. Currently, beyond Physical Education, and not only in Portugal, the study of pedagogical feedback within the scope of competitive sport activities has been a concern of several researchers, whether in individual (e.g., Monteiro et al., 2021) or collective (Barzouka et al., 2015) sports.

According to Rosado (1997), feedback seems to result from two distinct but complementary operations: diagnostic competence (the process by which motor performance, in all its complexity, is observed, analysed and compared with an ideal model); proper correction intervention (to produce effective learning, bringing real execution closer to the ideal). The first operation (diagnosis) will determine the second (prescription) (Rosado, 1997).

Pedagogical feedback has two essential purposes: information (e.g., the errors that were made, means of correcting and/or the causes of them); reinforcement (increasing the probability that a good performance will be repeated in the future, when in similar conditions) (Piéron, 1996). For this author, feedback results from a series of decisions taken by the teacher: observation and identification of students' mistakes; decision to react or not; determine the nature and the cause of the error; act; follow the behaviour after the reaction.

In the fitness area there are some studies whose focus is centred on the group exercise fitness activities, seeking to collect information and provide strategies to the fitness instructors, to improve their pedagogical intervention and, in consequence, the participants performance (e.g., Todorova et al., 2019; Tkachova et al., 2020). The instructor has an extraordinary role in that, due to his general behaviour (Franco et al., 2008), the way he talks, communicates and instructs (Campos et al., 2020), and provide pedagogical feedback (Simões et al., 2020).

In this context, pedagogical feedback is defined as the instructor reaction to the participants motor performance, with the aim of questioning him about what he did and how he did it, and/or evaluating, describing or correcting his performance (Simões et al., 2020). Is a determining tool for the teaching-learning process, and principally present three functions: motivation (leading the participant to increase his effort); reinforcement (both for correct and incorrect performance); information (about errors and their correction). Simões et al. (2020) presents four phases related with the feedback emission in fitness domain: observation; interpretation/diagnosis (evaluation); decision to react or not; reaction (feedback emission).

Corresponding Author: FRANCISCO CAMPOS, E-mail: francicampos@esec.pt

The feedback provided depends on the training and professional experience of the fitness instructors, being these two variables that must be considered, because they have a strong influence in the process of diagnosis and pedagogical prescription. More experienced and qualified professionals tend to be more competent in this process (Simões et al., 2009). Thus, the aim of present investigation is to characterize the pedagogical feedback provided by the Aerobics instructor, in a specific phase of the session (warm-up), and compare it according to their training and professional experience.

Empirically, is expected that there may be differences according to training and professional experience. However, it is important to quantify it (Franco et al., 2020; Ramos et al., 2021). Being aware of his behaviour (specifically related with the pedagogical feedback), it will be easier for the fitness instructor to adapt and adjust it according to the needs and preferences of the participants. It is very important this self-assessment, like in Napolitano (2016), allowing to be aware of the adopted behaviour, either in general or particular (pedagogical feedback), allowing the rectification of less successful characteristics and, consequently, improving the professional intervention.

Material & methods

Participants

20 Aerobics instructors participated in this study, aged between 18 and 42 years ($M \pm SD$: 23.95 ± 6.49), 10 female (23.10 ± 5.87) and 10 male (24.80 ± 7.26). For comparison, according to training and experience, four groups were created (Table 1):

- Group 1 (G1): Instructors in Training (IiT), attending the 2nd year of a Bachelor's degree, with 39 hours of specific training in Aerobics.
- Group 2 (G2): IiT, attending the 3rd year of the same degree, with a further 26 hours of Step, 26 hours of Aquarobics and 26 hours of Localized Gymnastics.
- Group 3 (G3): Instructors with Training (IwT), in the same degree, without professional experience (newly graduated), with 240 hours of intervention in Internship regime during a school year, in addition to the specific training previously indicated.
- Group 4 (G4): Senior IwT, with experience as instructors of fitness group activities (13.75 ± 4.50 years).

Table 1. Characterization of participants by group, age and gender

G1 (n = 6) 19.83 ± 1.16	G2 (n = 6) 21.67 ± 3.14	G3 (n = 4) 22.00 ± .81	G4 (n = 4) 35.50 ± 4.50
♀ (n = 3) 19.33 ± 1.52	♀ (n = 3) 20.67 ± .57	♀ (n = 2) 21.50 ± .70	♀ (n = 2) 34.00 ± 1.41
♂ (n = 3) 20.33 ± .57	♂ (n = 3) 22.67 ± 4.61	♂ (n = 2) 22.50 ± .70	♂ (n = 2) 37.00 ± 7.07

Instruments

In Portugal, in the scope of fitness group activities, Simões (2013) created the Fitness Instructors Feedback Observation System [Sistema de Observação do Feedback dos Instrutores de Fitness (SOFIF)], inspired on the works carried out by Sarmento et al. (1998). SOFIF presents 45 categories, distributed in 11 dimensions. In this investigation we studied 4 dimensions and 26 categories:

