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DIFFERENTIAL EFFECTS OF FEEDBACK TYPES ON THE IMPROVEMENT OF STUDENTS' PERFORMANCE IN SCHOOL-BASED ASSESSMENT

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ABSTRACT: *The study investigated the differential effects of performance feedback types on the improvement of students' performance in school-based assessment. It used 145 senior secondary two (SS II) students from five secondary schools in Emohua Local Government Area of Rivers State, Nigeria. The sample was drawn via a purposive sampling technique and assigned to four experimental groups and one control group. The groups were specific positive feedback, (SPF) specific negative feedback (SNF), non-specific negative feedback (NSNF), non-specific positive feedback (NSPF) and no feedback (NF, control). The study took a 5x2 between subjects factorial experimental research design by pretest post test technique. Two research questions and two null hypotheses guided the conduct of the study. Two equivalent instruments used for data collection were chemistry problem solving test form one and form two (i.e CPST1 and CPST2). They are essay itemed and their equivalent form reliability coefficient was 0.79. The inter-rater and Alpha coefficients for CPST1 were 0.68 and 0.73 respectively, while that of CPST2 were 0.71 and 0.76 respectively. Data collected were analysed using mean, standard deviation, paired t-test two-way analysis of covariance and pair wise comparison where necessary. The results obtained after data analysis showed a significant main effects for feedback types, gender and interaction between feedback types and gender. It was also found that SPF, SNF, NSNF and NSPF had significant effects, while NF had insignificant effects on the improvement of students' performance in solving problems in chemistry. Based on the results, it was recommended among all that teachers should endeavour to use SPF in the appropriate ratio to SNF while assessing students performance.*

KEYWORDS*: School-based assessment, specific positive feedback, specific negative feedback, non-specific negative feedback, non-specific positive feedback.*

INTRODUCTION

School-based assessment is an assessment which is embedded in the teaching learning process, it is conducted by the class/subject teachers. It allows the teacher to collect series of students' performance over a period of time, which help the teacher to determine the strength and

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weaknesses of the students even his/her own teaching effectiveness and efficiency. School-Based Assessment (SBA) creates room for the teachers to give immediate and constructive feedback to students. It is an instrument for change in students' performance since it stimulates continuous evaluation, adjustment of the teaching and learning programmes and complements external examinations. Hence SBA is a formative assessment while external examination is summative in nature. SBA as a formative test is supposed to help the teacher provide formative feedback. Joe (2011:50) stated that formative feedback enables students to continue learning if learning is progressing well or to correct errors or relearn skills if learning has not been satisfactory in order to continue learning.

Furthermore, it is expected that SBA will provide constructive feedback which will aid students to achieve well in subsequent tests and/or external examinations like the senior school certificate examinations and unified tertiary matriculation examinations etc. That is why Njabili, Abedi, Magesse and Kalile (2005) opined that the key role of assessment is to provide authentic and meaningful feedback for improving students learning, instructional practice and educational options. On the other hand, the students are expected to perform very well in any given subject in both internal and external examination having been exposed to series of SBA in different subjects. Presently, the situation is on the contrary because the students performance in both internal and external examinations including chemistry examination is still very poor below expectation. For instance, it has been observed that some students still fail test even when the questions are repeated. This situation had left many "whys" in the minds of many lovers of education including researchers. Such questions include: what are the factors responsible for students poor academic achievement? In search of these factors many have related it to the students and their reading culture, some relate it to the parents and their parenting styles (Nwankwo 2007) while some others relate it to the teachers and their teaching strategies (Orluwene, 2006).

To support this, Woolfolk, Hughes and Walkup (2008) stated that teachers have been both criticized as ineffective and lauded as the best hope for students. This is because teachers are effective when they make good decisions that lead to actions that promote and improved students performance. Good decisions depend on having good information about students performance while improvement in performance requires assessment and performance feedback. Assessment and awareness of performance levels through authentic and constructive feedback help to motivate and improved performance.

