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The Effects of Peer and Self-Assessment on Students' Self-Regulation, Perceived Motivational Climate and Volleyball Skill in Physical Education

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ABSTRACT

Assessment for learning strategies, particularly self-assessment and peer assessment, play a crucial role in fostering student engagement, self-regulation, and skill development in physical education. This study examines the impact of self-assessment and peer assessment on students' self-regulated learning, perceived motivational climate, and volleyball skill acquisition in a physical education setting. A quasi-experimental design was implemented with eighth-grade students, and over a seven-week intervention, both groups followed identical instructional methods, differing only in their assessment approach (self- or peer assessment). The findings indicated that in the comparison of the pre-test and post-tests regardless of the experimental groups, there was a statistically significant increase in overhead and forearm pass skill dimensions of volleyball skill, task value, peer instruction and help seeking dimensions of self-regulation and teacher-induced learning orientation dimension of perceived motivational climate in the post-tests. In this study, where two of five assessment for learning strategies were experimentally applied and their effects on students were compared, both assessment methods were found to improve students' learning experiences. The findings of the study highlight the value and power of structured peer and self-assessment practices in physical education and suggest that they should be incorporated into the efforts to develop curriculum and pre- and in-service teacher education programs.

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INTRODUCTION

In recent years, the concept of Assessment for Learning (AfL) has emerged as a crucial pedagogical strategy aimed at enhancing students' learning experiences by integrating assessment into the instructional process (Black & Wiliam, 2009). AfL represents a transformative paradigm in educational assessment, emphasizing that assessment should primarily promote and enhance learning rather than merely assess performance (Thompson & Wiliam, 2007). By shifting the focus from summative to formative assessments, AfL encourages students to reflect on their learning, identify areas for improvement, and engage in self-regulatory practices (Brown, 2018).

According to Thompson and Wiliam (2007), the five key strategies of AfL are; clarifying, sharing, and understanding learning intentions and criteria for success; engineering effective classroom discussions, activities, and learning tasks that elicit evidence of learning; providing feedback that moves learners forward; activating students as instructional resources for one another; and activating students as owners of their learning. These strategies promote a cycle of feedback and reflection (Chng & Lund, 2018) that is integral to student-centered pedagogy.

The use of self-assessment and peer assessment, respectively, is inevitable in the implementation of the last two AfL strategies. By incorporating these techniques, students are encouraged to reflect on their performance, recognize the value of effort, and seek feedback, all of which contribute to improved learning outcomes (Haerens et al., 2011). Self-assessment helps students monitor their progress, set personal goals, and identify areas for improvement (Panadero & Alonso-Tapia, 2013). Similarly, peer assessment fosters a collaborative learning environment, allowing students to learn from observing their peers, offer and receive feedback, and enhance their understanding of task requirements and standards (Dochy et al., 1999).

The application of AfL strategies in physical education (PE) is particularly beneficial, as it aligns with the goals of developing both motor and cognitive skills (Haerens et al., 2011). Self-assessment and peer assessment are particularly effective in promoting intrinsic motivation and collaborative learning dynamics in PE, where learning goals often include psychomotor skill acquisition and self-regulatory practices (Stančić, 2021; Lynch, McNamara, & Seery, 2012; Fitriady, Alfarizi, & Saputra, 2022).

AfL practices significantly influence the development of psychomotor skills in PE by incorporating self-assessment and peer assessment, which allow students to evaluate aspects

of their motor performance such as technique, coordination, and timing (Santos-Calero, Zubillaga-Olague & Cañadas, 2024). Assessing their performance in motor skills increases students' awareness of their movements, aiding control, precision, and fluency (Salamuddin, 2023). Evidence suggests that students who self-assess for physical skills perform better and are more motivated to improve their technique (Butler & Hodge, 2001).

It is known that the application of AfL strategies in the lesson environment also contributes to students' self-regulation skills. The process of self-regulation, defined as the capacity to manage learning through goal setting, monitoring, and reflection (Zimmerman, 2002), is vital in PE (Chng & Lund, 2018). When students self-assess, they use metacognitive strategies, set personal standards, and improve their learning by receiving immediate internal feedback (Nicol & Macfarlane-Dick, 2006).

Creating a positive motivational climate, which is defined as the environment in which students are encouraged and supported to engage meaningfully in learning tasks, is another critical goal of the AfL approach (Fitriady, Nurrochmah & Yudasmara, 2022). Research indicates that a mastery-oriented motivational climate, characterized by support for autonomy and task involvement, significantly enhances students' intrinsic motivation and engagement in physical activities (Wu et al., 2021; Hastie et al., 2014). The integration of AfL strategies within the PE context can further enhance student engagement and learning outcomes, fostering a supportive environment conducive to learning and physical activity (MacPhail & Halbert, 2010; Cid et al., 2019).

While AfL strategies have been extensively studied in general education settings, there is a notable lack of research examining their application in PE (O'Donovan et al., 2011). Existing studies on self- and peer-assessment tend to focus on cognitive outcomes, leaving the impact on physical skills and motivational factors underexplored (Andrade & Brookhart, 2020). This paper explores the influence of self- and peer-assessment on three key dependent variables in PE: self-regulation, perceived motivational climate, and volleyball skill acquisition. By examining the effects of peer and self-assessment methods through the lens of AfL, the study aims to fill important gaps in the literature concerning how these strategies impact not only physical skills but also cognitive and motivational factors in a PE context.

Effects of Peer and Self-Assessment on Students' Self-Regulation, Perceived Motivational Climate and Skill Acquisition

Peer and self-assessment are increasingly recognized as pivotal strategies in fostering students' self-regulation within the PE context. The systematic review by Otero-Saborido et al.

(2021) underscores the value of self-assessment in enhancing self-regulation, metacognitive skills, and overall learning in PE. The authors advocate for the integration of self-assessment strategies in PE curricula to promote active student engagement and autonomous learning. Furthermore, Bores-García et al. (2020) found that peer assessment encourages critical reflection and self-monitoring by placing students in evaluative roles, which strengthens their capacity to regulate learning independently. Moura et al. (2021) highlight that embedding AfL principles, including self and peer assessment, within PE fosters student engagement in monitoring and co-regulating their learning, thereby enhancing reflective and strategic learning behaviors. Recent empirical studies highlight that when students engage in structured peer and self-assessment activities, their ability to set realistic goals and adjust strategies during PE lessons significantly improves, leading to enhanced self-regulatory skills (Otero-Saborido et al., 2021; de Moura, 2022).