- Purpose (8 categories): Positive Evaluative (P-PE), Negative Evaluative (P-NE), Positive Prescriptive (P-PP), Negative Prescriptive (P-NP), Correct Model Descriptive (P-CMD), Error Descriptive (P-ED), Neutral Descriptive (P-ND), Interrogative (P-I).
- Content (8 categories): Exercise Name (C-EN), Breathing (C-B), Muscle Action (C-MA), Spatial Orientation (C-SO), Rhythm (C-R), Body Segment Positioning (C-BSP), Mixed (C-M), No Content (C-NC).
- Form (7 categories): Verbal (F-Ve), Visual (F-Vi), Kinaesthetic (F-K), Mixed Verbal-Visual (F-MVeVi), Mixed Verbal-Kinaesthetic (F-MVeK), Mixed Visual-Kinaesthetic (F-MViK), Mixed Verbal-Visual-Kinaesthetic (F-MVeViK).
- Direction (3 categories): Individual (D-I), Group (D-G), Class (D-C).

Procedures

This study is classified as descriptive and inferential, cross-sectional (Almeida & Freire, 2017). Previously, the profile of each group under analysis was defined, based on training and professional experience. Then, the instructors were invited to participate, being informed about the content, aim and intention. Indications were given to them to standardize the Aerobics session, specifically: warm-up phase; approximate duration of three to six minutes; musical set with 130 to 140 beats per minute (bpm); and Total Pyramid or Pairs Pyramid as choreographic methodologies (Campos et al., 2021). All sessions were ministered to the same class, with 20 beginner level participants, with an average duration of 241.70 seconds, a few more than four minutes.

Before collect data, on the same day, instructors were reminded of the main procedures, as well as participants. All sessions were registered in audio-visual recording, later analysed using Windows Media Player. The record of the instructors' provided feedback, using SOFIF, with Microsoft Excel. A frequency record of the

different feedbacks was made, and their respective relationship per unit of time (minute), considering the time of each session. Finally, the Statistical Package for the Social Sciences (SPSS) (V25) was used for statistical data analysis.

Before starting to record the instructors' feedback, observation/coding was trained, and the respective reliability tested using Cohen's Kappa (Fonseca et al., 2007), following the recommendations in the literature. The indexes obtained [intra-coder reliability (96.77%) and inter-coder reliability (92.12%)] were excellent (Fonseca et al., 2007), reflecting the degree of agreement between coders.

Data analysis

For characterization descriptive statistics were used, specifically $M \pm SD$ values of the relation feedback per minute (f/m), in each dimension and respective categories. Also are presented the percentage values of each provided feedback per dimension. We present the values of the IiT, made up of all participants from G1 and G2 (instructors with training not completed), and the IwT, made up of all participants from G3 and G4 (certified with the professional title of Physical Exercise Technician, legally obligatory in Portugal).

The comparison between groups (G1 to G4) was performed using the one-way ANOVA test, after validation of its assumptions of normality and homogeneity (Marôco, 2021; Pallant, 2020). For samples below 30, the assumption of normality was verified using the Shapiro-Wilk test (Marôco, 2021). When normality was not verified, the analysis of symmetry was resorted to, using the following condition (Field, 2018):

$$\left| \frac{\text{Skewness}}{\text{Std error Skewness}} \right| \leq 1.96$$

Levene's test was used to verify the assumption of homogeneity. To carry out the multiple comparison, the Tukey HSD post-hoc test was used, in case the assumptions of normality and homogeneity were verified. When the assumption of homogeneity was not verified, the post-hoc Games-Howell test was used (Marôco, 2021). The classification of the effect size ($\eta 2$) in one-way ANOVA test was carried according to Ferguson (2009): very high ($\eta 2 > .50$); high ($.25 < \eta 2 \leq .50$); medium ($.05 < \eta 2 \leq .25$); small ($\eta 2 \leq .05$). Statistical data analysis was performed using SPSS, for a significance level of 5% ($p < .05$).

Results

The presentation of the results is started with the characterization of provided pedagogical feedback of the Aerobics instructor, only in each dimension and respective categories observed/registered (Table 2).

Table 2. Characterization of the pedagogical feedback (f/m by category) of Aerobics instructor

	IiT (f/m)	IwT (f/m)	f/m
P-PE	.46 ± .19	.96 ± .48	.66 ± .41
P-PP	9.30 ± 1.83	13.89 ± 5.09	11.14 ± 4.10
P-CMD	2.46 ± .75	1.71 ± .59	2.16 ± .77
P-I	.57 ± .25	1.41 ± .57	.91 ± .57
C-EN	4.68 ± 1.50	3.48 ± 1.06	4.20 ± 1.45
C-MA	.27 ± .28	1.44 ± .90	.74 ± .83
C-SO	.51 ± .32	1.89 ± .93	1.07 ± .92
C-R	2.05 ± .71	3.34 ± 1.76	2.56 ± 1.36
C-BSP	.12 ± .15	1.04 ± 1.02	.49 ± .78
C-M	1.28 ± .29	2.89 ± 1.14	1.92 ± 1.08
C-NC	3.77 ± 1.56	3.87 ± 1.18	3.81 ± 1.38
F-Ve	8.45 ± 2.36	8.60 ± 2.02	8.51 ± 2.17
F-Vi	.43 ± .18	.87 ± .64	.61 ± .46
F-MVeVi	3.88 ± 1.85	8.51 ± 4.18	5.73 ± 3.72
D-I	.00 ± .00	.60 ± .53	.24 ± .44
D-C	12.77 ± 3.31	17.37 ± 5.18	14.61 ± 4.64
	12.77 ± 3.31	17.98 ± 5.67	14.86 ± 5.00

Through the analysis of the data of the 20 Aerobics instructors, it is possible to verify that, in general terms, they provide almost 15 feedbacks per minute (14.86 ± 5.00). IwT providing more (17.98 ± 5.67) compared to the IiT (12.77 ± 3.31).