To this end Elliot, Kratochwill, Cook and Travers (2000) stated that effective teachers provide students with appropriate feedback about their work efforts and performances. Indeed, teachers cannot be certain that students have learned unless they perform the behaviour. And once students exhibit a response or performance, it is important that the teacher provides appropriate feedback. To this end, Mcmillan (1997) regarded feedback as the transfer of information from the teacher to the students following an assessment. A good feedback means giving students accurate, detailed information about their performance, specifying what was done well and what needs improvement and how to do it (Elliot et al, 2000). Feedback helps to alert students on their current status and how far they have to go in achieving their goals. This is by pointing out their areas of weaknesses and strengths via obtaining information on the behaviour that were

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performed correctly, incorrect, why they were so and the corrective measures (ways out) to those incorrect ones. Hattie and Timperley (2007) emphasized that the main purpose of feedback is to reduce discrepancies between the current understanding or performance and some desired level of performance or goal. To support thus, Shute (2008) opined that feedback can signal a gap between a current level of performance and some desired level of performances or goals. Again feedback do not only play useful roles to the students but also to the teacher by guiding their own instructional planning and subsequent activities with the students. It also help the teachers to identify their strength and weaknesses, and inform them of the efficiency of the teaching methods and strategies used.

Based on the above descriptions of feedback it could be infer that besides having specific goals and creating supportive social relationships there are other factors that make goal setting in the classroom effective of which feedback may be one. Feedback is seen as an important tool to enhance learning, for instance Hattie (1999) described feedback as one of the influential factors in learning, as powerful as the quality and quantity of instructions. Moreno (2004) regarded feedback as crucial factor to improving knowledge and skill acquisition.
Obviously, feedback is helpful only when it is effective. And effective feedback has the following characteristics as outline in Wiggins cited in Mcmillan (1997 p.124).

1. Relates performance to standards
2. Indicates progress
3. Indicates corrective procedures
4. Is given frequently and immediately
5. Is specific and descriptive
6. Focuses on key errors.

In support of this, Shute (2008) found that feedback that is effective in enhancing learning is specific, clear, elaborated and relatively simple. And that it reduces uncertainty between performance and goals, and focuses on the task.

Having known the characteristics and importance of effective feedback in enhancing learning, some conclusions about the type of feedback used in our secondary schools today mostly at the secondary school levels are alarming. Firstly Kluger and DeNisi (1996) found that about one third of feedback interventions used by teachers actually decreases learning. Again that feedback in the classroom is rather rare. This is because once students are assessed, appropriate feedback from the teacher to the students is necessary, but some teachers do not give the students the feedback of their performance after assessing them but Elliot et al (2000) stated that closely associated with providing feedback is assessing students performance. Supporting this, Pauli (2010) found a low frequency of feedback intervention. They also observed that teachers for example ask new questions or explain further without explicitly reviewing the students responses/performance.

Research literature, as well as common experiences has confirmed that when feedback is used in the classroom, it is in most cases non-specific such as praise and grading like “good”, “that’s right”, excellent, 15% as the case may be. For instance, Pauli (2010) found that the most

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common feedback is praise as in well done. Voerman Meijer, Korthagen and Simons (2011) found that the frequency of the use of feedback intervention was highest with non-specific positive followed by non-specific negative feedbacks. These types of feedback used underestimate the power and role of feedback to simply confirming the correctness of a response that is whether it is right or wrong. Feedback of this nature is only part of what students need to improve their learning. As Mcmillan (1997) stated that students also need to know why their performance was graded as it was and what corrective procedures if any, are needed to improve their performance. It is helpful to tell students why they are wrong so that they can learn more appropriate strategies, without such feedback they are likely to make the same mistake again (Woolfolk et al, 2008).

All things being equal, in this study feedback will be regarded as information from the teacher about performances of the students that serve as means of achieving self-corrections or modification of incorrect performance while feedback intervention is creating positive or negative evaluation of students' performance in relation to the desired goal.

There are different types of feedback interventions which activate different achievement goals and different levels of performances among students. In this study only the effects of four feedback interventions were considered. That is the effect of specific positive feedback intervention, specific negative feedback intervention, non-specific positive feedback intervention, and non-specific negative feedback intervention. Specific feedback intervention means providing information about the learning goal, with reference to the task. Shute (2008) describe specific feedback as information about the accuracy of particular responses or behaviours. Chase and Houmanfar (2009) regarded specific feedback as indicating why an answer is right or wrong and in their research they found that specific feedback is effective in enhancing learning. Goodman, Hendrikx and Wood (2004 p.248) described specific and effective feedback as including information on the behaviours that were performed incorrectly and how to correct them". This description only considered the incorrect answers instead of considering both correct and incorrect answers.

