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## Developing Skill of Using Feedback in Learning-outcome Assessment for Future Teachers

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**Abstract.** Feedback is an integral part of students' learning-outcome (LO) assessment. To ensure that students understand what they did well and what needs improvement, teachers must give them clear and detailed feedback on their accomplishments and shortcomings. Therefore, in teacher training, it is essential to help Future Teachers (FTs) have the skill of providing and using feedback (feedback skills) in LO assessment (besides skills in teaching, building assessment tools, organizing learning activities, scientific research, ...). This study aims to identify the factors that affect feedback skills in LO assessment of FTs, thereby providing measures to develop this skill in FTs. This study uses a quantitative research method and a questionnaire design as a data collection tool. Simultaneously, the study uses the impact method to assess the FTs' changes in the performance of skills before, during, and after the training process. The results show that the main factors affecting the development of FTs' feedback skills are: classroom experience; feedback culture; pedagogical training; mentorship; confidence. While there are four types of feedback: Feedback about the task; the processing of the task; self-regulation; self as a person. When testing the impact on developing FTs' feedback skills, the results also show the effectiveness of the feedback skills training process based on experiential learning. The process consists of 4 stages: Concrete experience, reflective observation, abstract conceptualization, active experimentation. This study has theoretical and practical implications for educators of pedagogical universities in training feedback skills in LO assessment for teachers and FTs.

**Keywords.** feedback; future teachers; learning outcome; assessment; experiential learning

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## 1. Introduction

Assessment of learning outcomes is the process of assessing a student's proficiency in the skills, knowledge, and competencies required to complete academic tasks. (Mrunal and Manvinder, 2017) confirmed LO assessment is critical in education because it allows teachers, students, and parents to know a student's strengths and weaknesses as well as provides the information needed to improve their learning. However, teachers' feedback on students' LOs is a critical factor for those involved in the assessment to receive these values. (Hardavella & et all., 2017) have proposed, when giving feedback, teachers must keep a few essential points in mind. First of all, feedback should be provided positively and encouragingly. If students feel that the teacher is uninterested in their progress, they may lose interest and motivation to continue their efforts. Second, the feedback needs to provide detailed and authentic opinions about the students' LOs. This helps students better understand what they did well and where to focus on improving. Feedback should also provide suggestions and advice to assist the student in improving their academic performance. Finally, feedback needs to be provided in a complete and timely manner. If students have to wait too long to get a response, they can lose motivation and forget about their strengths and weaknesses. Therefore, teachers should provide prompt feedback so that students can use it to develop their skills further and improve their LOs. As such, feedback on students' LO assessment is critical to helping them better understand their achievement and improve on their weaknesses. By providing positive, detailed, and timely feedback, teachers can help students make great progress in their learning.

Training professional-pedagogical skills for future teachers in pedagogical universities is undoubtedly influential in the career development process. Many universities have conducted training for future teachers in assessment skills. However, in Vietnam, in the context of educational innovation, teachers and future teachers must have the skills of giving feedback to stakeholders about student learning outcomes. This study has the following research questions:

1. What factors affect the effectiveness of future teachers in developing feedback skills? What is the level of influence?
2. What measures will improve the effectiveness of developing future teachers' feedback skills? How to do that?

## 2. Literature Review

### 2.1. Theory of feedback in learning-outcome (LO) assessment

Since the 1970s of the 20th century, there have been many researchs interested in the relationship assessment and education, emphasizing the function of assessment in supporting, regulating and improving the quality of education (assessment for learning). That has led to many studies focusing on feedback in assessment.

Arguing about the function of feedback in assessment, (Joughin, 2009) analyzed the close relationship among learning, feedback, judgment, and classroom assessment. Many authors confirmed that feedback production and reception is the fundamental basis to help teachers and students build effective strategies to

regulate learning activities (Shute & Kim, 2014) (Dolin & et al., 2018) (Winstone & Boud, 2022), thereby improving students' learning (Black & Wiliam, 2018).