In the Purpose dimension, they mostly provide P-PP feedback (f/m = 11.14 ± 4.10; 73.74%. IiT: f/m = 9.30 ± 1.83; 72.02%. IwT: f/m = 13.89 ± 5.09; 76.32%). P-PE and P-I present higher values in IwT [P-PE (IiT: f/m = .46 ± .19; 3.94%; IwT: .96 ± .48; 5.43%); P-I (IiT: f/m = .57 ± .25; 4.71%; IwT: 1.41 ± .57; 7.75%)] and P-CMD, on the other hand, present higher values in IiT [P-CMD (IiT: f/m = 2.46 ± .75; 19.33%; IwT: 1.71 ± .59; 10.50%)].

In the Content dimension the differences are not that big. The most provided feedback is C-EN (f/m = 4.20 ± 1.45; 30.13%. IiT: f/m = 4.68 ± 1.50; 36.96%. IwT: f/m = 3.48 ± 1.06; 19.88%), the only category that IiT

have higher values of f/m. In all the others, the IwT present higher values [C-MA (IiT: f/m = .27 ± .28; 2.34%; IwT: 1.44 ± .90; 8.02%); C-SO (IiT: f/m = .51 ± .32; 3.85%; IwT: 1.89 ± .93; 10.16%); C-R (IiT: f/m = 2.05 ± .71; 15.92%; IwT: 3.34 ± 1.76; 17.89%); C-BSP (IiT: f/m = .12 ± .15; .86%; IwT: 1.04 ± 1.02; 5.39%); C-M (IiT: f/m = 1.28 ± .29; 11.20%; IwT: 2.89 ± 1.14; 16.13%); C-NC (IiT: f/m = 3.77 ± 1.56; 28.87%; IwT: 3.87 ± 1.18; 22.53%)]. In C-NC feedback, although the f/m value is higher in IwT, the percent value within the dimension is lower, compared with the IiT.

In Form dimension, the emphasis goes to F-Ve (f/m = 8.51 ± 2.17; 60.02%. IiT: f/m = 8.45 ± 2.36; 66.85%. IwT: f/m = 8.60 ± 2.02; 49.78%). In the other observed/registered categories, the trends are the same, with higher values in IwT [F-Vi (IiT: f/m = .43 ± .18; 3.83%; IwT: .87 ± .64; 4.59%); F-MVeVi (IiT: f/m = 3.88 ± 1.85; 29.32%; IwT: 8.51 ± 4.18; 45.63%)]. Although the f/m of the IwT are always higher, we would like to highlight the percentage values of the F-Ve and F-MVeVi feedbacks. In IwT they are quite close, however in IiT the values are very far apart, preferentially using the F-V.

Finally, in Direction dimension, the large majority of the feedbacks are D-C (f/m = 14.61 ± 4.64; 98.81%. IiT: f/m = 12.77 ± 3.31; 100.00%. IwT: f/m = 17.37 ± 5.18; 97.02%). There is no observed/registered D-I feedback in IiT, and a residual value in IwT (f/m =.60 ± .53; 2.98%).

With Figure 1 is pretended to allow a better understanding of the characterization of both groups. In that is possible to verify the number of f/m in each observed/registered category. We highlight: P-PP feedback, of Purpose dimension, provided every 5.38 seconds (IiT: 6.45; IwT: 4.31); F-Ve feedback, of Form dimension, provided every 7.05 seconds (IiT: 7.10; IwT: 6.97); F-MVeVi feedback, also of Form dimension, provided every 7.05 seconds by IwT; D-C feedback, of Direction dimension, provided every 4.10 seconds (IiT: 4.69; IwT: 3.45). In general, the Aerobics instructor provide a feedback every 4.03 seconds (IiT: 4.69; IwT: 3.33).