Peer and self-assessment practices have been shown to positively influence learning climate by fostering a supportive and autonomy-enhancing environment (Slingerland, Weeldenburg, & Borghouts, 2024). Bores-García et al. (2020) reported that peer assessment in PE has been found to increase students' motivation and engagement, and to enhance their sense of responsibility and reflection, which has been associated in the literature with greater student motivation and engagement in learning environments. Similarly, Chng and Lund (2021) demonstrated that AfL tools, such as peer-recorded performance maps, empower students to take ownership of their learning by providing visual and reflective data on their performance, thereby enhancing intrinsic motivation and task involvement. This aligns with findings from Tolgfors and Öhman (2016) that demonstrated peer assessment promotes social relatedness and collaborative learning, which are key components of a motivational climate that supports sustained effort and resilience in PE. However, the effectiveness of these practices depends on adequate training for both teachers and students to ensure constructive feedback and positive interpersonal dynamics (Tolgfors & Öhman, 2016). Studies on self-assessment have also revealed similar results. Potdevin et al. (2018) examined the impact of teacher support and self-assessment accompanied by video feedback on motivation in primary school gymnastics students. Self-assessment students' demotivation dramatically decreased during the five-week experimental study, according to the results, but the control group did not experience any significant changes.

Bores-García et al. (2020) highlight that peer assessment not only improves students' technical skills but also fosters higher-order thinking by engaging them in evaluative dialogues, such as diagnosing problems and suggesting solutions, that deepen their

understanding of game tactics and overall game comprehension. Complementing this, Chng and Lund (2021) show how practical tools such as hit maps, heat maps, and statistical data collection that incorporate peer assessment facilitate targeted skill development by allowing students to visualize and reflect on their performance in real time. Besides, Potdevin et al (2018) compared the effects of self-assessment supported by video feedback and teacher guidance on motor learning in students learning gymnastics at the primary level. The results obtained from the five-week experimental study showed that the hand-shoulder-hip in the front handstand to flat back landing movement in the self-assessment group significantly improved compared to the control group. Evidence from the literature suggests that both peer and self-assessment, when implemented in PE contexts, can enhance skill proficiency.

Only one experimental study has investigated how AfL affects students' motivational strategies and motivational control in the setting of Turkish PE (Çınargür, 2021). Nevertheless, the skill development of the students was not investigated in this study, nor were the impacts of peer and self-assessment investigated independently. Therefore, this study is the first attempt in the Turkish PE literature to examine the effects of two strategies of AfL, peer and self-assessment, on students' motivational outcomes separately, and aimed to examine the effects of self-assessment and peer assessment on students' self-regulated learning, perceived motivational climate, and volleyball skill acquisition in a PE setting.

METHODS

This research is a quantitative study and has a pre-test post-test quasi-experimental design without a control group. Considering the goal of this study was to examine solely the effects of the experimental interventions involving self-assessment and peer evaluation, there was no requirement for a control group.

Participants

The participants consisted of a total of 35 students from two eighth grades in a public secondary school in the Aegean Region in the fall semester of the 2021-2022 academic year. However, five students who were quarantined due to the COVID-19 pandemic and who were absent from the PE lesson for more than three weeks were excluded from the study during the data analysis. Therefore, the study was completed with 30 volunteer students. The mean age of the participants was 13.96 ± 0.18 years. The gender distribution of the students in the two experimental groups participating in the study is given in Table 1.

The equivalence of the self-assessment and peer-assessment groups in terms of the dependent variables of the study was tested. Independent samples t-test results showed that there was no statistically significant difference between both experimental groups in the pre-test scores for overhead pass [t(28) = 0.758; p = 0.301], forearm pass skills [t(28) = 1.468; p = 0.153], learning goal orientation [t(28) = 0.822; p = 0.418], performance goal orientation [t(28) = 0.651; p = 0.521], task value [t(28) = 0.127; p = 0.900], control beliefs about learning [t(28) = 1.264; p = 0.217], self-efficacy [t(28) = 0.728; p = 0.473], iteration [t(28) = -0.073; p = 0.942], elaboration [t(28) = 0.201; p = 0.842], metacognitive self-regulation [t(28) = -0.220; p = 0.827], peer instruction [t(28) = 1.574; p = 0.400], help-seeking [t(28) = -2.222; p = 0.665], teacher-induced learning orientation [t(28) = 0.592; p = 0.559], student competition orientation [t(28) = 0.243; p = 0.810], students' concerns about their mistakes [t(28) = -2.135; p = 0.059], effortless outcome orientation [t(28) = -1.675; p = 0.105] and student learning orientation [t(28) = 0.469; p = 0.643]. These findings indicate that both experimental groups were equivalent in all dependent variables prior to the intervention.

Table 1.
Distribution of the Participants by Gender and Experimental Groups

Gender	Peer Assessment Experimental Group	Self-Assessment Experimental Group
Girl	10 (%66.6)	10 (%66.6)
Boy	5 (%33.3)	5 (%33.3)
Total	15 (%100)	15 (%100)

In the second half of the sixth grade and the entire seventh grade, the participants attended PE lessons via online lessons due to the COVID-19 pandemic. In the eighth grade, they began receiving face-to-face lessons. Neither of the experimental groups' students had previous volleyball experience. In addition, this study was the first time the students had ever used peer or self-assessment tools during their school years, and they had never received PE lessons based on the AfL approach.

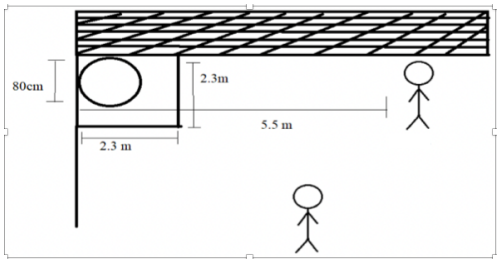
Data Collection Tools

Volleyball skill test battery. Volleyball Skill Test Battery developed by Gabbett and Georgieff (2006) aims to assess the student's skill level in volleyball techniques. This test battery consists of overhead passing and forearm passing tests.

