Art. #1651, 14 pages, https://doi.org/10.15700/saje.v40n2a1651

How peer assessment could be interactive and effective

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In practical courses, students consider teachers' assessment of various skills to be baseless and unfair. Unfortunately, due to a lack of equipment, only a few students take part in practical skills performance, while the rest of the students remain passive in learning and assessment. In this paper we suggest an original design to use peer assessment as an interactive strategy and examine its efficiency to improve students' individual skills, teamwork skills and practical performance in an educational technology course. In the study reported on here, a quasi-experimental design was used, which included a sample of 73 female students divided into experimental and control groups. The treatment tools were provided to the experimental group while the assessment tools were applied to both groups before and after the intervention. Data analysis revealed that an interactive peer assessment strategy was effective in improving individual skills, teamwork skills and practical performance. We recommend that this suggested strategy is used widely in practical courses.

Keywords: individual skills; interactive peer assessment strategy; peer tutoring; practical performance; teamwork skills

Introduction

Traditional assessment/assessment is a concept that many students may consider to be a baseless evaluation process undertaken by their teachers. Due to recent criticism in the pedagogical field, traditional means of evaluation were replaced by an assessment process in which the responsibility for making judgments about student performance and achievement is shared by students and teachers, rather than it being limited to teachers with students playing an inactive role. According to Gaytan (2002), forms of evaluation that are limited to leading questions do not necessarily result in student learning; thus, to achieve targeted learning, teachers need to be aware of this when defining the various criteria, objectives, and desired outcomes in the assessment processes. Allam (2004), on the other hand, emphasises that learning and evaluation should no longer be considered as two separate activities, but rather as one integrative activity. Similarly, Khedr, Hamaash and Hasha (2011) advocate for the merger of both learning and evaluation contexts and for the preparation and deployment of realistic evaluation tools rather than traditional ones as it is necessary to train students to apply constructive assessment to everyday situations.

Furthermore, the new perspective of alternative (reflective) assessment highlights the fact that evaluation methods have profound effects on student learning, particularly given that students spend so much time and effort in accomplishing evaluation tasks. Accordingly, by engaging in different stages and processes to complete these tasks, they become able to achieve more realistic and integrated learning outcomes. In addition, self-assessment and peer assessment support this new perspective since learning takes place through the student's active participation in performative and cognitive tasks, which involve partners in the learning process. Boud and Falchikov (2006) state that student participation in designing evaluation standards is an effective and more sustainable strategy for subsequent practical life.

Falchikov (1995) maintains that much like self-assessment, peer assessment is a precursor to learning processes since it encourages students to think for themselves, to increase their self-confidence, and to take responsibility for their own learning. In addition, peer assessment has a further advantage in that every student evaluates the works of his/her peers in such a way that enables him/her to identify the characteristic features and criteria for the tasks they are evaluating, and to better understand the curriculum. As a result, the student is no longer a passive receiver of evaluation, but instead becomes an evaluator who is capable of assessing not only his/her own work, but also the work of his/her peers (Adachi, Tai & Dawson, 2018). However, this necessitates clarifying the concept of judgment-making processes and setting aside subjectivity (Prins, Sluijsmans, Kirschner & Strijbos, 2005). In this context, Yang, Badger and Yu (2006) conclude that with regard to some aspects of learning, student-to-student feedback leads to better learning outcomes than teacher-to-student instruction.

Peer Tutoring and Peer Assessment

Peer tutoring evolved from the application of Bandura's social cognitive theory of learning, which involves an individual, who is termed an observer, learning by observing another person who possesses certain features – a model. It depends on the active participation of every student in the learning process (Allam, 2004; Bandura, 2002). Peer tutoring is deeply associated with peer assessment as an instructional strategy, where an academically stronger student is trained to coach another weaker student, irrespective of them being of the same age, from the same or even a higher class. However, according to Burks (2004), peer tutoring is most appropriate at the class-wide peer-tutoring level. Madrid, Canas and Ortega-Medina (2007) affirm that students score better marks in learning language skills owing to peer education than through competitive and traditional education.

Peer tutoring emphasises performance. According to Kolb's theory of experiential learning, peer tutoring occurs through the following stages: providing a concrete experience, reflectively observing it, conceptualising it, and actively experimenting with it (Al-Dahmash, 2014). Hughes and Fredrick (2006) maintain that most human behaviour is learned by following or observing models or realistic examples. Learning by observation allows students to avoid costly mistakes. Peer tutoring is considered a necessity in cases where learning in the usual circumstances of the class becomes difficult. Peer tutoring was used to develop the social behaviour of students with learning difficulties in reading in the 2nd and 4th grade in Irbid city (Al-Afify, 2009). In addition, for students facing difficulties in dictation, mathematics, reading, and vocabulary, it was used to minimise disordered behaviour and to increase social interaction (Burks, 2004; Dowse & Van Rensburg, 2015). Juwah (2003) maintains that peer tutoring is an efficient method to develop students' knowledge and skills.

Peer Assessment Strategy (PAS)

Peers can learn from each other through interactions, which enable them to shorten the social distance and establish confidence in each other (Bulu & Yildirim, 2008), that could be supported by the cooperative atmosphere that facilitates the learning process (Uijl, Filius & Ten Cate, 2017). Teachers act as monitors who offer facilities for learners to develop their academic, social and performative skills (Hall & Stegila, 2003), while teamwork develops communicative competence among students (Kasasbeh, 2007). Similarly, Al-Jamal (2009) employed the Peer Response Strategy to develop writing skills in English and foster positive attitudes among Jordanian students. Moreover, Attia (2004) reveals the role of peer tutoring in developing reading-aloud skills.