To this end, it means that there are positive and negative specific feedback intervention. This will be clarified using examples. For instance, after a student had perform a behaiour, the teacher gives her a score of 75%, a praise as in good performance, well done that's correct" or in addition, gives her information relating to why her performance was graded the way it was, points out the areas correct and incorrect answer and the correction procedures for the incorrect answer what the teacher had done is specific feedback. Then non-specific feedback does not describe the correct and incorrect answer in relation to why they are so but only informs students you are right or wrong. Thus Mcmillan (1997) stated that feedback intervention that does not specify in exact terms the nature of the performance is non-specific type. That means the students are not informed on why they did well or poor and even the corrective procedure but were only informed on how they performed like you scored 75%, well done, you are incorrect or you did poorly. This type of feedback intervention is not effective and cannot enhance learning as Howie, Sy. Ford and Vicente (2000) found that lack of information in the feedback intervention explained the low power of feedback interventions. Supporting this, Hattie and Timperley (2007) stated that lack of specific information is one of the reasons for low

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achievement in the classroom. Pauli (2010), reported that low achievement among students results from the frequent application of non-specific feedback intervention as in well done" and "that's my girl or boy" incorrect and wrong response.

A critical observation on the above descriptions indicated that both the specific and non-specific feedback interventions have positive and negative forms. Positive feedback is a way of teaching students to identity the appropriate behaviour they exhibited (Sigler and Aamidor, 2005) while negative feedback is a way of pointing out the inappropriate behaviour the students performed. Based on that positive feedback is a way of showing support, encouragement, acceptance or appreciation while negative feedback is a way of showing disapproval, rejection or even sarcasm. All the types of feedback intervention are clarified using an illustration. For instance a teacher evaluates the responses from four students by giving;

1) Student A, a score say 75% or a praise as in well done, "good performance etc in addition to information relating to why and how the performance was graded like that. For example "well done, you have shown the way you arrived at the final answer". You are doing well because you followed the steps in order.
2) Student B "good performance or 80%" without description on how, and why the score was like that and even the corrective procedure
3) Student C "that's incorrect or poor performance or 5%" you did poorly because you fail to order your work step by step which is required of you. And you fail to show how you arrive at the final answer.
4) Student D "that's incorrect or wrong answer" 5% or poor job without description on how and why the answer was wrong or the performance was poor.

Following the above illustrations the feedback intervention used for students A, B, C and D are specific positive feedback, non-specific positive feedback, specific negative feedback and non-specific negative feedback interventions respectively. These different feedback interventions can have different learning enhancing effect on the students. This is because Chase and Houmanfar (2009) reported that specific feedback is effective in enhancing learning than the non-specific feedback. And Voerman, et al (2011) stated that both positive and negative feedback can enhance learning as long as they provide specific information but that this happen at different levels.

Based on that, it is the researchers' hunch that there will be differential effects of these feedback interventions in improving performance. Again literature search indicated that little or no research of this nature has been carried out in Emohua Local Government Area of Rivers State, Nigeria.

Then against this background that the researchers found it appropriate to carry out a study on the differential effects of feedback interventions on students performance in solving problems in chemistry. It is hopeful that if the effect of feedback interventions on students' performance is verified, it will go a long way to help in the production of sound chemistry students from secondary levels into the tertiary levels. Again it will also help to increase our level of technology-based production. Finally the identification of the most effective feedback

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intervention will enhance and encourage its use in schools by the teachers. And students will benefit from the potency of the intervention hence, their performance in chemistry in internal and external examination will be improve upon.

Aim and Objectives

The aim of the study was to determine the differential effects of feedback intervention on students' performance in chemistry. In specific terms, the study determined the following whether:

1. The different feedback interventions, specific positive, specific negative non-specific positive, non-specific negative, and no-feedback intervention are effective in enhancing students' performance in solving problems in chemistry as determined by their pre-and post test mean scores.
2. There are differential effects of the feedback interventions types on the improvement of students' performance in solving problems in chemistry as determined by their post test mean score based on their gender.