Discussing the content of feedback, Many authors confirmed that the feedback is most complete and effective in learning orientation when it shows students both correct results and their errors or limitations, explains the reasons for those and gives specific instructions to help students adjust and improve their learning (Lee, 2011), (Havnes & et al., 2012), (Ní Chróinín D. & Cosgrave C., 2013), (Shute & Kim, 2014), (Dawson & et al., 2019)... confirmed. In addition, feedback should focus on student tasks, especially criteria related to learning objectives (Henderson & Phillips, 2015); (Diefes-Dux, 2019); (Brooks & et al., 2019); and, more importantly, guide students to direct their learning activities in the future (Boud & Molloy, 2013); (Merry & et al., 2013); (Gamlem & Smith, 2013); (Dawson & et al., 2019). In terms of forms, feedback should be expressed as constructive dialogues or discussions, especially when assessing complex objectives at high cognitive levels (Brookhart, 2017); (Tekian & et al., 2017); (Winstone & et al., 2017); (Carless & Boud, 2018), feedback should be informative, specific, easy to understand, but not overly detailed, lengthy, unfocused or commanding, which make students overwhelmed or annoyed (Hargreaves, 2013); (Brookhart, 2017)

Hattie and Timberly have proposed a fairly complete model of feedback in teaching, in which feedback is information generalized from students' current learning outcomes and accompanied by suggestions and guidance to improve those learning outcomes (Hattie & Timperley, 2007). The purpose of feedback is to bridge the gap between the student's recent learning outcomes and the set learning objectives. By providing feedback, students have a clearer understanding of their learning outcomes, form motivation, and develop more effective learning strategies to enhance their learning outcomes under the direction and supervision of the teacher. To promote effective teaching, feedback needs to answer three main questions:

1. *Where am I going?* (What learning objectives are expected of students?): Teachers need to clarify and repeat the learning objectives that students need to achieve according to the requirements of the program or the subject.
2. *How am I going?* (What progress is being made towards the goal?): Teachers need to determine the student's current positions and levels of achievement of their learning objectives.
3. *Where to next?* (What are the activities that need to be undertaken to make better progress?); Teachers give directions for students to improve their learning outcomes to achieve expected objectives, including teachers' suggestions and instructions or specific tasks and requirements that guide students to self-regulate their learning activities to achieve objectives.

The model also identifies four types (levels) of feedback:

1. Feedback about the Task (FT): Feedback focuses on correctness and limitations in task results, accompanied by instructions for students to supplement and adjust information and knowledge, indicating the correct results.
2. Feedback about the Processing of the task (FP): Feedback focuses on the progress and strategies (methods) to process the task (such as metacognitive strategies, learning process, problem research,...), accompanied by instructions

on how to correct mistakes, adjust skills, way to implement the task and choose strategies or techniques when implementing the task.

3. Feedback about self-Regulation (FR): Feedback does not focus on process or task results instead, it requires students to self-assess strategies, processes, and results of the tasks, so that they can make adjustments while implementing the task.

4. Feedback about Self as a person (FS): Feedback focuses on praise or criticism, general blame with no or very little specific information about the process or the results of the task.

Generally, while FS has low effectiveness in supporting learning, FT is suitable for guiding students to supplement their knowledge and improve cognitive competency; FP and FR are quite suitable for directing students to practice competencies in science inquiry, knowledge-skills application and the other (self-study, problem-solving,...). Furthermore, FR also helps to practice self-assessment and self-regulation and strengthen students' confidence in their competencies.

From the perspective of many researchers, it is possible to systematize the basic requirements to ensure effective feedback in improving learning as follows ( (Nitko & Brookhart, 2013); (Henderson & Phillips, 2015); (McMillan, 2021), (Cambridge Assessment International Education, 2018), (Voelkel & et al., 2020); (Heritage, 2021) : Content of feedback focuses on students' expressions related to learning objectives, contains specific, easy-to-understand, and clear information for students to adjust even defines a detailed roadmap to direct students to achieve small objectives towards the big goals; Feedback is suitable for the students that receive (feedback for fairly good students does not need to be too detailed like low-level students, feedback for student groups needs to focus on the group's results instead of individual errors); Avoid praise, criticism in general, judgment, and blame students, not only focus on mistakes and limitations but also emphasize specific expressions of students' effort and progress; Ensure fairness, while ensuring individuality and differentiation, avoiding comparison of achievements between students; At the right time, in time for students to self-regulate (right when students have taken formative assessment and as soon as possible when they have taken summative or summative-based formative assessment).