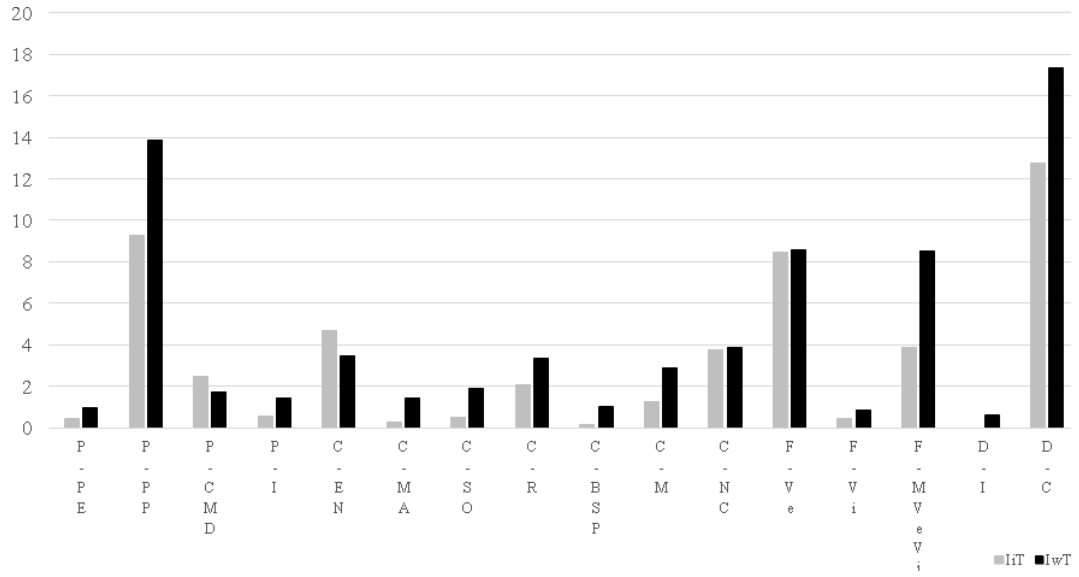

Figure 1. Characterization of the pedagogical feedback (f/m) of Aerobics instructor

As for the comparison of data according to training and professional experience, we present the results in Table 3, considering the four groups separately (G1, G2, G3 and G4).

Table 3. Comparison of the pedagogical feedback (f/m by category) of Aerobics instructor, according to experience and professional experience

	G1 (f/m)	G2 (f/m)	G3 (f/m)	G4 (f/m)	*F*	*p*	η^2
P-PE	.37 ± .11^{c}	.54 ± .23^{b}	.70 ± .07	1.22 ± .59^{b,c}	6.894	.003*	.564
P-PP	8.90 ± 2.54^{c}	9.71 ± .76^{b}	10.73 ± 1.24^{a}	17.06 ± 5.67^{a,b,c}	7.151	.003*	.573
P-CMD	2.61 ± .82	2.32 ± .72	2.03 ± .64	1.39 ± .36	2.629	.086	.330
P-I	.43 ± .16^{c,d}	.71 ± .24^{b}	.94 ± .05^{a,d}	1.88 ± .43^{a,b,c}	27.759	.001*	.839
C-EN	4.96 ± 1.37	4.41 ± 1.70	3.41 ± .82	3.54 ± 1.40	1.318	.303	.198
C-MA	.14 ± .16^{c}	.41 ± .33^{b}	.84 ± .52^{a}	2.04 ± .82^{a,b,c}	14.345	.001*	.729
C-SO	.28 ± .23^{c,d}	.75 ± .19^{b}	1.23 ± .18^{a,d}	2.56 ± .89^{a,b,c}	23.828	.001*	.817
C-R	1.86 ± .57^{c}	2.23 ± .84	2.54 ± .28	4.15 ± 2.32^{c}	3.354	.045*	.386
C-BSP	.08 ± .13^{c}	.16 ± .18^{b}	.51 ± .33	1.58 ± 1.26^{b,c}	6.352	.005*	.544
C-M	1.22 ± .34^{c}	1.33 ± .24^{b}	1.91 ± .25^{a}	3.86 ± .66^{a,b,c}	44.240	.001*	.892
C-NC	3.76 ± .165	3.78 ± 1.61	3.95 ± 1.03	3.80 ± 1.47	.014	.998	.003
F-Ve	8.53 ± 2.25	8.36 ± 2.67	8.23 ± 1.53	8.96 ± 2.61	.076	.972	.014
F-Vi	.38 ± .15	.48 ± .21	.60 ± .21	1.14 ± .85	3.056	.059	.364

F-MVeVi	3.40 ± 1.35^{c}	4.36 ± 2.27^{b}	5.57 ± 2.06^{a}	$11.45 \pm 3.67^{a,b,c}$	10.519	.001*	.664
D-I	$.00 \pm .00^{c}$	$.00 \pm .00^{b}$	$.16 \pm .02^{a}$	$1.04 \pm .38^{a,b,c}$	39.549	.001*	.881
D-C	12.32 ± 3.37^{c}	13.22 ± 3.49^{b}	14.24 ± 1.02	$20.51 \pm 5.95^{b,c}$	4.283	.021*	.445
	12.32 ± 3.37^{c}	13.22 ± 3.49^{b}	14.41 ± 1.02	$21.56 \pm 6.32^{b,c}$	5.197	.011*	.494

*significant for $p < .05$; multiple comparison using post-hoc test:
a) G4 vs G3; b) G4 vs G2; c) G4 vs G1; d) G3 vs G1.