Overhead pass. A circle with a diameter of 80 cm is used as a target point to assess students' overhead passing skills. The hoop is placed in the corner between the net line and

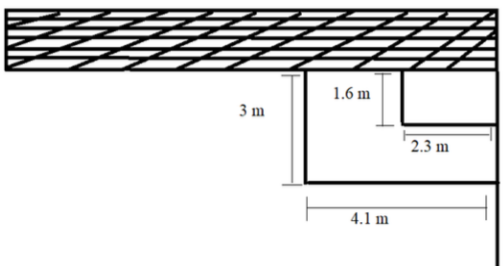
the side edge line in a square area with 2.3 m side lines. The student who is going to shoot waits 5.5 m away from the hoop near the net edge line and tries to reach the target point by overhead passing the balls coming from the student waiting 5.5 m away from the center point of the net to the net. A throw inside the circle is evaluated with 3 points, a throw above the circle is evaluated with 2 points, a throw between the circle and the square area outside the circle is evaluated with 1 point, and not hitting the target areas is evaluated with 0 points. The scores of each student at the end of 6 overhead passes are summed up. Thus, the minimum score a student can get for the overhead pass is 0, and the maximum score is 18. Figure 1 shows a schematic representation of the overhead pass test.

Figure 1.
Schematic representation of the overhead pass skill test (Gabbett & Georgieff, 2006).



Forearm pass. There are two target points to assess the student's forearm pass skill. The first target is a 1.6 m long and 2.3 m wide rectangular area between the net and the outer sideline. The second target is a 3 m long and 4.1 m wide rectangular area with the same starting point as the first target point. Balls hitting the first target area are awarded 2 points, while balls hitting the area between the first and second targets are awarded 1 point. Balls that do not hit both target areas are not awarded points. The points scored by the student at the end of 6 forearm passes are summed up. Therefore, the minimum score a student can get for the forearm pass is 0, and the maximum score is 12. Figure 2 shows a schematic representation of the forearm pass test.

Figure 2.
Schematic representation of the forearm pass skill test (Gabbett & Georgieff, 2006).



Self-Regulated Learning Strategies in Motor Skills Scale: The scale was developed by Alalyani (2008) by adapting the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991). The scale consists of 49 items and has a 7-point Likert-type scale ranging from "does not fit me at all" (1) to "fits me completely" (7). The scale consists of two subscales: a 22-item motivational beliefs scale consisting of learning goal orientation, performance goal orientation, task value, control beliefs about learning, and self-efficacy subscales; and a 27-item learning strategies scale consisting of iteration, elaboration, metacognitive self-regulation, peer instruction, and help-seeking subscales.

The Cronbach alpha values for the scale were between 0.60 and 0.83 (Alalyani, 2008). Bal (2017) adapted the scale into Turkish with a sample of 6th and 7th-graders. The results of the Confirmatory Factor Analysis demonstrated a satisfactory fit between the data and the motivational beliefs scale (GFI=.92; X^2/df=2.72; AGFI=.90; RMSEA=.054; CFI=.96; NNFI=.95). Lambda values of the factor loadings of the items were between 0.33 and 1.07, the explained variance values were between 0.08 and 0.40, and the t values were between 13.46 and 16.90 ($p<0.01$) for the motivational beliefs scale. The findings of the Confirmatory Factor Analysis demonstrated a good fit between the data and the learning strategies scale (GFI=.90; X^2/df=2.53; AGFI=.89; RMSEA=.051; CFI=.97; NNFI=.97). Lambda values of the factor loadings of the items were between 0.62 and 1.31, the explained variance values were between 0.11 and 0.47, and the t values were between 11.02 and 17.11 ($p<0.01$) for the learning strategies scale. Cronbach alpha values were as follows: learning goal orientation: 0.62, performance goal orientation: 0.20, task value: 0.74, control beliefs regarding learning: 0.53, self-efficacy: 0.78, iteration: 0.71, paraphrasing: 0.76, metacognitive self-regulation: 0.70, peer teaching: 0.58, and help seeking: 0.29 (Bal, 2017).

Sample items for the subscales of the motivational beliefs scale; "In a course like this, I would prefer a new skill that challenges me even if it is hard to do" (Learning goal orientation), "I would like to be very good in this course; because it is important for me to show my ability to my teacher and classmates" (Performance goal orientation), 'It is important for me to learn the skills needed for this course' (Task value), 'If I try hard, I can do the skills in this course well' (Control beliefs about learning) and 'I am confident that I can do the skills taught in this course well' (Self-efficacy).

Sample items for the subscales of the learning strategies scale; "When practicing for this course, I repeat the skill in my mind many times" (Iteration), 'When practicing for this course, I try to associate the new skills with the skills I already know' (Elaboration), "When practicing for this course, "I often realize that I am doing a skill without understanding

important parts of it" (Metacognitive self-regulation), 'When given time to practice, I try to work with my classmates to do new skills better' (Peer teaching), and 'I ask my teacher to clarify techniques and tactics that I do not understand' (Help seeking).

Learning and Performance Orientations in PE Classes Questionnaire: The questionnaire was developed by Papaioannou (1994), to assess students' perceptions of the task and ego-containing climate in PE classes, and adapted into Turkish by Daşdan-Ada, Aşçı, Kazak-Çetinkalp, and Altıparmak (2012) with high school students (between 14-18 years). The scale has 26 items and a 5-point Likert-type scale ranging from strongly disagree (1), disagree (2), not sure (3), agree (4), strongly agree (5). The scale has five subscales: teacher-induced learning orientation, student competition orientation, students' concerns about their mistakes, effortless outcome orientation, and student learning orientation. The results of the Exploratory Factor Analysis revealed that all subscales explained 46.85% of the total variance. For teacher-induced learning orientation Cronbach's alpha coefficient was 0.79, for student competition orientation 0.69, for students' concerns about their mistakes 0.47, for effortless outcome orientation 0.71 and for student learning orientation 0.58 (Daşdan-Ada, Aşçı, Kazak-Çetinkalp & Altıparmak, 2012).