Through the analysis of roles, purposes, content, method to give feedback, etc., it is necessary to make teachers aware that feedback in teaching activities is an application of system control model theory, in which the feedback is the "rudder/vector" that drives the teaching activities to the correct goals. To avoid the harmful effects of the "trial-error-redo" method, which is still encountered in education, it is necessary to control the teaching activities with adequate and timely feedback through the assessment activity

## **2.2. Skill of using feedback in LO assessment to support teaching and learning**

After conducting an assessment, teachers must use the results of these assessments to make decisions toward one or both purposes: confirming student learning outcomes and supporting and improving teaching and learning activities. Scott A. Scharrel stated "Feedback is an integral part of the educational

process. It provides learners with a comparison of their performance to educational goals to help them achieve or exceed their goals" (Scott , 2012). Skills of providing and using feedback to support teaching and learning are teachers' ability to use assessment results to make informed decisions, to inform, adjust and improve their teaching activities (on the part of teachers themselves) and develop learning activities (on the part of students), to improve the quality of teaching and learning in the next learning period.

Description: When giving and using feedback, teachers need to make flexible and reasonable application of the following factors:

1. Knowledge: teachers need to develop a correct and sufficient awareness of the theoretical basis of feedback, the roles of feedback, and the uses of feedback in supporting teaching and learning activities, besides their basic understanding of the rules of using assessment results to grade students.

2. Skills: teachers need to acquire skills in giving feedback and using them to support teaching and learning activities (based on the instructions in documents (Hattie & Timperley, 2007), (Heritage, 2021), (Walvoord & Anderson, 2010), (Mertler, 2014). Specifically:

- a) From the current assessment results (cause analysis has been done), combined with the analysis of lesson objectives – teaching contents in the next period
- b) Identifying the basic and central problems that exist in students' learning outcomes which can be potentially improved in the next period (including expressions of qualities and competences that have not yet been well achieved)
- c) Setting specific objectives of improvement to be attained (which are fit to students' current levels of qualities and competences and feasible regarding the teaching content that follows)
- d) Proposing supportive solutions:

Supporting students' learning activities: Supportive solutions need to be concretized into several immediate or long-term tasks and requirements that students need to implement in the next learning period. These solutions should be reflected students along with the information about current assessment results.

Supporting teacher's teaching activities: Supportive solutions need to be concretized into immediate adjustments in teaching activities or adjustments planned for the next period (including adjustments in setting learning objectives, building learning content, selecting methods and organizational forms of teaching, designing teaching and assessment activities).

3. Attitudes: teachers are fostered and trained to have a positive and delicate sense of giving feedback, making sure that the assessment is educational and developmental; demonstrating an objective, responsible and cautious attitude when making decisions related to students and the regulation of teaching activities.

### 3. Methodology

#### 3.1. Subjects, context, and time of research

The subjects of the survey and experimental study of the measure are 110 FTs who have trained for bachelor's degrees in Biology Education at Quynhon University, Vietnam. The FTs participating in the study were all in the 4th year of their training course; they had been trained with modules of Theory and Methodology in Biology teaching and had been equipped with basic knowledge of Psychology, Pedagogy, and specialized knowledge in Life Sciences. Experimental contents and measures to develop the skill of using feedback in the learning-outcome assessment are conducted when FTs participate in the module "Assessment in teaching Biology." Experimental time in the years 2019, 2020, and 2021.

**Table 1: Subjects, background, and time of the study**

Experiment round	Class of FTs	Number of FTs	Time of experiment
1	Biology Future Teacher K38, 2015-2019	53	2019
2	Biology Future Teacher K39, 2016-2020	33	2020
3	Biology Future Teacher K40, 2017-2021	24	2021

#### 3.2. How to collect data on factors affecting feedback skills in assessing learning outcomes

The study used questionnaires to collect data on future teachers' perceptions and attitudes about feedback in learning-outcome assessment. The survey was conducted for 110 Biology future teachers selected from the above sample. The questionnaire consists of two parts: part I asks about demographic information, and part II asks about factors that affect the effectiveness of future teachers' feedback skills training. Part II uses a five-point Likert scale. Respondents are required to be serious, responsible, and honest in answering the questions posed in the questionnaire.