In Purpose dimension, there are significant differences in three categories [P-PE ($F = 6.894$; $p = .003$; $\eta 2 = .564$; effect size very high); P-PP ($F = 7.151$; $p = .003$; $\eta 2 = .573$; effect size very high); P-I ($F = 27.759$; $p = .001$; $\eta 2 = .839$; effect size very high)]. In the three categories the values increase with higher levels of training and professional experience [P-PE: G1 (.37 ± .11), G2 (.54 ± .23), G3 (.70 ± .07), G4 (1.22 ± .59); P-PP: G1 (8.90 ± 2.54), G2 (9.71 ± .76), G3 (10.73 ± 1.24), G4 (17.06 ± 5.67); P-I: G1 (.43 ± .16), G2 (.71 ± .24), G3 (.94 ± .05), G4 (1.88 ± .43)]. Differences occur between G4 and G1 (P-PE, P-PP and P-I), G4 and G2 (P-PE, P-PP and P-I), G4 and G3 (P-PP and P-I) and G3 and G1 (P-I).

In Content dimension there are significant differences in five categories [C-MA ($F = 14.345$; $p = .001$; $\eta 2 = .729$; effect size very high); C-SO ($F = 23.828$; $p = .001$; $\eta 2 = .817$; effect size very high); C-R ($F = 3.354$; $p = .045$; $\eta 2 = .386$; effect size high); C-BSP ($F = 6.352$; $p = .005$; $\eta 2 = .544$; effect size very high); C-M ($F = 44.240$; $p = .001$; $\eta 2 = .892$; effect size very high)]. Like in the previous dimension, in these five categories the values increase with higher levels of training and professional experience [C-MA: G1 (.14 ± .16), G2 (.41 ± .33), G3 (.84 ± .52), G4 (2.04 ± .82); C-SO: G1 (.28 ± .23), G2 (.75 ± .19), G3 (1.23 ± .18), G4 (2.56 ± .89); C-R: G1 (1.86 ± .57), G2 (2.23 ± .84), G3 (2.54 ± .28), G4 (4.15 ± 2.32); C-BSP: G1 (.08 ± .13), G2 (.16 ± .18), G3 (.51 ± .33), G4 (1.58 ± 1.26); C-M: G1 (.22 ± .34), G2 (1.33 ± .24), G3 (1.91 ± .25), G4 (3.86 ± .66)]. Differences occur between G4 and G1 (C-MA, C-SO, C-R, C-BSP and C-M), G4 and G2 (C-MA, C-SO, C-BSP and C-M), G4 and G3 (C-MA, C-SO and C-M) and G3 and G1 (C-SO).

In Form dimension there are significant differences only in one category [F-MVeVi ($F = 10.519$; $p = .001$; $\eta 2 = .664$; effect size very high)], with an increase with higher levels of training and professional experience [F-MVeVi: G1 (3.40 ± 1.35), G2 (4.36 ± 2.27), G3 (5.57 ± 2.06), G4 (11.45 ± 3.67)]. Differences occur between G4 and G1, G4 and G2, and G4 and G3.

In Direction dimension there are significant differences in the two observed/registered categories [D-I ($F = 39.549$; $p = .001$; $\eta 2 = .881$; effect size very high); D-C ($F = 4.283$; $p = .021$; $\eta 2 = .445$; effect size high)]. Like in all categories where there are significant differences, the values increase with higher levels of training and professional experience [D-I: G1 (.00 ± .00), G2 (.00 ± .00), G3 (.16 ± .02), G4 (1.04 ± .38); D-C: G1 (12.32 ± 3.37), G2 (13.22 ± 3.49), G3 (14.24 ± 1.02), G4 (20.51 ± 5.95)]. The differences occur between G4 and G1 (D-I and D-C), G4 and G2 (D-I and D-C) and G4 and G3 (D-I).

Finally, considering the global provided feedback, there are significant differences between the groups ($F = 5.197$; $p = .011$; $\eta 2 = .494$; effect size high), arising from G1 and G4 and G1 and G2. Figure 2 allow us a better perception of the differences between the four analysed groups.