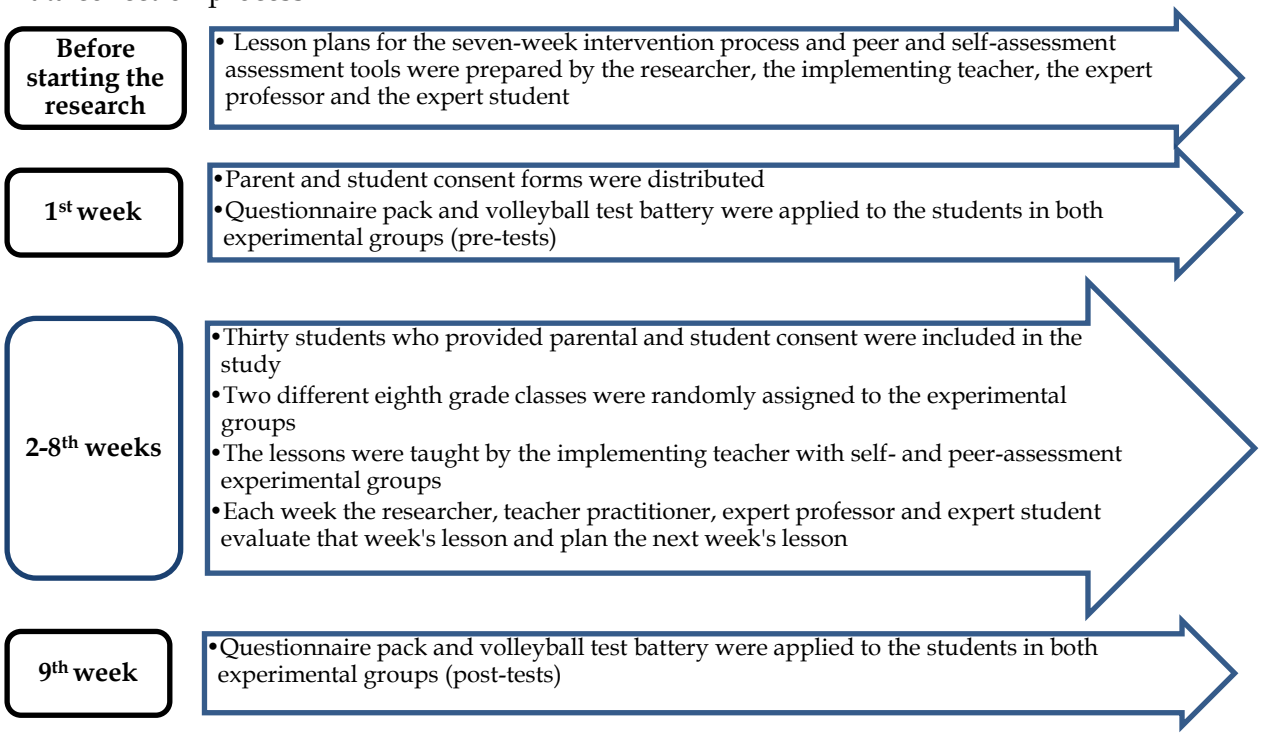
Sample items related to the subscales of the scale; "In PE class, our teacher is very pleased when students show improvement by working hard" (Teacher-induced learning orientation), 'The most important thing for a student in PE lesson is to show that he/she is better than his/her classmates' (Student competition orientation), "In PE class, the teacher is aware of the mistakes made by the student while learning something, "In PE class, students who perform best with little effort are considered to be the most successful students" (Effortless outcome orientation) and 'I am very happy when I learn new skills in PE class' (Student learning orientation).

Procedures

Before starting the study, permissions were obtained from the Ministry of Health, the Ethics Committee of XX University and the Provincial Directorate of National Education, and the necessary information was provided to the school administration where the study would be conducted. The study was conducted with eighth-grade students studying in a public secondary school in XX region during a nine-week period (one week each for pre- and post-tests) in the spring semester of the 2021-2022 academic year. The stages of the data collection process are given in Figure 3.

The study was carried out by a 23-year-old male PE teacher who had not been employed at the school where the study was carried out. This teacher was recruited to carry out the experimental intervention because he was proficient and experienced in the subject matter (using the AfL approach's peer and self-assessment techniques). He completed a PE teacher education program in a public university, a year prior to the data collection phase of the study. Throughout his undergraduate education, he gained current knowledge about the comprehension of AfL in PE. Furthermore, the PE teacher was working toward a master's degree in the field. The seven-week PE lessons in the experimental intervention program were carried out by the same PE teacher for both experimental groups.

Figure 3.
Data collection process



Experimental school and students' PE backgrounds. PE is required in the school where the experimental study was carried out. PE lessons are conducted in the school's garden or, in the event of bad weather, in a ground-floor area. Classes at the school run for seven hours per day, with two hours in the afternoon and five hours before midday. The two experimental classes in the study had afternoon PE lessons on different days.

Stages of the data collection process of the research

Preparation of the lesson plans. During the preparation phase of the lesson plans and assessment tools, two experts were consulted. The researcher was assisted by the opinions of these two experts while preparing the seven-week lesson plans. The first expert, a lecturer, is

a female academic with 17 years of experience. This expert has been involved in various studies and training programs with many PE teachers and has theoretical and practical experience in assessment and evaluation in PE. In addition, the expert has experience in teaching on assessment and evaluation and scientific research methods at undergraduate and graduate levels.

A two-year-experienced male research assistant serves as the second expert. Currently pursuing a PhD in PE teaching, this specialist has completed an experimental master's thesis on AfL. The researcher, teacher practitioner, academic expert, and student expert collaborated to create the seven-week daily lesson plans and the peer and self-assessment tools that would be used for the lessons for each of the experimental groups before the study began.

Experimental process. Pre-tests were collected in the first week of the data collection process, post-tests were collected in the ninth week, and in the intervening seven weeks, the experimental intervention was carried out in PE lessons. In the self-assessment experimental group, self-check style was used in addition to the practice style. In the peer assessment experimental group, reciprocal style was used in addition to the practice style (Mosston & Ashworth, 1986). In the experimental groups, the same assessment tools were designed to be self-administered in the self-assessment experimental group and to be completed by observing peers in the peer assessment experimental group.

In the week before the research started, the researcher explained the research to both experimental groups during their own PE lesson hours. Parent consent forms and student consent forms were distributed to the students. It was explained that participation in the study was not compulsory but optional and that they would not face any negative consequences if they did not participate.

In the first week, the researcher included only the students who brought the consent forms signed by themselves and their parents and applied the questionnaire pack. During the application of the scales, the researcher was present in the environment to answer the students' questions. After the application of the scales, the researcher, in the area prepared for the Volleyball Test Battery in the school garden, first gave the students two attempts and then six overhead passes. The student's scores from each shot were combined to obtain a total score. After all students completed the overhead pass test, the researcher gave the students two attempts and then six forearm passes. The student's scores from each throw were combined to obtain a total score.