Peer assessment provides students with the opportunity to evaluate each other's work. Allam (2004) discusses that students play an active role in learning and evaluating their own and their peers' work; they can exchange their tasks and evaluate the quality and appropriateness of each other's work. This commonly takes place according to the quality standards set by the teacher using a rubric. In this sense, peer assessment is consistent with real evaluation which focuses on the extent to which students have mastered the desired skills according to the required standards of performance. Furthermore, the analytic evaluation criteria have great importance in dividing tasks into constituent sub-skills, which help students complete the required tasks. In this regard, Spiller (2012) concludes that it is necessary to provide students with the criteria for peer assessment. In addition, formative evaluation during peer assessment is essential (Panadero, Jonsson & Alqassab, 2018). Topping, Smith, Swanson and Elliot (2000) contend that it was effective on postgraduate students' mastery of specialised academic writing.

The aims with a peer-assessment strategy is to improve students' understanding of the curriculum and to enhance their academic skills (Dijks, Brummer & Kostons, 2018). Hwang, Hung and Chen (2014) conclude that PAS is very effective in increasing academic achievement, motivating learning and promoting students' problem-solving skills in science. Similarly, Adeyemi (2012) states that applying peer and self-assessment in the teaching of mathematics promoted students' self-efficacy and autonomy (according to Alade & Moyosore, 2014). Al-Sayed (2014) states that when peer assessment is used in electronic learning environments, it is preferable to use the analytical criteria of evaluation rather than the holistic criteria since they develop critical thinking skills and improve higher outcomes of learning. Chen (2010) encourages employing feedback in peer assessment via phones in an interactive environment.

Interactive Peer Assessment Strategy (IPAS)

In referring to IPAS, Chiang, Shih, Liu and Lee (2011) place prominence on formative evaluation and feedback. While the evaluation process aims at assisting learners, it necessitates creating a collaborative learning environment in order to improve learners' activities and facilitate the process of interactive peer assessment (Panadero et al., 2018). Moreover, evaluation increases learning motivation since it promotes learners' intrinsic motivation and personal responsibility, increases their interaction, maintains their interest during activities, improves their self-confidence and develops their social bonding and empathy for others.

In the study reported on here the concept of IPAS was adopted to emphasise the full interaction of learners. In traditional peer assessment there are written benefits, which accrue only to students who are evaluated from those who undertake evaluation. However, IPA, also offers mutual benefit for all learners. IPAS is an appropriate strategy for attaining cognitive and practical learning outcomes based on students' interaction and engagement. Chiang et al. (2011) state that IPAS is suitable for the mastering of learning skills through three different levels of feedback, which cover both cognitive and performative outcomes of learning: corrective feedback with approximation, emphatic feedback with clarification, and emphatic feedback with rephrasing or re-performance; all of which lead to active learning. In this context, Wang (2008) and Xiao and Lucking (2008) conclude that IPA promotes students' learning skills and performance. Similarly, Lai and Hwang (2015) reveal the effect of this strategy on developing knowledge and skills related

to creative activities, such as artistic design through students' full participation in developing the standards of performance evaluation.

Individual Skills and Teamwork Skills

According to the theory of social constructivism, individual and teamwork skills are considered to be among the objectives of learning, which occurs at two levels during the implementation of active learning situations; the social level (among individuals) and the individual level (within an individual). Hence, it is impossible to isolate the individual's cognitive development from the social context since interaction and utilisation of tools are considered important elements of this development (Al-Dahmash, 2014). These skills are necessary for social interaction and success in everyday life, therefore, students in educational institutions should be trained to acquire such skills due to the effective role they play in solving problems of teamwork, besides responding collaboratively to social situations (Uijl et al., 2017).

The evaluation of group work measures the group's efficiency and pays the same attention to both individual and group skills, because the efficiency of learning outcomes differs individually, where teamwork results in higher results than individual work. Therefore, students learn much more by working in groups than individually, on condition that groups are designed and evaluated to guarantee full participation of all individuals.

The evaluation should assess the progress of both group work and individual students to prevent the decrease of the individual effort within the group as compared to the individual work. Excellence should be rewarded, and negligence should be blamed. Fuchs and Fuchs (2005) suggest that peer tutoring contributes to the development of social skills in groups and the establishment of friendships in the primary education stage. Mak and Coniam (2008) investigated the effect of peer assessment on developing students' social relations by using electronic discussion environments (Wikis).

Furthermore, peer assessment is supposed to be one of the tools of collaborative learning, a tool which contributes to the development of both individual and group skills by providing an interactive educational context, bearing in mind the fact that learning operates through mutual interaction among learners in a favourable environment for the development of different skills. PAS promotes not only group skills, but also individual skills (Panadero, 2016). Gaytan and McEwen (2007) recommended using projects, seminars, self-assessment, and peer assessment in order to create a coherent, interactive educational environment and achieve different learning outputs.

Practical Performance Skills

Performance skills are considered an educational priority, particularly in practical courses. In this regard, Al-Motawa and Al-Tagawy (2002) maintain that employing various strategies based on work groups result in developing practical performance skills in physical education. In the same vein, El-Harby (2011) refers to the effectiveness of collaborative laboratory working groups in developing secondary school students' laboratory skills in physics.

In this sense, evaluating the extent to which students have learned the given skills is realistic. That is, it is done through examining students' performance of some meaningful cognitive tasks (Khedr et al., 2011). The objective of evaluating practical performance skills is not simply to ensure that learners have properly followed specific procedures in a certain order, but rather to ensure that they have understood why the performance had been so (Ahmed, 2002). Nitko (1996) defines the evaluation of practical performance as a procedure of using certain tasks to get information concerning the quality of students' learning and their ability to apply those skills and knowledge they have acquired to different educational situations in such a way that would exhibit their ability to achieve an educational objective through performance.