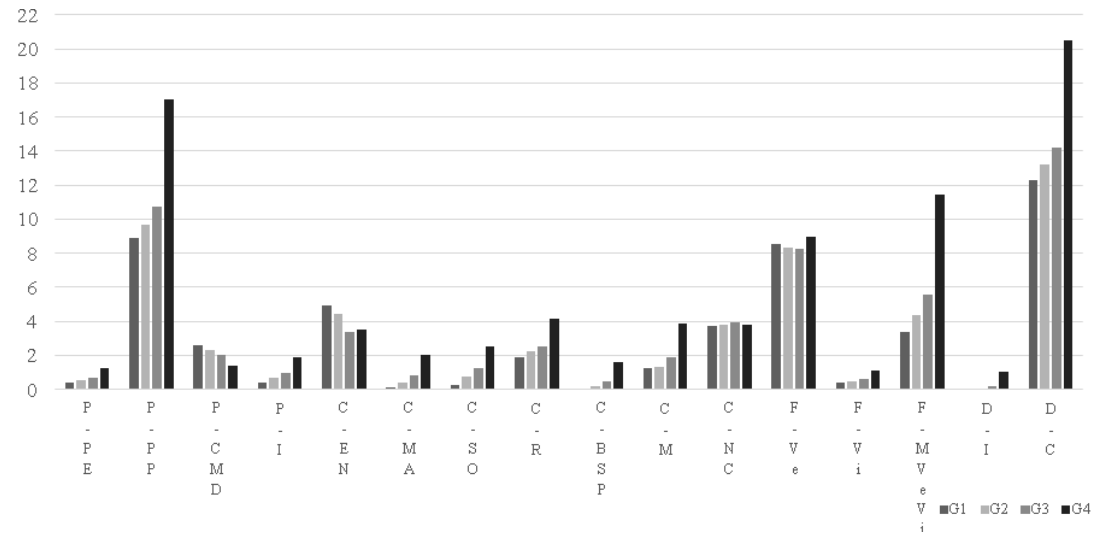

Figure 2. Comparison of the pedagogical feedback (f/m) of Aerobics instructor

Discussion

In Portugal, only one investigation was carried out using SOFIF, within the scope of fitness group activities, in Localized Gymnastics (Simões, 2013), with 72 instructors, with different levels of professional experience, divided into two groups: 35 interns instructors, 12 male and 23 female, aged between 20 and 35 years (22.50 ± 2.90); 37 experienced instructors, 18 male and 19 female, aged between 25 and 50 years (30.30 ± 4.20). In this study, data were collected from the three phases of the session (warm-up, fundamental phase, cool-

down). The f/m ratio are presented only for the total of feedbacks. Is possible to verify that the interns instructors provide more f/m (2.70 ± 1.40) when compared with the experienced instructors (2.50 ± 1.20), although there were no significant differences between the groups. The analysis by category is performed only considering the *M* ± *SD* percent values (Table 4). By comparison, in these dimensions and categories under analysis, it was possible to verify significant differences only in the P-NE feedback ($p = .036$).

Table 4. Characterization (*M* ± *SD*) and comparison of the pedagogical feedback (%) of Localized Gymnastics instructor (Simões, 2013)

	Interns	Experienced	*p*
P-PE	29.60 ± 12.0 0	27.30 ± 17.70	.222
P-NE	.20 ± .70	.50 ± .80	.036*
P-PP	58.10 ± 10.30	62.10 ± 18.80	.265
P-NP	5.30 ± 4.360	5.30 ± 4.20	.906
P-CMD	.00 ± .20	.00 ± .00	.953
P-ED	.40 ± .70	.30 ± .60	.481
P-N	.60 ± .90	.50 ± .90	.880
P-I	5.40 ± 5.50	3.60 ± 4.20	.133
C-EN	.20 ± .50	.10 ± .50	.917
C-B	.70 ± 1.80	.40 ± .90	.341
C-MA	4.80 ± 3.90	5.40 ± 8.00	.400
C-SO	.20 ± .60	.20 ± .60	.435
C-R	1.50 ± 2.10	2.10 ± 1.80	.070
C-BSP	31.30 ± 13.20	36.20 ± 15.40	.153
C-M	.70 ± 1.10	.90 ± 1.20	.898
C-NC	60.20 ± 14.20	54.40 ± 14.70	.094
F-Ve	70.00 ± 12.20	68.20 ± 16.00	.587
F-Vi	1.30 ± 2.30	2.00 ± 2.90	.240
F-K	1.60 ± 2.40	1.60 ± 2.40	.784
F-MVeVi	18.00 ± 9.60	17.70 ± 10.20	.589
F-MVeK	8.70 ± 7.50	10.10 ± 9.00	.635
F-MViK	.00 ± .00	.00 ± .10	.166
F-MVeViK	.10 ± .40	.20 ± .90	.686
D-I	41.10 ± 22.40	41.00 ± 22.60	.983
D-G	3.40 ± 4.60	4.00 ± 4.70	.339
D-C	55.40 ± 22.30	54.90 ± 23.00	.932

In this study the interns provide more f/m (2.70 ± 1.40) comparatively with experienced instructors (2.50 ± 1.20) (Simões, 2013), but in the present investigation, more trained and professional experienced instructors present a growing values trend, in the large majority of the 16 observed/registered categories, and in all of 11 which significant differences were found [P-PE, P-PP and P-I (Purpose dimension), C-MA, C-SO, C-R, C-BSP, C-M (Content dimension), F-MVeVi (Form dimension), D-I and D-C (Direction Dimension)]. Also in general, the trend is similar (more provided feedback in instructors with more training and professional experience). The difference may occur essentially due to two factors: the specificity of the activities under analysis (Aerobics vs Localized Gymnastics); the phase and respective analysis time (warm-up phase vs entire session).