From the second week onwards, the researcher, the teacher practitioner, the expert academic, and the expert student held online meetings once a week to discuss the experiences

gained from the previous week's assessment and to make arrangements for the next week's lesson plan. In the experimental groups, the intervention process was carried out by paying attention to the following elements;

1. Before starting each activity in the lessons, students were given time to examine the assessment tools.

2. At the end of each activity, students were asked to apply the assessment tools by thinking about their performance in the self-assessment group and the performance of their peers in the peer assessment group.

3. After the students in the self-assessment group were given additional time to correct the deficiencies and/or mistakes they identified, they were given two more repetitions and then moved on to the next activity. In the peer assessment group, the practitioner student gave additional time for the students to correct the deficiencies and/or errors in two more repetitions. Then, all these procedures were carried out for the other peer as well, thus ensuring that all students completed their roles as both practitioners and peer evaluators, and the next activity was started.

4. During the activities, the PE teacher observed the students to make sure that they were practicing their roles correctly in the self-assessment group by observing their performances and in the peer assessment group by observing their peers' performances, and intervened and guided the students who were not practicing their roles correctly.

During the seven-week intervention period, the self-assessment and peer assessment experimental groups were assessed an average of 3,57 times in each lesson. Both experimental groups completed the same number of activities using the same materials. Both experimental groups completed an average of 3,42 activities per week in the classes. In the ninth week, the questionnaire pack and the Volleyball Test Battery were administered to the students in both experimental groups during their lesson hours.

Data Analysis

Internal consistency was tested by calculating Cronbach alpha values for the sub-scales of the data collection tools, and normality of the distributions was tested by calculating kurtosis and skewness values (Gravetter & Wallnau, 2014). Level of significance was 0.05. The equivalence of the experimental groups in terms of the dependent variables of the study was tested with Independent samples t-test. A 2x2 ANOVA was used to compare the difference between the pre and post-tests of the experimental groups for each dependent variable.

RESULTS

The Effect of Peer and Self-Assessment on Volleyball Skill Levels

Table 2 shows descriptive values for the students' volleyball skills for the pre-tests and post-tests.

Table 2.
Descriptive Values Table for Volleyball Skills

Variable	Test	Group	X	SD	N	Skewness	Kurtosis
Overhead Pass	Pre-test	Self	6.13	2.030	15	4.630	3.210
		Peer	6.13	1.302	15		
	Post-test	Self	7.73	3.217	15	3.479	3.455
		Peer	7.40	2.898	15		
Forearm Pass	Pre-test	Self	2.87	1.922	15	2.630	3.321
		Peer	1.87	1.807	15		
	Post-test	Self	5.00	1.511	15	2.309	2.967
		Peer	3.67	2.093	15		

Levene's test was performed to test the homogeneity of variances. Results revealed that the variances were homogeneously distributed for overhead pass [Levene (3, 56) = 0.311; p = 0.746] and for forearm pass [Levene (3, 56) = 0.411; p = 0.73]. The 2x2 ANOVA results showing the volleyball skill levels of the students are given in Table 3.

Table 3.
2x2 ANOVA Results for Volleyball Skills

	Source	Sum of Squares	SD	Mean Squares	F	p	$\Delta\lambda^2$
Overhead Pas	**Corrected Model**	31.650	3	10.550	1.717	0.174	0.084
	Test	30.817	1	30.817	5.017	0.029*	0.082
	Group	0.417	1	0.417	.068	0.795	0.001
	Test x Group	0.417	1	0.417	.068	0.795	0.001
Forearm Pas	**Corrected Model**	78.850	3	26.283	7.714	0.000*	0.292
	Test	58.017	1	58.017	17.028	0.000*	0.233
	Group	20.417	1	20.417	5.992	0.058	0.097
	Test x Group	0.417	1	0.417	0.122	0.728	0.002

*p<0.05

There was a significant increase in both groups between overhead pass and forearm pass pre and post-test scores. In the comparison of the pre-test and post-tests regardless of the experimental groups, there was a statistically significant increase in both overhead and forearm pass skills in the post-tests. In other words, overhead pass and forearm pass improved

depending on the experimental interventions, but this improvement did not depend on the type of self- or peer assessment, and both methods contributed to volleyball skills at similar levels.

The Effect of Peer and Self-Assessment on Self-Regulation Levels

Descriptive values related to learning goal orientation, performance goal orientation, task value, control beliefs about learning, self-efficacy, iteration, paraphrasing, meta-cognitive self-regulation, peer instruction, and help-seeking levels of the experimental groups in PE lesson are given in Table 4.

Table 4.
Descriptive Values Table for Self-Regulated Learning Strategies in Motor Skills

Variable	Sub-Scales	Test	Group	X	SD	N	Skewness	Kurtosis	Cronbach α
Motivational Beliefs Scale	**Learning Goal Orientation**	Pre-test	Self	5.20	1.218	15	0.028	-0.840	0.81
			Peer	4.87	0.990	15			
		Post-test	Self	5.50	1.285	15	4.630	23.821	
			Peer	6.42	4.882	15			
	Performance Goal Orientation	Pre-test	Self	5.53	1.482	15	-0.479	-0.987	0.80
			Peer	5.20	1.320	15			
		Post-test	Self	5.87	1.157	15	-0.454	-0.704	
			Peer	5.23	1.100	15			
	Task Value	Pre-test	Self	5.27	1.356	15	-0.229	-0.864	0.83
			Peer	5.21	0.890	15			
		Post-test	Self	5.97	0.932	15	-0.504	0.282	
			Peer	5.61	0.877	15			
	Control Beliefs About Learning	Pre-test	Self	5.52	1.215	15	-0.129	-0.878	0.79
			Peer	5.07	0.651	15			
		Post-test	Self	5.77	0.909	15	-0.628	-0.073	
			Peer	5.65	1.030	15			
	Self-efficacy	Pre-test	Self	5.11	1.411	15	-0.309	-0.467	0.84
			Peer	4.79	0.990	15			
		Post-test	Self	5.64	1.041	15	-0.089	-0.800	
			Peer	5.21	0.915	15			

Table 4. (Continued)