However, due to a lack of resources, practical courses in educational technology are usually taught in a purely theoretical way, which impedes the effective performance of future teachers. Thus, the obstacles of employing educational technology in the educational process are attributed to the scarcity of in-service teacher training programmes and the emphasis on theoretical aspects (Al-Mazro'u, 2009). Similarly, Al-Hossary (2000) confirms that unequipped preparation classes are one of the reasons why teachers do not use educational technology in teaching. In this vein, some studies call for paying massive attention to the skills and competencies that student teacher should possess in educational technology courses in order to improve the quality of performance-based education (Abuel-Magd, 2000; Dakrory, 2001).

Despite the importance of practical skills in educational technology courses, it is obvious that much attention is traditionally devoted to theoretical aspects – whether in the teaching or the evaluation process. Al-Rantisy (2009) confirms the necessity to replace assessment in these courses by a variety of evaluation methods that include all aspects of learning and emphasise skill aspects, which are the pillars upon which teachers rely in their careers. Bekhit and Teaima (1999) propose a solution for this problem through both peer tutoring, which has led to developing achievement, and training. Al-Mazro'u (2009) emphasises using peer

tutoring in teaching the curricula of field training for student teachers since they develop their teaching skills and increase their self-efficiency in teaching.

After having been taught practical courses for a long time, students are required to perform several learning skills. However, due to the inadequacy of equipment and materials, these courses are usually taught theoretically, or with teachers demonstrating at best. When student demonstration is used, some students gain skills. Only the student demonstrating is actively involved while the rest of the students remain passive. We propose that it is of paramount importance that student teachers learn how to implement IPAS. Hence, the study was guided by the following questions:

- How can peer assessment be interactive?
- How can IPAS be effective?

In the study we examined the following hypotheses:

- There is a statistically significant difference between students' scores in the experimental group and the control group on the scale of individual skills within the group (ISWG) in favour of the experimental group students.
- There is a statistically significant difference between students' scores in the experimental group and the control group on the scale of group skills of the whole group (GSWG) in favour of the experimental group students.
- There is a statistically significant difference between students' scores in the experimental group and the control group in practical performance in favour of the experimental group students.
- There is a statistically significant difference between the experimental group students' pre- and post-test scores on the scale of ISWG in favour of the post-test.
- There is a statistically significant difference between the experimental group students' pre- and post-test scores on the scale of GSWG in favour of the post-test.

Methodology

After having surveyed the relevant literature, a theoretical framework was structured. Then the treatment tools such as task papers and the IPAS implementation guide were prepared. Next, the checklists for usage/evaluation of performance were modified to meet the criteria for each topic. These checklists were arranged in a three-point Likert scale, and scored as follows: 2 = good; 1 = acceptable; 0 = none). In addition, space for individual and group feedback was provided in the checklists. The tools were then submitted to referees for comment, and after modifications had been made, the checklists were finalised.

Seventy-three female students in the third year (level 6) of the faculties of girls, Dammam University, Kingdom of Saudi Arabia (KSA), who were enrolled for the course, educational equipment usage during 2014/2015 participated in this study. This sample was divided into 35 students as an experimental group and 38 students as a control group. The students in the experimental group were randomly divided into six collaborative sub-groups; each of which was named using alphabet letters (A to F) and each group included six students. In addition, each student was allocated a number (1 to 6) within the group. A quasi-experimental design was used in the study (see Figure 1).

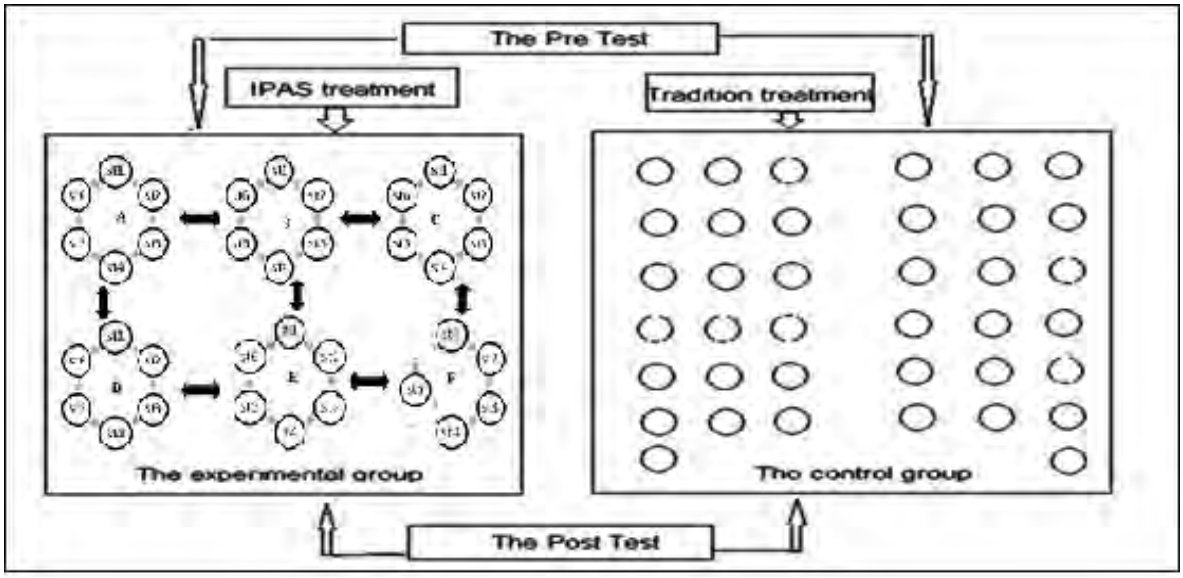


Figure 1 The diagram of the experimental design

The IPAS design was established to illustrate how the strategy should be applied. Thus, individual students took on a variety of roles through the IPAS, namely, as performer; observer; evaluator; or

learner. The design of each group is shown in Figure 2, and the interaction among all groups is presented in Figure 3.