Aerobics is a choreographed activity, based on dance (Melo & Campos, 2021a), while Localized Gymnastics is an activity where participants, in a general perspective, repeat several series of exercises, using their own body overload and/or free weights (Melo & Campos, 2021b). This more technical characteristic makes the instructor adopt a different behaviour, with more attention and proximity to the participants, provide them (Melo & Campos, 2021b): more indications about the accurate performance; more corrections, especially when they adopt bad or incorrect postures, which can sometimes endanger their physical integrity; more motivation, due to this physical higher proximity, to a more individualized feedback and to the fact that the session is more physical intense, requiring a greater presence and interaction between instructor and participant. In Aerobics these aspects do not happen (e.g., use of material), or are not as prominent (e.g., maximal attention to incorrect performance). Aerobics is defined as an aerobic exercise program, where some steps are organized and mixed to build some choreographic sequences (Melo & Campos, 2021b). The definition of the two activities leads us to a greater technicality of Localizada, which inherently will require a differentiated behaviour from the instructor. Apparently, these could justify that Localized Gymnastics issue more feedback, which did not happen, with higher differences between the results.

Regarding the session phase, and respective time, there are different purposes for different phases (Campos et al., 2021), which will make the technician's intervention be shaped by this specificity. Hence the possible differences between the studies. In cool-down phase, for example, one of the main purposes is relax, physical and mentally, so a less intervention by the instructor, with less provided feedback, is normal. This could be also a reason the justify the differences between both studies. It is important to emphasize that the amount of

feedback cannot be the exclusive parameter under analysis. The fact that I talk more does not necessarily imply that I am more assertive and effective in the communication. That is why it is equally, or even more, important to look at the quality of the feedback (percent values in each category).

Simões (2013), standardizing the behaviour of the instructor, in a general perspective, mentions that they provide feedback to all the participants, about the performed exercise, during their execution, verbally, to explain how the exercise should be performed, without referring to a specific aspect, with neutral affectivity, facing the participants but away from them, performing the same exercise simultaneously and observing the participants after providing feedback. In the present investigation, in Aerobics, is possible to verify that more experienced instructors provide more positive prescriptive feedback, directed to all the class, mixed (verbal and visual) preferentially but several times only verbal. About the content, the results are very similar, but we highlight the feedbacks related with the rhythm, the name of the exercises, mixed (combination of two or more categories of this dimension) and with no specific content.

Conclusions

In this study it was possible to characterize the behaviour of Aerobics instructor, related with provided feedback, in the specific warm-up phase. It allowed also, by the comparison between four different groups, to understand how different it is considering different levels of training and professional experience, variables of relevant importance in this domain (Campos et al., 2020; Franco et al., 2008; Franco et al., 2020; Ramos et al., 2021).

For retention and satisfaction of the participants, instructors should focus their intervention on encouraging the practice, observation (observing and listening to them) and in instructional situations (e.g., demonstration, verbal and/or non-verbal explanation, correction, questioning, encouragement and motivation), adapting their behaviour to the characteristics of the participants (e.g., gender, age) and the situation (e.g., activity and/or dimension of the group/facility) (Franco & Simões, 2017).

The behaviour of more experienced instructors should be considered a role model, through which the technicians themselves, training entities and those responsible for the service (e.g., Technical Director), must reflect and act, to improve the technical intervention, to positively influence the retention, loyalty and satisfaction of the participants (García-Fernández et al., 2016), one of the most important aspects related with the quality of service (Campos et al., 2020; Franco & Simões, 2017). “Licenses (professional titles) of fitness professionals” and “employing certified fitness professionals” are the first and second fitness trends for Portugal, in the last three years (Franco et al., 2021, 2022, 2023; Kercher, 2023), which reflects the importance of the behaviours of the instructors, as well as their training and professional experience.

Funding

This work is funded by FCT/MCTES through national funds and, when applicable, co-financed by EU funds under the UIDB/50008/2020 project. This work also received support from the Institute of Applied Research (i2A) of the Polytechnic of Coimbra, under the exemption for Applied Research (Despacho n.º 7333/2020), and from the Research Unit in Applied Sports Sciences (ASSERT) from Education School of Polytechnic of Coimbra.

References

Almeida, L., & Freire, T. (2017). *Research methodology in Psychology and Education* [in Portuguese]. Psiquilíbrios.

Barzouka, K., Sotiropoulos, K., & Kioumourtzoglou, E. (2015). The effect of feedback through an expert model observation on performance and learning the pass skill in volleyball and motivation. *Journal of Physical Education and Sport, 15*(3), 407-416.

Campos, F., Franco, S., Simões, V., & Ângelo E. (2021). Music, planning and choreographic writing. In F. Campos, R. Melo & R. Mendes (Coords.), *Fitness and gym activities. Guide for professionals* [In Portuguese] (pp. 135-150). LIDEL.

Campos, F., Simões, V., & Franco, S. (2020). Instructor quality in fitness group activities. In S. Franco & V. Simões (Eds.), *Fitness pedagogy: Contributions to the professionals' intervention* [In Portuguese] (pp. 7-29). Omniserviços.

Ferguson, C. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research and Practice, 40*, 532-538.

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics*. Thousand Oaks.

Fonseca, R., Silva, P., & Silva, R. (2007). Inter-judge agreement: The case of the kappa coefficient [In Portuguese]. *Laboratório de Psicologia, 5*(1), 81-90.

Franco, S., Castañer, M., & Rodrigues, J. (2020). Pedagogical intervention of fitness instructors. In S. Franco & V. Simões (Eds.), *Fitness pedagogy: Contributions to the professionals' intervention* [In Portuguese] (pp. 31-52). Omniserviços.