Learning Strategies Scale	**Iteration**	Pre-test	Self	4.60	1.202	15	-0.066	-0.764	0.81
			Peer	4.63	1.281	15			
		Post-test	Self	5.28	1.105	15	-0.625	-0.225	
			Peer	4.50	1.268	15			
	Elaboration	Pre-test	Self	4.82	1.038	15	-0.226	-0.919	0.88
			Peer	4.74	1.084	15			
		Post-test	Self	5.54	1.229	15	-0.627	0.307	
			Peer	4.62	0.872	15			
	Metacognitive Self-Regulation	Pre-test	Self	4.31	0.828	15	-0.034	-0.291	0.78
			Peer	4.37	0.828	15			
		Post-test	Self	4.97	1.027	15	-0.570	-0.423	
			Peer	4.54	0.821	15			
	Peer instruction	Pre-test	Self	4.73	1.216	15	-0.395	-0.187	0.84
			Peer	4.00	1.333	15			
		Post-test	Self	5.36	0.821	15	-0.783	-0.107	
			Peer	4.31	1.365	15			
	Help-Seeking	Pre-test	Self	4.55	1.146	15	-0.979	-0.623	0.77
			Peer	4.65	1.312	15			
		Post-test	Self	5.25	0.973	15	-0.315	-0.315	
			Peer	5.02	0.832	15			

Levene's test was performed to test the homogeneity of variances. Results revealed that the variances were homogeneously distributed for learning goal orientation [Levene (3, 56) = 1.491; p = 0.227], performance goal orientation [Levene (3, 56) = 0.599; p = 0.618], for task value [Levene (3, 56) = 3.012; p = 0.058], for control beliefs about learning [Levene (3, 56) = 3.474; p = 0.022], for self-efficacy [Levene (3, 56) = 2.267; p = 0.091], for iteration [Levene (3, 56) = 0.212; p = 0.887], for paraphrasing [Levene (3, 56) = 0.562; p = 0.642], for metacognitive self-regulation [Levene (3, 56) = 0.357; p = 0.784], for peer instruction [Levene (3, 56) = 2.170; p = 0.102] and for help seeking [Levene (3, 56) = 0.522; p = 0.669]. The 2x2 ANOVA results showing the sub-dimensions of levels of self-regulated learning strategies in motor skills according to the experimental groups are given in Table 5.

Table 5.
2x2 ANOVA Results for Self-Regulated Learning Strategies in Motor Skills

		Source	Sum of Squares	SD	Mean Squares	F	p	$\Delta\lambda^2$
Motivational Beliefs Scale	**Learning Goal Orientation**	Corrected Model	19.97	3	6.657	0.953	0.422	0.049
		Test	12.834	1	12.834	1.837	0.181	0.032
		Group	1.276	1	1.276	0.183	0.671	0.003
		Test x Group	5.859	1	5.859	0.838	0.364	0.015
	Performance Goal Orientation	Corrected Model	4.346	3	1.449	0.893	0.450	0.046
		Test	0.504	1	0.504	0.311	0.579	0.006
		Group	3.504	1	3.504	2.161	0.147	0.037
		Test x Group	0.338	1	0.338	0.208	0.650	0.004
	Task Value	Corrected Model	5.586	3	1.862	1.746	0.168	0.086
		Test	4.593	1	4.593	4.307	0.043*	0.071
		Group	0.641	1	0.641	0.601	0.442	0.011
		Test x Group	0.353	1	0.353	0.331	0.568	0.006
	Control Beliefs About Learning	Corrected Model	4.225	3	1.408	1.487	0.228	0.074
		Test	2.604	1	2.604	2.750	0.103	0.047
		Group	1.204	1	1.204	1.272	0.264	0.022
		Test x Group	0.417	1	0.417	0.440	0.510	0.008
	Self-efficacy	Corrected Model	5.498	3	1.833	1.499	0.225	0.074
		Test	3.334	1	3.334	2.726	0.104	0.046
		Group	2.123	1	2.123	1.736	0.193	0.03
		Test x Group	0.041	1	0.041	0.034	0.855	0.001

*p<0.05

Table 5. (Continued)

Learning Strategies Scale	Iteration	**Corrected Model**	**5.745**	**3**	**1.915**	**1.295**	**0.285**	**0.065**
		Test	1.134	1	1.134	0.767	0.385	0.014
		Group	2.109	1	2.109	1.426	0.237	0.025
		Test x Group	2.501	1	2.501	1.691	0.199	0.029
	Elaboration	Corrected Model	7.774	3	2.591	2.293	0.088	0.109
		Test	1.350	1	1.350	1.194	0.279	0.021
		Group	3.750	1	3.750	3.318	0.074	0.056
		Test x Group	2.674	1	2.674	2.366	0.130	0.041
	Metacognitive Self-Regulation	Corrected Model	3.961	3	1.320	1.704	0.177	0.084
		Test	2.563	1	2.563	3.308	0.074	0.056
		Group	0.486	1	0.486	0627	0432	0.011
		Test x Group	0.913	1	0.913	1.178	0.282	0.021
	Peer Instruction	Corrected Model	15.481	3	5.160	3.562	0.020*	0.160
		Test	11.852	1	11.852	8.180	0.006*	0.039
		Group	3.267	1	3.267	2.255	0.139	0.127
		Test x Group	0.363	1	0.363	0.251	0.619	0.004
	Help-Seeking	Corrected Model	4.750	3	1.583	1.355	0.266	0.068
		Test	4.267	1	4.267	3.652	0.049*	0.061
		Group	0.067	1	0.067	0.057	0.812	0.001
		Test x Group	0.417	1	0.417	0.357	0.553	0.006

*p<0.05

Regardless of the experimental groups, the task value, peer instruction and help seeking sub-dimensions of Self-Regulated Learning Strategies in Motor Skills increased statistically significantly in the post-tests when comparing the pre-tests and post-tests. That is, task value, peer instruction, and help-seeking behaviors improved depending on the

experimental interventions, but this improvement did not depend on the type of self- or peer assessment, and both methods contributed to self-regulation at similar levels.

The Effect of Peer and Self-Assessment on Perceived Motivational Climate Levels

Descriptive values related to the levels of teacher-induced learning orientation, student competition orientation, students' concerns about their mistakes, effortless outcome orientation, and student learning orientation of the experimental groups in PE lessons are given in Table 6.