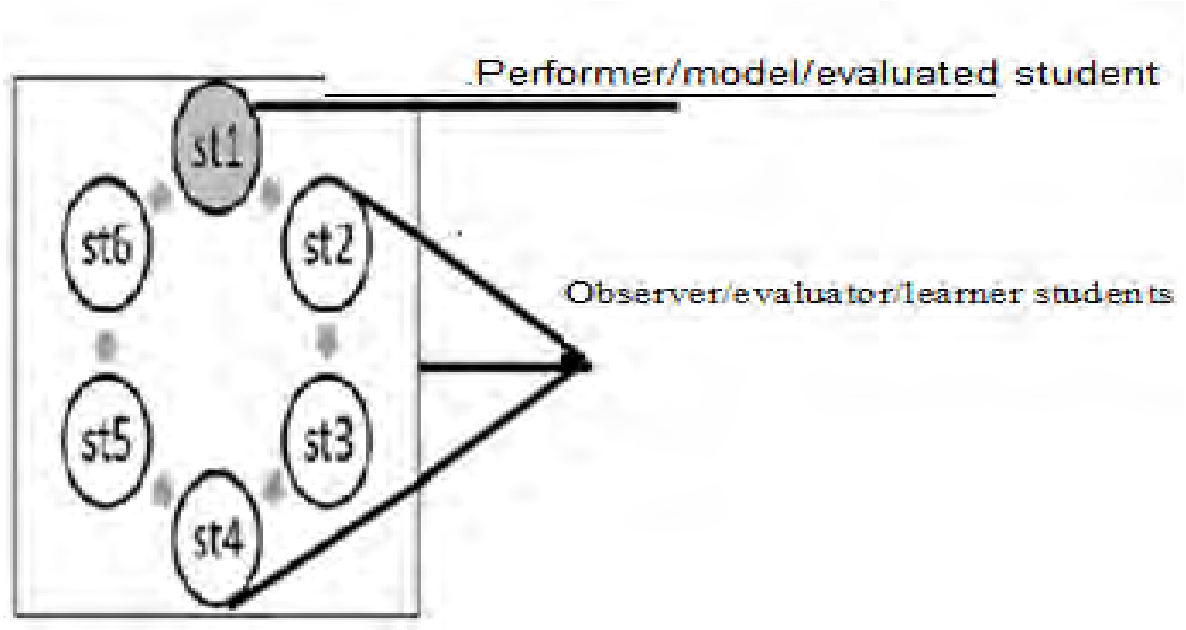


Figure 2 Design of each group

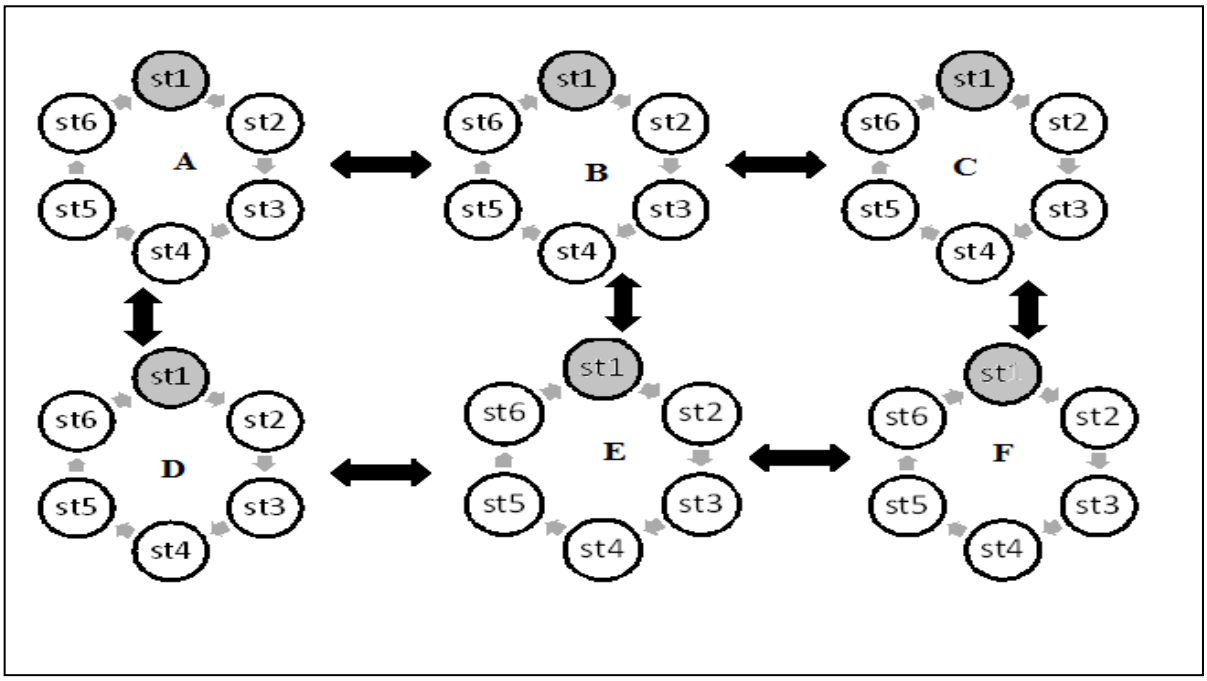


Figure 3 Design shows the order of performer students in the second session/meeting

In the second session, one student from each group (st1) is assigned the role of the performer student. While st1 of group A performs, all the students in the other groups offer their individual feedback according to the usage checklist. The role of the performer student is then handed to the st1 of the other groups (B, C, D, E, F), as showed in Figure 4.