To guide the achievement of the objectives, the following research questions were formulated.

1. How effective are the different feedback interventions (specific positive, specific negative, non-specific positive, non-specific negative and no-feedback on students' performance in solving problems in chemistry as determined by their pre-and post test mean scores?
2. The effectiveness of the feedback interventions (specific positive, specific negative, non-specific positive, non-specific negative and no-feedback) on students performance in chemistry do not differ significantly based on their gender?

However, to further achieve the objectives of this study, the following null hypotheses tested at 0.05 level of significance were stated.

1) Feedback interventions types (SPF, SNF, NSNF, NSPF and NF) do not have significant effects on the improvement of students' performance in solving problems in chemistry as determined by their pre-and post test mean scores.
2) The effects of the feedback intervention types (SPF, SNF, NSNF, NSPF and NF) on the improvement of students' performance in solving problems in chemistry do not differ significantly based on their gender.

METHOD

The study adopted a 5x2 between-groups subject factorial experimental research design by pretest-posttest technique. This is because it involved five levels of feedback intervention types (treatment) and two levels of gender as seen in table 1. A sample of 145 senior secondary two (SS II) students (including males and females) was used for the study. The sample was composed purposively from five randomly selected co-educational secondary schools in Emohua Local Government Area of Rivers State, Nigeria. In each school, an intact chemistry class was used to represent a given group hence a total of five intact chemistry classes were used, they represent the four experimental groups and one control group.

The five groups of students received the same pretest and post-test but were differentially treated with different feedback interventions types as shown in table 1.

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Table 1: An illustration of a 5x2 factorial design on the effects of feedback types on the improvement of students' performance based on their gender.

Randomly assigned group	Pretest	Feedback types	Gender	Post test	Number
A	T_1	SPF	M	T_2	14
B	T_1	SNF	M	T_2	19
C	T_1	NSPF	M	T_2	16
D	T_1	NSNF	M	T_2	15
E	T_1	NF	M	T_2	10
A	T_1	SPF	F	T_2	10
B	T_1	SNF	F	T_2	16
C	T_1	NSPF	F	T_2	11
D	T_1	NSNF	F	T_2	20
E	T_1	NF	F	T_2	11

T_1 = pretest on the test form 1, T_2 = post-test on the test form 2
SPF = specific positive feedback, NSPF = non-specific positive feedback,
SNF = specific negative feedback, NSNF = non-specific negative feedback
NF = no feedback
M and F = male and female respectively

Furthermore, two equivalent/parallel instruments were used for data collection. They are chemistry problem solving test form 1 (CPST1) and form 2 (CPST2). They are made up of five essay questions derived from the same content areas such as gas law, mass-volume relationship and electrolysis. The items are multipled-scored with each item having a maximum of 10 marks and minimum of zero mark (0). Hence both forms of CPST had a maximum of 50 marks and zero (0) mark.

The two forms of the instrument CPST1 and CPST2 were trial tested on 40 senior secondary II students outside the five randomly selected schools for the study. The data collected were subjected to equivalent, inter-scorer and Cronbach Alpha method of determining reliability. Where a reliability coefficient of 0.79 indicating the coefficient of equivalence between the two forms of test was obtained. The inter-rater and Alpha coefficients for CPST1 were 0.68 and 0.73 respectively while that of CPST2 are 0.71 and 0.76 respectively.

The pretest was administered to 145 SS II students using the CPST1 by direct delivery approach. Then during the scoring of the responses of the students on the pretest, the treatment took place using the various feedback intervention types.

Group A - specific positive feedback SPF
Group B - specific negative feedback SNF
Group C - Non-specific negative feedback NSNF
Group D - Non-specific positive feedback NSPF
Group E - no feedback NF

That means, for the experimental groups scoring was done alongside with specific and non-specific negative or positive comments on, how and why the work was either good or bad. Then

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after the students answer scripts were given back to them, while to the control group no scoring was done and their scripts were not also given back to them. The treatment took about three weeks thereafter the post test was administered to the same 145 senior secondary (SS II) students using the CPST2. Finally, after the post-test administration, its scoring and collation, the data collected were analyzed using mean, standard deviation paired t-test two-way analysis of covariance (ANCOVA) and pair wise comparison where necessary.