Franco, S., Rodrigues, J., & Balcells, M. (2008). Pedagogical behavior of Localized fitness group class instructors [In Portuguese]. *Fitness & Performance Journal, 7*(4), 251-263.

Franco, S., Santos-Rocha, R., Ramalho, F., Simões, V., Vieira, I., & Ramos, L. (2021). Fitness trends in Portugal for 2021. *Cuadernos de Psicología del Deporte, 21*(2), 242-258.

Franco, S., Santos-Rocha, R., Ramalho, F., Simões, V., Vieira, I., & Ramos, L. (2022). Fitness trends in Portugal for 2022. *Motricidade, 18*(1), 61-72.

Franco, S., Santos-Rocha, R., Simões, V., Ramalho, F., Vieira, I., & Ramos, L. (2023). Fitness trends in Portugal for 2023 [In Portuguese]. *Retos, 48*, 401-412.

Franco, S. & Simões, V. (2017). Fitness professionals' pedagogical intervention. *European Journal for Exercise Professionals - Europe Active, 1*, 29-38.

García-Fernández, J., Gálvez-Ruiz, P., Velez-Colon, L., & Bernal-Garcia, A. (2016). Service convenience, perceived value, satisfaction, and loyalty: A study of consumers from low-cost fitness centers in Spain. *Journal of Physical Education and Sport, 16*(4), 1146-1152.

Kercher, V., Kercher, K., Levy, P., Bennion, T., Alexander, C., Amaral, P., Batrakoulis, A., Chávez, L., Cortés-Almanzar, P., Haro, J., Zavalza, A., Rodríguez, L., Franco, S., Santos-Rocha, R., Ramalho, F., Simões, V., Vieira, I., Ramos, L., Veiga, O., … Romero-Caballero, A. (2023). 2023 Fitness trends from around the globe. *ACSMs Health & Fitness Journal, 27*(1), 19-30.

Marôco, J. (2021). *Statistical analysis with SPSS statistics* [In Portuguese]. Report Number.

Melo, R., & Campos, F. (2021a). Historical and sociocultural notes on fitness culture and industry. In F. Campos, R. Melo & R. Mendes (Coords.), *Fitness and gym activities. Guide for professionals* [In Portuguese] (pp. 2-10). LIDEL.

Melo, R., & Campos, F. (2021b). The fitness operators: The several typologies characterized by their supply and demand. In F. Campos, R. Melo & R. Mendes (Coords.), *Fitness and gym activities. Guide for professionals* [In Portuguese] (pp. 278-297). LIDEL.

Monteiro, G., Araújo, N., Mazzardo, T., Francisco, P., Ribas, S., & Aburachid, L. (2021). Practice schedule analysis and pedagogical feedback in swimming classes. *Journal of Physical Education and Sport, 21*(3), 1950-1957.

Napolitano, S. (2016). The use of video analysis for self-assessment in Aerobics. *Journal of Physical Education and Sport, 16*(4), 1207-1210.

Pallant, J. (2020). *SPSS survival manual: Step-by-step guide to data analysis using the SPSS program*. Routledge.

Piéron, M. (1996). *Acquisition of teaching techniques and pedagogical supervision* [In Portuguese]. FMH.

Ramos, L., Esteves, D., Vieira, I., Franco, S., & Simões, V. (2021). Vidaprofit: Characterization of fitness professionals in Portugal [In Portuguese]. *Motricidade, 17*(1), 42-53.

Rosado, A. (1997). *Observation and reaction to motor performance* [In Portuguese]. FMH.

Sarmento, P., Veiga, A., Rosado, A., Rodrigues, J., & Ferreira V. (1998). *Sport Pedagogy: Physical Education and Sport observation instruments* [In Portuguese]. FMH.

Simões, V. (2013). *Analysis of pedagogical feedback from trainee and experienced instructors in Localized fitness activities. Observed feedback, instructors' self-perception, and participants' preferences* [In Portuguese] [Unpublished PhD thesis]. UTAD.

Simões V., Franco S., & Rodrigues, J. (2009). Study of pedagogical feedback in TEF of Localized fitness activities with different levels of professional experience [In Portuguese]. *Fitness and Performance Journal, 8*(3), 174-182.

Simões, V., Rodrigues, J., & Franco, S. (2020). Pedagogical feedback: Importance in fitness activities. In S. Franco & V. Simões (Eds.), *Fitness pedagogy: Contributions to the professionals' intervention* [In Portuguese] (pp. 53-86). Editorial Omniserviços.

Tkachova, A., Dutchak, M., Kashuba, V., Goncharova, N., Lytvynenko, Y., Vako, I., Kolos, M., & Lopatskyi, S. (2020). Practical implementation of differentiated approach to developing water aerobics classes for early adulthood women with different types of body build. *Journal of Physical Education and Sport, 20*(1), 456-460.

Todorova, V., Podhorna, V., Bondarenko, O., Pasichna, T., Lytvynenko, Y., & Kashuba, V. (2019). Choreographic training in the sport aerobics. *Journal of Physical Education and Sport, 19*(6), 2315-2321.