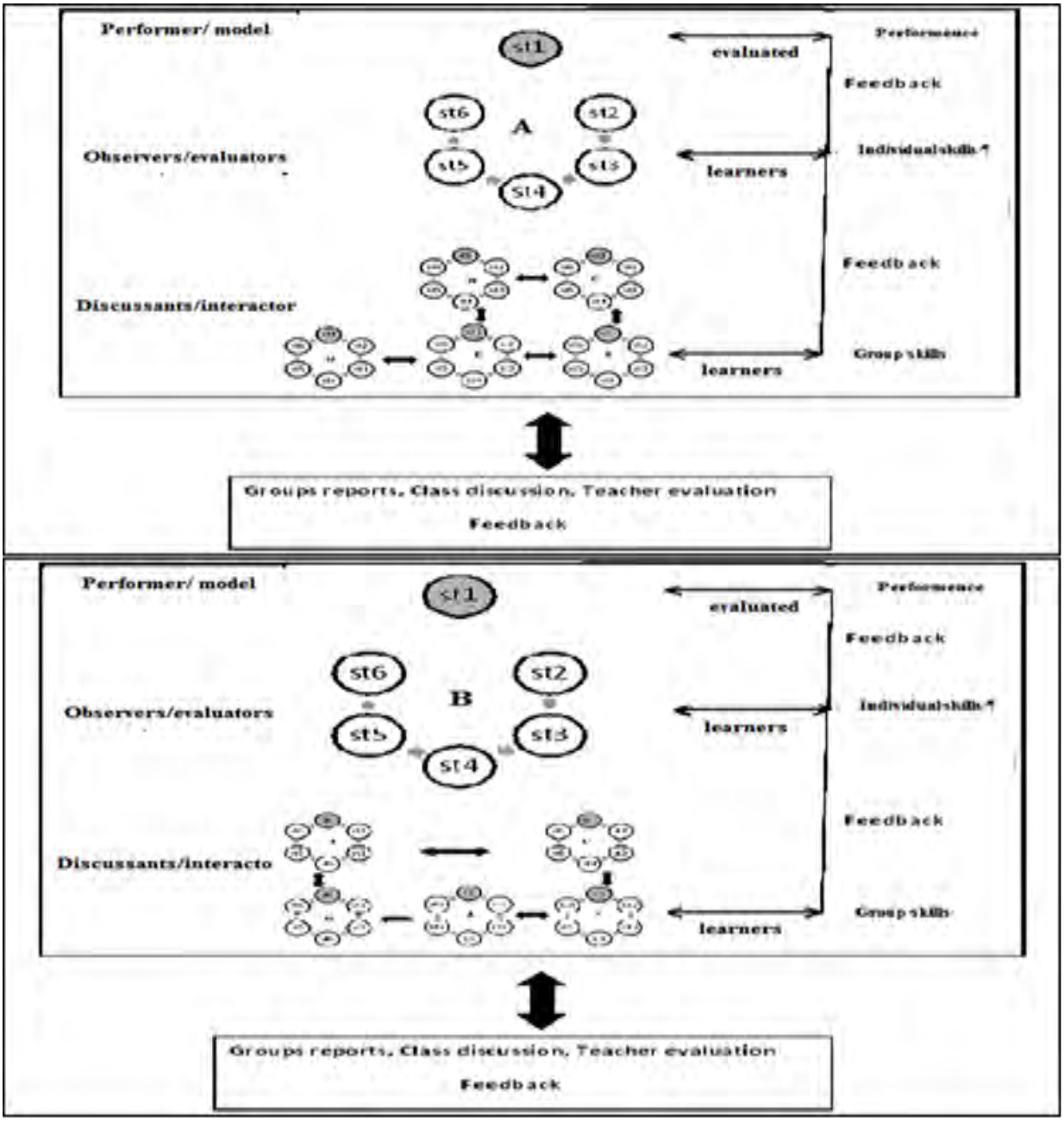


Figure 4 Design shows part of the processes of implementation of IPAS in the second session

The role of the performer student (st2, st3, st4, st5, st6) rotates consequentially per session through the weeks of the IPAS implementation until every student has had a chance to act as performer student. Figure 5 shows part of the processes of implementation of IPAS in the third session, where st2 from groups (A, B, C, D, E, F) acted as performer students.

The IPAS implementation process includes many skills, such as: a) student performance; b) observation and evaluation of the other students who act as observers and evaluators (which leads to enhancing tutorial learning and individual skills); c) discussion and interaction of the six groups (which leads to developing interactive learning and group skills).

An organised and simple IPAS distribution plan is shown in Table 1. This process provides an answer to the first research question: How can peer assessment be interactive?