RESULTS

Research question one was answered using mean and standard deviation while its corresponding null hypothesis one was tested, using paired t-test statistics. The results obtained are presented in table 2.

Table 2: Paired t-test on the effect of feedback intervention types on students improvement in solving problems in chemistry.

Group	Test	N	Mean	SD	Paired diff. mean	Paired diff. SD	DF	t-cal	Sign
SPF	Post	24	28.17	4.17	6.42	3.83	23	8.20	0.000
	Pre	24	21.75	4.22					
SNF	Post	38	29.37	5.92	5.76	5.06	37	7.02	0.000
	Pre	38	23.61	4.75					
NSNF	Post	35	24.37	5.25	1.63	1.77	34	5.45	0.000
	Pre	35	22.74	5.12					
NSPF	Post	27	27.00	9.33	3.30	1.94	26	8.84	0.000
	Pre	27	23.70	7.15					
NF	Post	21	24.67	4.18	0.714	2.45	20	1.34	0.197
	Pre	21	23.95	5.12					

Table 2 shows that the group treated with specific positive feedback (SPF) are 24 in number. And that their pretest and post mean scores are 21.75 and 28.17 respectively while the standard deviation of their scores are 4.22 and 4.17 respectively. Their mean scores gave a paired mean difference of 6.42 and a standard deviation of 3.83, which yielded a significant t-value of 8.20 when tested with paired t-test.

For the group treated with specific negative feedback SNF, they are 38 in number and their pretest and post mean scores are 23.61 and 29.37 while the standard deviation of their scores are 4.75 and 5.92 respectively. Based on their pretest and post test mean score, the paired difference mean of 5.92 and the standard deviation of 5.06 were obtained, which yielded a significant t-value of 7.02. Furthermore, the group treated with non-specific negative feedback were 35 in number. Their pretest and post test mean scores were 22.74 and 24.37 respectively while the standard deviation of their scores were 5.12 and 5.25 respectively. It was also shown that the paired difference mean of 1.63 and the standard deviation of 1.77 yielded a significant t-value of 5.45. Again table 2 revealed that the group treated with non-specific positive feedback were 27 in number. Their pretest and posttest mean scores are 23.70 and 27.00 respectively while the standard deviations of their scores were 7.15 and 9.33 respectively. Then the paired difference

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mean of 3.30 and the standard deviation of 1.94 yielded a significant t-value of 8.84. Finally table 2 showed that the control group (NF) which received no feedback intervention had the mean scores of 23.95 and 24.67 respectively for their pretest and post-test respectively. The standard deviation of their scores were 5.12 and 4.18 respectively while the paired difference mean and standard deviation of 0.714 and 2.45 respectively, yielded an insignificant t-value of 1.34.

To answer research question 2 mean and standard deviation were used, while in testing the null hypothesis 2, 2-way ANCOVA was used. The results obtained were presented in tables 3 and 4 respectively.

Table 3: Mean and standard deviation of students' performance level by feedback types and gender

Group	Gender	N	Mean	SD
SPF	Female	13	27.69	4.29
	Male	11	28.73	4.15
	Total	**24**	**28.17**	**4.17**
SNF	Female	17	25.76	3.74
	Male	21	32.29	5.82
	Total	**38**	**29.37**	**5.92**
NSNF	Female	20	24.10	4.66
	Male	15	24.73	6.10
	Total	**35**	**24.37**	**5.25**
NSPF	Female	11	22.73	7.36
	Male	16	29.94	4.96
	Total	**27**	**27.00**	**7.33**
NF	Female	10	24.10	5.70
	Male	11	25.18	2.23
	Total	**21**	**24.67**	**4.18**
Total	Female	71	24.94	4.75
	Male	74	28.66	6.30

Results in table 3 revealed that in all the five groups the males outperformed their female counterparts based on the post test mean scores. For instance for NPF their mean scores are 28.73 and 27.69 respectively for the males and females, for NSF their mean scores are 32.29 and 25.76 respectively for males and females. In the NSNF group the male had 24.73 while the female had 24.10, for NSPF group the male had 29.94 while the females had 22.73. Finally, in the control group the males had the mean score of 25.18 while the female had 24.10. Generally when all the students were group into male and female irrespective of their treatment groups, the males had 28.66 while the females had 24.94. Considering their performance based on their groups, table 3 revealed that the group treated with SNF had the highest mean score of 29.37 followed by SPF group ($\bar{x}$ = 28.17), NSPF group ($\bar{x}$ = 27.00), NF group ($\bar{x}$ = 24.67) and then NSNF group with the mean score 24.37 in all.