Table 6.
Descriptive Values Table for Learning and Performance Orientation

	Test	Group	X	SD	N	Skewness	Kurtosis	Cronbach α
Teacher-Induced Learning Orientation	Pre-test	Self	4.05	0.750	15	-0.095	-0.737	0.78
		Peer	3.91	0.599	15			
	Post-test	Self	4.35	0.424	15	0.158	-1.003	
		Peer	4.25	0.277	15			
Student Competition Orientation	Pre-test	Self	3.35	0.727	15	0.206	3.643	0.76
		Peer	3.29	0.440	15			
	Post-test	Self	3.47	0.445	15	0.303	1.347	
		Peer	3.56	0.620	15			
Students' Concerns About Their Mistakes	Pre-test	Self	3.07	0.662	15	0.357	-0.220	0.80
		Peer	3.63	0.770	15			
	Post-test	Self	2.96	0.790	15	-0.188	0.240	
		Peer	3.17	0.968	15			
Effortless Outcome Orientation	Pre-test	Self	2.80	0.819	15	-0.595	0.947	0.77
		Peer	3.25	0.641	15			
	Post-test	Self	2.92	0.572	15	0.601	1.321	
		Peer	3.08	0.817	15			
Student Learning Orientation	Pre-test	Self	4.13	0.562	15	0.284	-0.735	0.82
		Peer	4.05	0.430	15			
	Post-test	Self	4.09	0.820	15	-0.602	0.479	

Levene's test was performed to test the homogeneity of variances. Results revealed that the variances were homogeneously distributed for teacher-induced learning orientation [Levene (3, 56) = 3.559; p = 0.200], for student contest orientation [Levene (3, 56) = 0.559; p = 0.644], for students' concerns about their mistakes [Levene (3, 56) = 0.304; p = 0.823], for effortless outcome orientation [Levene (3, 56) =0.751; p = 0.526] and for student learning orientation [Levene (3, 56) = 3.267; p = 0.058]. The 2x2 ANOVA results showing the sub-dimensions of perceived motivational climate according to the experimental groups are given in Table 7.

Table 7.
2x2 ANOVA Results for Perceived Motivational Climate

	Source	Sum of Squares	SD	Mean Squares	F	p	$\Delta\lambda^2$
Teacher-Induced Learning Orientation	Corrected Model	1.763	3	0.588	1.994	0.125	0.097
	Test	1.536	1	1.536	5.213	0.026*	0.085
	Group	0.216	1	0.216	0.733	0.396	0.013
	Test x Group	0.011	1	0.011	0.036	0.85	0.001
Student Competition Orientation	Corrected Model	0.647	3	0.216	0.662	0.579	0.034
	Test	0.561	1	0.561	1.720	0.195	0.030
	Group	0.006	1	0.006	0.018	0.893	0.000
	Test x Group	0.081	1	0.081	0.247	0.621	0.004
Students' Concerns About Their Mistakes	Corrected Model	3.869	3	1.290	1.990	0.126	0.096
	Test	1.176	1	1.176	1.815	0.183	0.031
	Group	2.243	1	2.243	3.461	0.068	0.058
	Test x Group	0.451	1	0.451	0.695	0.408	0.012
Effortless Outcome Orientation	Corrected Model	1.736	3	0.579	1.115	0.351	0.056
	Test	0.009	1	0.009	0.018	0.894	0.000
	Group	1.426	1	1.426	2.747	0.103	0.047
	Test x Group	0.301	1	0.301	0.580	0.450	0.010
Student Learning Orientation	Corrected Model	0.096	3	0.032	0.092	0.964	0.005
	Test	0.017	1	0.017	0.048	0.828	0.001
	Group	0.003	1	0.003	0.009	0.926	0.000
	Test x Group	0.077	1	0.077	0.219	0.642	0.004

*p<0.05

DISCUSSION

This study aimed to examine the effects of self-assessment and peer assessment on students' self-regulated learning, perceived motivational climate, and volleyball skill acquisition in a PE setting. Students in the peer and self-assessment experimental groups showed a significant improvement in their forearm and overhead passing abilities. By using the assessment tools, students in both experimental groups participated in the evaluation process more than they would have in a summative assessment setting. For half of the implementation time, students in the peer assessment group were practitioners, and for the other half, they were evaluators. In contrast, over the same implementation period, students

in the self-assessment group practiced before evaluating themselves. As a result, equal time was allocated for skill practice and observation for both peer and self-assessment. In both learning scenarios, students were in charge of their own or their peers' learning, and it is often recognized that when students realize they are in charge of their own or their peers' learning, they become more engaged (Lund & Shanklin, 2011). Given that both experimental groups had the same number of activities, durations, assessments, and time allocated for students to evaluate (either themselves or their peers) in the assessment tools, it is believed that the lack of a significant difference in volleyball skills between the experimental groups results from the fact that practice and evaluation time should be comparable in both learning scenarios.

Similar to the results of this study, other studies have demonstrated that students' motor skills and learning processes are enhanced by both peer and self-assessment. Butler and Hodge (2001), for instance, highlighted the importance of reflective practices in skill development and revealed how self-assessment and peer assessment significantly improved students' motor skill learning and retention in PE. According to Dochy et al. (1999), peer assessment enhances learning through students' understanding of task criteria, which is consistent with the improvements in volleyball skills recorded in this study. Additionally, Panadero and Alonso-Tapia (2013) claimed that students' higher-order skills are enhanced through self-assessment. This is most likely the reason why the volleyball skills of the self-assessment group improved significantly. Peer and self-assessment are two examples of formative assessment strategies that provide continuous feedback, enabling students to recognize their areas of weakness and enhance their performance (Black and Wiliam, 1998).

Task value, peer teaching, and help seeking all significantly increased in both experimental groups. The findings indicated that proper peer and self-assessment is an effective tool that helps eighth graders develop self-regulation. Given that AfL practices offer chances for self-regulated learning and seek to support students in understanding how to learn (Lysaght, 2015), students' self-regulation improved in this study as they gained experience deciding what and how to assess during the teaching process.

Self-regulated learning is a complex process; self-regulated learners observe themselves, practice self-judgment and self-reflection, and adopt skills such as goal setting, planning, activating, organizing, and transferring knowledge (Azevedo, 2009; Bembenutty, 2009; Zimmerman, 2008). While task value, peer tutoring, and help seeking improved significantly across both self- and peer-assessment outcomes, the mechanisms behind these improvements may differ. By encouraging students to critically review their performance, make goals, and highlight areas for growth, self-assessment promotes metacognitive abilities

and self-regulation (Nicol & Macfarlane-Dick, 2006; Panadero et al., 2016). Students who actively participate in their learning process are better able to monitor and modify their behavior, which promotes skill development (Zimmerman & Schunk, 2011).