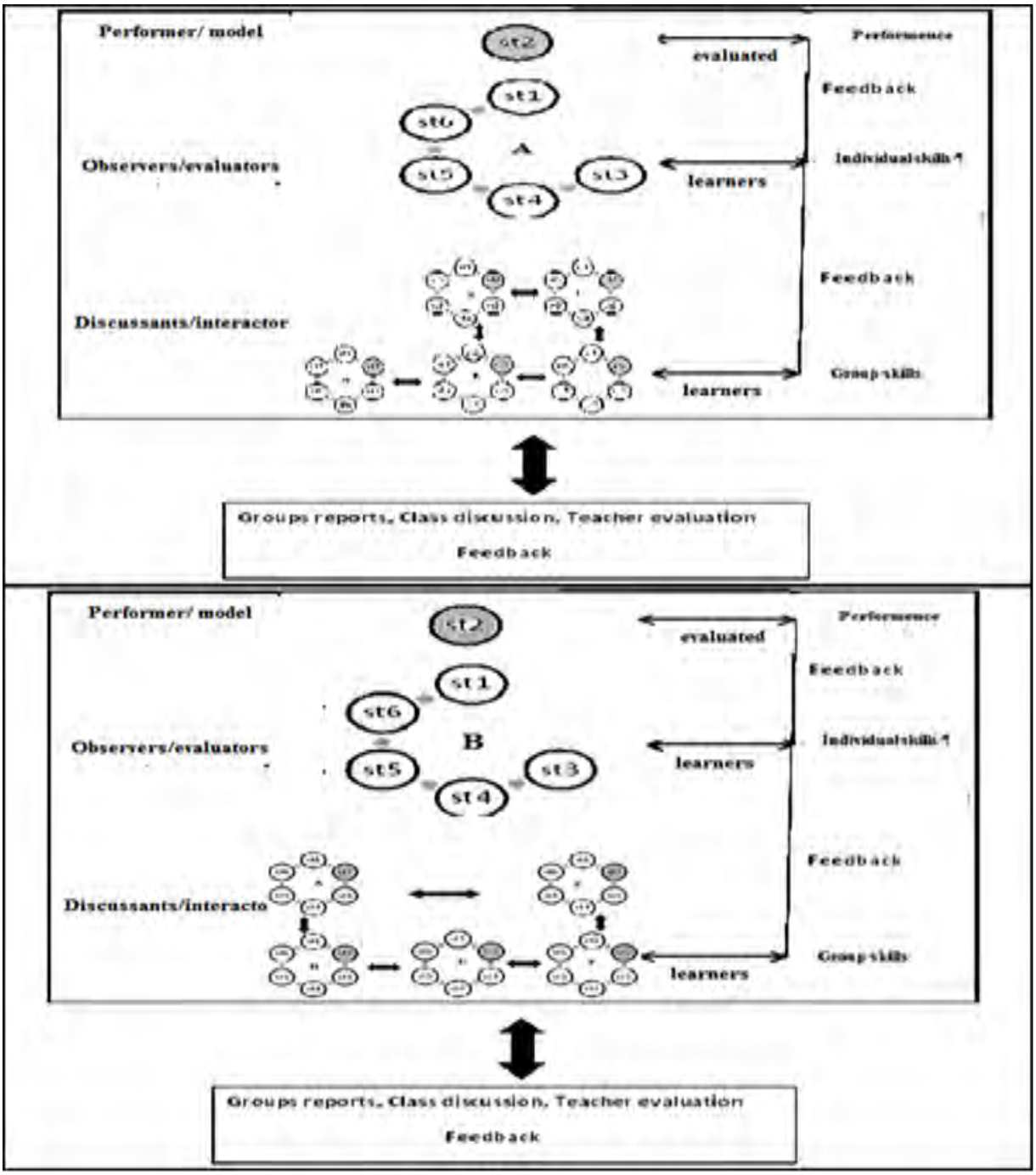


Figure 5 Design shows part of the processes of implementation of IPAS in the third session

Table 1 Distribution plan of the applied group work during the sessions

Session	Content/ equipment	Development of practical performance	Development of individual skills	Development of group skills
		Performer/model/evaluated	Observer/evaluator/learner	Discussants/interactors/evaluators/ learners
First	Applying the scale of "group skills of the whole group" and the scale of "individual skills within the group."			
Second	Presentation of educational transparencies.	Students (1A-1B-1C-1D-1E-1F).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (2–6) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective evaluation and feedback. • Groups (A-B-C-D-E-F).
Third	Presentation of transparent slides.	Students (2A-2B-2C-2D-2E-2F).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (1, 3–6) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective. evaluation and feedback. • Groups (A-B-C-D-E-F).
Fourth	Presentation of opaque.	Students (3A-3B-3C-3D-3E-3F).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (1, 2,4–6) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective evaluation and feedback. • Groups (A-B-C-D-E-F).
Fifth	Presentation of microfilm.	Students (4A-4B-4C-4D-4E-4F).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (1–3, 5, 6) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective evaluation and feedback. • Groups (A-B-C-D-E-F).
Sixth	Presentation of document - cam (visual Presenter).	Students (5A-5B-5C-5D-5E-5F).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (1–4, 6) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective evaluation and feedback. • Groups (A-B-C-D-E-F).
Seventh	Presentation of smart board.	Students (6A-6B-6C-6D-6E).	• Each individual student within the group. • Individual provides specific evaluation and feedback. • The rest of the students (1–5) in groups (A-B-C-D-E-F).	• All members in each group collectively discuss and interact with each other. • They provide collective evaluation and feedback. • Groups (A-B-C-D-E-F).
Eighth	Applying the scale of group skills of the whole group (GSWG), the scale of individual skills within the group (ISWG), and performance tests.			

The scale of ISWG was formulated to evaluate the interaction of each individual student within the team when performing a given task, and the scale of GSWG was created to evaluate the interactivity and efficiency of the teamwork as a whole when performing a given task. The two scales took the form of three-point Likert scale. Each scale included 15 items ranged according to the degree of performance (good; acceptable; weak) and scored as (2; 1; 0) respectively. The practical performance test was then prepared to assess the extent to which students mastered the practical skills when using given educational equipment. Items of the test consisted of eight cards; each card included five sub-skills which examined the accuracy and speed of practice when using educational equipment. The performance ranged as follows: (accuracy with speed; accuracy; just performance; none) and

scored respectively as (3; 2; 1; 0). The reliability and validity of the assessment tools were statistically controlled.

The pre-test for the individual skills scale and the group skills scale were applied to the experimental group and the control group and a *t*-test was used to ensure the equivalence of the two groups (see Table 2).

Table 2 The scores for the pre-test individual skills ISWG and group skills GSWG scales for the two groups

	Group	*N*	*M*	*SD*	*t*-value	Significance
Individual skills	Control	38	21.5	4.60	0.72	Insignificant
	Experimental	35	20.8	3.58		
Grouping skills	Control	38	18.4	4.3	0.38	Insignificant
	Experimental	35	18.5	4.2		

Note. *df* = 71; *t*-value of table = 2.63.