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However the significance of the differences found in the mean scores of the various groups and gender are shown in table 4.

Table 4: Summary of 2-way ANCOVA on students performance based on their feedback types and gender.

Sources of variation	Type II sum of squares	df	Mean square	F	Sig
Corrected model	4036.74	10	403.67	57.26	0.000
Intercept	277.811	1	277.81	39.41	0.000
Pretest score	2684.07	1		380.76	0.000
Groups	590.48	4		20.94	0.000
Gender	104.84	1		14.87	0.000
Group & gender	370.97	4		13.15	0.000
Error	944.61	134			
Total	109448.00	145			
Corrected total	4981.35	144			

a R squared = 0.810 adjusted R squared = 796

Results in table 4 revealed that a significant f-value (20.94) for feedback types (groups(was obtained. This indicated that the students' performance level improved differentially among the five groups. However the direction of the significant difference was shown in table 5. Table 4 also revealed that the calculated f-value (14.87) for gender was significant. This is an indication that the male and female students performance level significantly improved differentially. Finally, table 4 revealed that the calculated f-value (13.15) for interaction effect between feedback types and gender was also significant. This is an indication that the students performance in chemistry problems Test varied across groups and gender as seen in the figure 1.

Figure 1: Estimated marginal means of post scores showing the interaction between feedback intervention types (groups) and gender.

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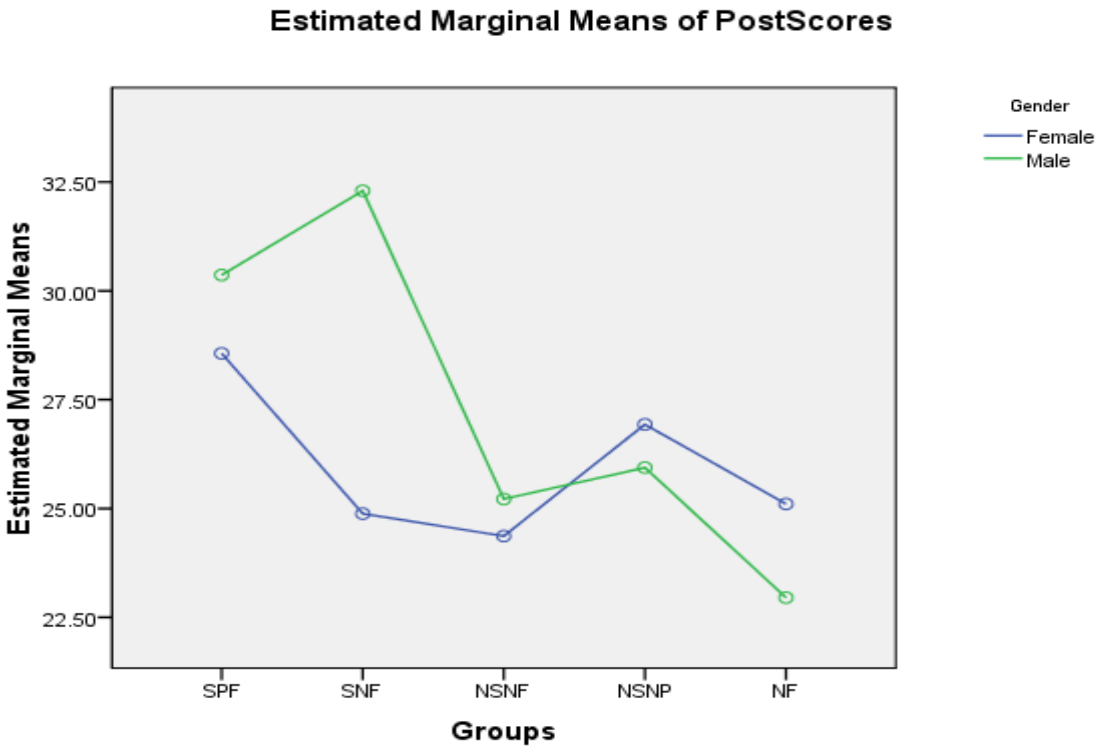

Figure 1 shows that the lines representing the scores of the male and female students in the various groups were not parallel but interacted. The level of performance is greater for male as the line for male slopes upward while that for female slopes downward hence the interaction effect.