Peer assessment, on the other hand, promotes social interaction and collaborative learning by giving students opportunities for shared meaning-making and reciprocal feedback (Topping, 2009). Peer assessment can help students better comprehend work requirements and enhance their interpersonal and communication skills by exposing them to other opinions, constructive criticism, and alternative approaches (Liu & Carless, 2006). Students are more likely to ask for explanations, offer explanations, and refine their methods through peer-mediated discourse and cooperative problem solving, which may account for why peer assessment has a greater impact on peer teaching and help-seeking behaviors (van den Boom et al., 2007).

Self-questioning through peer and self-assessment, goal setting, looking critically at one's own performance, and making judgments about deficiencies and how to correct these deficiencies should start as early as possible in terms of the development of these skills. In a similar vein, Helfer (1972) recommends that early in education, students be taught to evaluate themselves and their peers. He claims that early use of peer and self-assessment encourages students to embrace these approaches and helps them develop the critical questioning and evaluation skills that are essential for lifelong learning. According to Helfer (1972), students' behaviors shift when they receive early formative feedback on these crucial abilities.

The teacher-induced learning orientation pre-test and post-test scores of the experimental groups for peer and self-assessment significantly increased in both groups. A key implication of this finding is that both assessment methods—self-assessment and peer assessment—were equally effective in enhancing teacher-induced learning orientation. This suggests that it is not necessarily the type of assessment that determines improvements in students' learning orientation, but rather the active engagement in assessment processes that contributes to this positive change.

This finding is consistent with theories of student engagement and formative assessment, which argue that students actively assess their own or their peers' work, increase their awareness of learning goals, and cultivate more sophisticated learning techniques (Black & Wiliam, 1998; Nicol & Macfarlane-Dick, 2006). Furthermore, data support the notion that teacher behaviors—like giving feedback, organizing assessment tasks, and creating a mastery-oriented environment—are essential in helping students develop a more successful learning orientation (Hattie & Timperley, 2007).

Considering that teacher-induced learning orientation refers to the learning orientation that occurs in students with the teacher's behaviors in a lesson (Daşdan et al., 2007), these findings suggest that teachers can use both self-assessment and peer assessment as tools to enhance students' learning orientation, without needing to prioritize one over the other. The focus should instead be on how these assessment techniques are applied and how educators assist the process to establish a disciplined and encouraging learning environment that encourages motivation and self-control. In this study, it is believed that the teacher creates a learning climate by structuring the environment, providing clear criteria for assessment, and encouraging reflection and social support, which in turn facilitates peer and self-assessment (Black & Wiliam, 1998). When teachers emphasize formative feedback over summative judgment, students are more likely to internalize assessment as a learning tool rather than a measure of performance, thereby strengthening their commitment to the task and motivational beliefs (Sadler, 1989; Hattie & Timperley, 2007).

However, there was no significant difference between the increases of both experimental groups in all sub-dimensions. Performance goal-oriented people concentrate on being better than others or on the outcomes attained by others, whereas learning goal-oriented people concentrate on their own growth and meeting task requirements (White, Kavussanu, Tank Kari, & Wingate, 2004). As anticipated, the study's use of peer and self-assessment did not result in a shift in the performance orientations of the students (easiness of outcome, competitive orientation, and concern for errors). This is because the frequent use of peer or self-assessment throughout the intervention process created a learning environment where students could recognize their skill development, identify any mistakes or deficiencies in the process, and have the chance to correct them. A shift in the learning (mastery) climate that prioritizes social responsibility, the development of lifelong skills, and persistence is the expected result in such an environment.

Limitations

Despite its contributions to understanding the effects of self- and peer-assessment in PE, this study has several limitations. First, the sample size was relatively small and limited to a specific age group, which may limit the generalizability of the findings. Future research with larger and more diverse populations is needed to validate the results. Second, the study duration was limited to seven weeks, which may not have been sufficient to observe long-term effects on self-regulation and motivational climate. Longitudinal studies could provide a deeper understanding of the sustained impact of AfL strategies. Additionally, the absence of

a control group limits the ability to compare self- and peer-assessment effects against traditional assessment methods. Further research employing a control group and different assessment conditions would enhance the robustness of the findings. Lastly, while this study focused on volleyball skill acquisition, future studies should explore the impact of self- and peer-assessment in different sports and physical activities to determine whether the effects observed are consistent across various contexts.

CONCLUSION

In this study, two of the five AfL strategies, activating students as instructional resources for one another and activating students as owners of their own learning, were experimentally applied and their effects were compared. Peer and self-assessment are the basis for the implementation of these two AfL strategies. According to the findings of the study, both assessment methods improve students' learning experiences. The findings of the study emphasize the value of structured peer and self-assessment procedures in PE and suggest the need for their inclusion in efforts to develop curricula and teacher education programs.

PRACTICAL IMPLICATIONS

The learning climate that teachers foster is a sub-dimension of teacher-induced learning orientation. The learning climate supported by teachers is a sub-dimension of teacher-based learning orientation. It is assumed that the learning environments that include peer and self-assessment created by the teacher in this study are the reason for the significant increase in teacher-induced learning orientation in both groups.

Therefore, it is recommended that PE teachers use self-assessment and peer assessment in their teaching practices to improve students' self-regulation skills. Research has shown that if children are taught to use and develop self-regulation strategies, they can be used even in primary school (Veenman, Wilhelm, & Beishuizen, 2004; Buttner, 2008). Therefore, although this study was conducted with eighth-grade students, it is recommended that self- and peer assessment be used at every grade level starting in primary school.

In this sense, it is of critical importance that PE teacher education programs provide training on the preparation and use of assessment tools that will enable pre-service teachers to use peer and self-assessment in their classes. In addition, in-service training programs should be provided to PE teachers to equip them with the necessary knowledge and skills to effectively use peer and self-assessment by adopting the AfL method. It is also recommended that the Ministry of National Education work with institutions to create support resources

(such as guidebooks) that are appropriate for the course content and specific to the class in order to ensure the quality and widespread use of the process.

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Authors' Contribution

Yasemin AZZALOUALIDINE was responsible for the design of the study, data collection, data analysis and interpretation, drafting the article and final revisions of the manuscript to be published. Gökçe ERTURAN was responsible for the design of the study, data analysis and interpretation, drafting the article and final revisions of the manuscript to be published.

Declaration of Conflict Interest

The authors have no conflicts of interest.

Ethics Statement

The ethics committee approval of the study was obtained from Pamukkale University Non-Interventional Clinical Research Ethics Committee (permission dated 14/12/2021 and numbered E-60116787-020-149944).

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