The IPAS experiment required eight weeks for application. At the beginning of the lessons, the IPAS was explained, the rules were clarified, and the design figures and task papers were handed over to the experimental group students. In addition, the two scales and the practical performance test were applied to both groups after treatment using the inverted cards and the teacher's evaluation of the performance accuracy. Finally, the data were collected and the findings were statistically analysed.

Results

To test the study hypotheses, the *t*-test was applied to the two samples.

To test the first hypothesis, the mean (*M*), standard deviation (*SD*) and *t*-value of the students' scores for the ISWG of the experimental and the control group are illustrated in Table 3.

Table 3 The scores for the ISWG for the experimental and control groups

Sample	*N*	*M*	*SD*	*t*-value	Significance
Control	38	22.6	3.88	5.7	0.001*
Experimental	35	27.1	2.59		

Note. *df* = 71; *t*-tabular value = 2.63, *$p < .01$.

Table 3 indicates that the *t*-value (5.7) was greater than the *t*-tabular value. Therefore, the *t*-value is statistically significant at (0.01). Accordingly, the difference between the two means is statistically significant in favour of the experimental group. This may be credited to the effect of IPAS through which the experimental group has learned. Hence, the first hypothesis is confirmed.

To test the second hypothesis, the mean (*M*), standard deviation (*SD*) and *t*-value of the students' scores for the GSWG for the experimental and the control groups are illustrated in Table 4.

Table 4 The scores for the GSWG for the experimental and control groups

Sample	*N*	*M*	*SD*	*t*-value	Significance
Control	38	22.1	4.6	6.63	0.001*
Experimental	35	27.8	2.3		

Note. *df* = 71; *t*-tabular value 2.63, *$p < .01$.

Table 4 indicates that the *t*-value (6.63) was greater than the *t*-tabular value. Therefore, the *t*-value is statistically significant at (0.01). This may be credited to the effect of IPAS through which the experimental group was taught the course. Accordingly, the difference between the two means is statistically significant in favour of the experimental group. Hence, the second hypothesis is confirmed.

To test the third hypothesis, the mean (*M*), standard deviation (*SD*) and *t*-value of the students' scores for the practical performance for the experimental and the control groups are illustrated in Table 5.

Table 5 The scores for the practical performance test for the experimental and control groups

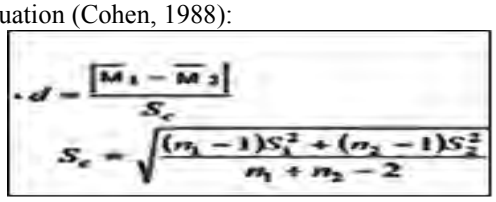
Sample	*N*	*M*	*SD*	*t*-value	Significance
Control	38	9.1	1.48	8.9	0.001*
Experimental	35	12.5	1.73		

Note. *df* = 71; *t*-tabular value 2.63, *$p < .01$.

Table 5 indicates that the *t*-value is (8.9). Therefore, the *t*-value is statistically significant at (0.01). This may be credited to the effect of IPAS through which the experimental group was taught, so the difference between the two means is statistically significant in favour of the experimental group students. Hence, the third hypothesis is confirmed.

To verify the effectiveness of IPAS, the value of the coefficient effect (*d*) was calculated in terms

of the means and standards by using the following equation (Cohen, 1988):



Cohen explains the value of effect size (d) as follows: $0.2 \leq d \leq 0.49$ is a small effect; $0.5 \leq d \leq 0.79$ is a medium effect, and $0.8 \leq d$ is a large effect. Table 6 shows the calculated data of (d) value in the post-test of measurement.

Table 6 The value of coefficient effect (d) for the research variables

Independent variable	Dependent variables	M_1	M_2	s^1	s^2	d-value	Effect
IPAS	ISWG	27.1	22.6	2.59	3.88	1.37	Very large
	GSWG	27.8	22.1	2.32	4.6	1.58	Very large
	Practical performance	12.5	9.1	1.73	1.48	2.1	Very large

Note. $n_1 = 34$, $n_2 = 37$. M_1 is the mean of experimental group; M_2 is the mean of control group.

Table 6 indicates that the value of (d) was 1.37, 1.58 and 2.1 respectively, and it was even greater than Cohen's value for the large effect size (0.8). Therefore, the effect of the IPAS on developing students' individual skills, group skills and practical performance is great.

Subsequently, the effect of the IPAS on developing the three variables of the study was most evident in the practical performance, group skills, and individual skills, thus answering the second research question: How can the IPAS be effective?

To test the fourth hypothesis, the mean, standard deviation and t-value of the experimental group students' scores are illustrated in Table 7.

Table 7 The scores for pre- and post-test of ISWG for the experimental group

Test	N	M	SD	t-value	Significance
Pre-test	35	20.8	3.59	8.36	0.001*
Post-test	35	27.1	2.59		

Note. $df = 68$; t-tabular value 2.62, $*p < .01$.

Table 7 indicates that the t-value is (8.36), which is greater than the t-tabular value, revealing that the t-value is statistically significant at (0.01). Accordingly, the difference between the two means of the experimental group students' scores for the ISWG is statistically significant in favour for the post-test. Hence, the fourth hypothesis is confirmed.

To test the fifth hypothesis, the mean, standard deviation and t-value of the experimental group students' pre- and post-test scores are illustrated in Table 8.

Table 8 The scores for pre- and post-test for the GSWG for the experimental group

Test	N	M	SD	t-value	Significance
Pre-test	35	18.5	4.32	11.44	0.001*
Post-test	35	27.8	2.28		

Note. $df = 68$; t-tabular value 2.7, $*p < .01$.

Table 8 indicates that the t-value is (11.44). The t-value is thus statistically significant at (0.01). Accordingly, the difference between the two means of the experimental group students' scores for the GSWG scale is statistically significant in favour of the post-test. Hence, the fifth hypothesis is confirmed.