Table 5: Pair-wise comparison showing the direction of the significant difference among the five groups.

Compared groups	Mean difference	Sig
SPF VS SNF	0.873	0.215
SPF VS NSNF	4.671*	0.000
SPF VS NSPF	3.028*	0.000
SPF VS NF	5.434*	0.000
SNF VS NSNF	3.798*	0.000
SNF VS NSNF	2.155*	0.002
SNF VS NF	4.561*	0.000
NSNF VS NSPF	1.641*	0.019
NSNF VS NF	0.763	0.303
NSPF VS NF	2.406*	0.002

* = mean difference is significant at 0.05

Result in table 5 revealed that significant mean difference was found in almost all the groups compared except for the comparisons between SPF versus SNF groups and NSNF against NF groups which yielded insignificant mean differences.

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DISCUSSION OF THE FINDINGS

Effects of feedback types on students' improvement in solving chemistry problems

The investigation established that SPF, SNF NSNF and NSPF were significantly effective in improving students' performance in solving problems in chemistry while NF had insignificant effect. This is an indication that the students performed better in their posttest than in their pretest. This finding is expected due to the fact that the main purpose of feedback is to reduce the discrepancies between current performance and the standard performance by providing information on what to do to close the gap. This finding indicated that students perform better or reached their goal when at least a little feedback on the previous performance is given. That is effective feedback is directional and guidance- oriented for future performance and aimed at improving learning. This finding is in line with the assertion made by Moreno (2004) that feedback is a crucial factor to improving knowledge and skill acquisition.

Based on the finding, one can deduced that the group treated with SPF, SNF, NSNF, NSPF had reduced level of uncertainty between what they had done and what is expected of them, than those treated with NF whose uncertainty level may had even increased instead of reducing. High level of uncertainty is detrimental, and may lead to confusion instead of clarity thereby reducing performance.

Finally, one can deduced that SPF, SNF, NSNF and NSPF interventions informed the students about the gaps between their present performance and the standard performance while the NF group was not informed. So most of the students in the SPF, SNF, NSNF and NSNP may have not repeated their errors in the pretest during the post test while the NF group may have done so.

Differential effects of feedback types on students' improvement in solving problems in chemistry

The investigation also established that a significant difference was found on the effects of the feedback (SPF, SNF, NSNF, NSPF and NF) types on the improvement of students performance in solving chemistry problems. Specifically SNF had the highest effect followed by SPF, NSPF, and then NF and NSNF. This finding is expected because effective feedback is informative, directives and guidance-oriented towards future performance. That is why Wiggin in Mcmillian (1997) stated that effective feedback relates performance to standards, indicates corrective measures, indicates progress and focuses on the key errors. That is SNF focuses on the key errors and provides corrective measures which help to highly equipped the students reduced their levels of uncertainty between their present status quo and the desired/standard performance more than any other feedback types in the study. Again this finding could be an indication that SNF is specific and more elaborate than SPF since it had informed the students about what needs to be accomplished to attain the desired level of performance more than the other feedback types.

On the other hand, a critical examination of the findings of the study revealed that the students treated with specific feedback (SNF and SPF) types improved significantly better than those treated with non-specific feedback (NSNF and NSPF) types. This may be attributed to the fact that the non-specific feedback groups lack information, on how and why, the already achieved level and even what more has to be done to meet the standard performance. This finding is in

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support of Chase and Houmanfar (2007) who found that specific feedback is effective in enhancing learning. And also in support of the findings of Pauli (2010) and Hattie and Timperley (2007) that lack of specific information is one of the reasons for low achievement in the classroom.