Discussion

The Effect of IPAS on Improving the ISWG

Descriptive data show that the individual skills of the students who were taught using IPAS, have improved. This may be attributed to the fact that IPAS encourages students within the experimental group to individually think about the scientific content and the quality of performance in accordance with usage/evaluation standards, which give an ideal image of the quality of work. Moreover, this strategy trains students to be objective and set aside their subjectivity to make unwavering decisions and provide unique desired feedback for the performance of their colleague who feels more confident and takes responsibility for his/her learning. This conforms with Chiang et al. (2011), Khedr et al. (2011) and Spiller (2012) who emphasise the necessity of providing criteria for learning excellence. In this context, the student could arrive at a conception of judgement and understand how teacher and peers evaluate their own learning to improve performance, which is consistent with the argument of Falchikov (1995). Accordingly, IPAS is not merely a method of evaluation, but rather a strategy of learning, which agrees with the arguments by Al-Sayed (2014), Chen (2010) and Yang

et al. (2006).

In addition, this improvement may be attributed to the full participation and the positive role of each student in the team, whether through discussion and interaction of all the members of the team, or through providing collective evaluation and feedback for the performing student. Furthermore, individual skills have been emphasised when employing IPAS; that is, the student who exerts efforts within the group receives individual good evaluations which increase motivation and engagement, promote personal responsibility and develop self-confidence; all of which were not available for the control group students. This is consistent with the arguments by Adeyemi (2012), Panadero et al. (2018), Prins et al. (2005) and Spiller (2012).

The Effect of IPAS on Improving the GSWG

Descriptive data show that the group skills of the students who were taught using IPAS have improved. The reason may be the fact that IPAS guarantees that students within groups exert efforts and spend time to accomplish given evaluating tasks. IPAS also guarantees the commitment of those students to the accomplishment of the assigned tasks within the team – whether through preparing the presentation materials or evaluating. In such a manner, students learn through their active participation in performative and cognitive tasks, evaluating themselves, or being evaluated by their peers. Moreover, the members of each group share a willingness to succeed in their assigned tasks and develop academic, performative and social skills. This seems to agree with findings in studies by Bulu and Yildirim (2008), Burks (2004), Fuchs and Fuchs (2005), Hall and Stegila (2003), Hwang et al. (2014) and Mak and Coniam (2008).

Furthermore, the reason for this improvement may be the fact that the students in the experimental group learned more through teamwork than through individual tasks. They also learned through collective thinking in favour of the success of the whole group in such a way that every student was actively involved in learning and solving the problems of the team in order to accomplish the goals. Moreover, they learned through collaborative response to social situations, so they felt more confident and took responsibility for the task. It is obvious that the strategy has promoted the students' self-efficiency and that the collaborative learning context has improved the activity and interaction. The fixed group formation brought about coherence and sympathy and improved inspiration among students within groups; that is, employing IPAS has resulted in shortening the social distance and promoting confidence among peers; all of which were not available to the control group students as posited by Adeyemi (2012), Prins et al. (2005) and Yang et al. (2006).

The Effect of IPAS on Improving the Practical Performance

Descriptive data show that the practical performance of the students who were taught through IPAS has improved. This may be attributed to the students in the experimental group adhering to the instructions and rules of IPAS from the beginning to the end. Since most human behaviour is acquired observationally through modelling, students have benefited from observing their colleague's performance and from checking the usage/evaluation criteria which provided them with an ideal image of the expected performance. In so doing, they compared the actual performance of their colleague with the usage criteria to reach a real evaluation of their colleague's actual performance. In this sense, the application of the IPAS has promoted learning performance and skills in such a way that would provide the necessary hands-on training in practical courses rather than simply focusing on the theoretical aspects. This proved to be consistent with studies by Abuel-Magd (2000), Dakrory (2001) and Nitko (1996).

Moreover, repeating the performance six times on the same equipment in each session has resulted in the experimental group students' mastering of these skills. Accordingly, students have been given six opportunities to practical performance; in five instances they observed their colleagues performing and provided feedback, and in one instance they performed the actions and received feedback from their peers. The students' enthusiasm for the performance reduced mistakes and the supportive learning environment reduced students' feelings of confusion and anxiety during the performance; all of which were not available to the control group students. This is consistent with such studies by Al-Motawa and Al-Tagawy (2002), El-Harby (2011), Hall and Stegila (2003) and Kasasbeh (2007).

Conclusion

In this study we adopted a new concept, namely IPAS, which has, to the best of our knowledge, not previously been used in Arabic studies. We have been using IPAS in teaching since 2014/2015. IPAS is much more elaborate than self-assessment, peer tutoring and peer assessment. First of all, IPAS places much prominence on the interactive role. It emphasises the positivity and mutuality of learning in accordance with the principles of collaborative learning and social constructivism. Furthermore, students are able to evaluate their learning and develop individual skills while assessing or being assessed. During this process those who are assessing focus on what the others are performing and how they perform. They also receive accurate judgements and varied feedbacks which are based on criteria set by their peers and which help them to

improve their learning. Such feedback guarantees the interactive role of evaluators during the learning process, which increases their motivation and self-esteem. In addition, it is worth mentioning that the exchange of roles necessarily leads to interactivity.

Moreover, IPAS is effective in developing different skills since the students' roles are not restricted solely to evaluation, but rather includes assessment of their peers' performance, from which they also learn. Hence, they are considered as observers while another student uses the equipment. In such a way, peers are given the opportunity to learn from the performer's actions and mistakes. This, in turn, develops the students' ability to individually judge each student in the group and to collectively judge the group as a whole.

Notes

ii. DATES: Received: 17 December 2017; Revised: 25 July 2019; Accepted: 26 September 2019; Published: 31 May 2020.

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