Specifically, it was revealed that those treated with NSPF significantly outperformed those treated with NSNF. This may be that non-specific negative feedback impose threat to the students self-esteem, self-efficacy and even their level of confidence whereby confusion may set in that may inturn reduced performance. This is because non-specific negative feedback is away of showing disapproval or sarcasm to the students responses which may discourage and frustrate them thereby impeding learning while the non-specific positive feedback is away showing appreciation, support and somewhat encouragement to the students' responses which may have motivated them to perform more than those in NSNF group who may have been demoralized. Demoralized students may withdrawal from the task like Hattie and Timperley (2007) rightly noted that non-specific negative feedback interventions can lead to task avoidance among the students.

Finally, the study also established that the students in SPF, SNF, and NSPF experimental groups improved significantly better than their counterparts in the NF group (control). While with NSNF, there was no significant difference in their level of improvements and that of the NF group. This findings is an indication, that the level of uncertainty created by NSNF do not differ significantly with that created by NF intervention. Based on that the students in the groups may have repeated their mistakes during the posttest which now affected them negatively. This finding is a prove that the sense of direction a student may have is not enough to help reached the goal until adequate feedback is given.

Gender influence on the effect of feedback intervention types on students' improvement in solving problems in chemistry

The investigation established as in tables 3 and 4 that male students significantly outperformed the female students in almost all the groups. This findings may be attributed to fact that, the males are more incline to problems that involve calculation than their female counterparts. Again, it could be that most parents give their males more opportunity at home to read than the females who may be involved in much domestic chores. However, this finding is not expected in this era of gender equity where the both gender are expected to perform comparably equal. Well, it could be that the females may have not fully arrived in every aspect including performance in problem involving calculation due to their parental attitude towards gender role.

IMPLICATIONS OF THE FINDINGS

The findings of this study have some implications for the teachers and the lovers of education. For instance one of the findings indicated that SPF, SNF, NSNF and NSPF significantly improved the performances of the students as measured by their pretest and post test mean scores. This implies that feedback interventions is one of the effective propelling tools that promotes learning and that feedback serve as road map to effective learning. It also implies that

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feedback is a very motivating and energizing tool which have a strong link to students' satisfaction and performance.

Another finding of this study stated that the feedback types have significant differential effects on the improvement of students performances in solving problems in chemistry. This implies that the type of feedback intervention used by a teacher determines the level of improvement the students will acquire in their learning.

In another dimension the study revealed that a significant difference existed between the comparison of the effects of the specific and non-specific feedback types on students improvement in solving problems in chemistry. This implies that specific feedback interventions contain enough information that help the students to acknowledge what is right or wrong in their performances. It also implies that specific feedback intervention is directional and focused while the non-specific feedback is non-directions without a focuses.

Again, the findings that the NSPF group significantly outperformed the NSNF group implies that NSNF causes students to view the feedback they received as useless and also draws their attention away from the task. On the other hand when students receive NSPF, they tend to be overly self critical or self congratulatory which may in turn motivate them. The study also revealed that NF had insignificant improvement on the students' performance solving problems in chemistry. This implies that it is difficult for students to be self aware without feedback from their teacher. This is because feedback from teachers inform the students in ways that will enriched their self-knowledge.

Finally the study revealed that gender significantly influenced the effects of the feedback intervention types on improving students' performance in solving problems in chemistry. This implies that most parents are yet to embrace de-sexism in sharing their domestic chores and planning for their children's education.

RECOMMENDATIONS

Based on the implications of the findings the researchers made the following recommendations:

1. Teachers should endeavour to use specific positive feedback in the appropriate ratio to specific negative feedback while assessing their students' performances. This is because the interplay between SPF and SNF effectively enhanced learning.
2. Teachers should endeavour to apply feedback that matches the specific response, appropriate for the quality of responses.
3. Parents should try to de-emphasis sexism when making plans for their children's education. This is by giving both sex equal attention.
4. Teachers should not only use specific feedback but the one that is elaborate and focused on detecting the discrepancy between the present performance and the standard.
5. Teachers should avoid creating feedback famine. They should realize that students learning without feedback is similar to embarking on a journey without a map or sign post.

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CONCLUSION

Based on the findings from this study, it is concluded that specific feedback types are more influential and rewarding than the non-specific feedback types. Again that effective feedback serve as good road map for subsequent performance, hence it is an information that every student needs to be very effective.

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