The consistency of scores in each criterion is determined by reliability. Therefore, it is necessary to analyze the data obtained through the survey by percentage and frequency to find the reliability value. Cronbach's alpha measures the consistency of a research instrument's reliability. This study determines the reliability of the questions through Cronbach's alpha value. The higher the confidence, the more accurate data can be obtained to produce quality results. Typically, a Cronbach's alpha value higher than 0.60 is said to have a moderate confidence level. With such variables having Cronbach's alpha value, it can be used as an indicator to measure the device's reliability. On the other hand, Cronbach's alpha values less than 0.60 are considered low confidence and should not be accepted. Therefore, variables with Cronbach's alpha value must be deleted or modified.

### 3.3. How to collect data on the effectiveness of feedback skills training in the assessment of learning outcomes

Research layout plan: the study uses the impact method and evaluates the future teachers' change in the expression of feedback skills before, during, and after the training process.

Method of conducting the study: The study was carried out three rounds, each round including the following stages:

1. Pre-impact phase: During the first week of study, the lecturer receives the class, introduces the subject and the training program to the future teachers, and conducts the first assessment (input assessment). the pre-impact test.

2. Stage in impact (During-impact phase): Carrying out training feedback skills in learning-outcome assessment when teaching the module "Assessment in teaching Biology". At the same time, evaluate the training process two times at two points:

Second assessment: through the results of the experiential skill exercise/task (when the future teacher is in step 3 of the procedure).

Third assessment: through the results of practical skill exercise/task (when future teachers are in step 5 of the procedure).

3. Post-impact phase: evaluate the results of feedback skills training in learning-outcome assessment to future teachers after having finished the lessons in the course program (output assessment) by the post-impact test.

After each impact and assessment of the future teachers' skills, from the assessment results, the research team will edit the training measures and the evaluation criteria for feedback skills. However, the research team edited the sentences to make them easier for learners to understand.

How to assess experimental results:

At all times, the future teachers' training demonstrations are evaluated based on the system of assessment criteria (Table 3). Scores of all future teachers are processed by descriptive statistical parameters and tested for the difference in mean values by the Paired-Sample T-test tool to verify the progress in the expression level of skills between assessment times (2<sup>nd</sup> time - 1<sup>st</sup> time, 3<sup>rd</sup> time - 2<sup>nd</sup> time, 4<sup>th</sup> time - 3<sup>rd</sup> time, and 4<sup>th</sup> time - 1<sup>st</sup> time). The test was conducted with two hypotheses:

H0: there is no difference between the assessment (the expression level of the skill does not change).

H1: there is a difference between the assessment (the expression level of the skill changes).

Where: If the value Sig. (2-tailed) < .050: reject hypothesis H0, vice versa: accept hypothesis H0 (with  $\alpha = .050$ ).

Simultaneously, the study also conducted qualitative observation and analysis of the future teachers' performance during the experiment to draw some conclusions confirming the effect and meaning of the measure to practice feedback skills for future teachers.

**Table 2: Criteria for assessing the skill of using feedback in learning-outcome assessment**

Skill	Level	Manifest in each level
1. Providing feedback and guiding students to improve their learning activities	Level 1	Failing to indicate or indicate incorrect feedback information and solutions to improve students' learning.
	Level 2	Indicating feedback information incompletely, suggesting a few subjective solutions to improve students' learning.
	Level 3	Indicating feedback information completely, suggesting several basic and systematic solutions to improve students' learning.
	Level 4	Indicating feedback information completely, suggesting solutions to improve students' learning which is specific, systematic, well-ground and fit to certain situations
2. Constructing solutions to improve teaching activities	Level 1	Failing to suggest or suggesting incorrect solutions to self-regulating teaching activities
	Level 2	Suggesting a few solutions to self-regulating teaching activities which are incomplete, unsystematic or subjective.
	Level 3	Suggesting several basic and systematic solutions to self-regulating teaching activities
	Level 4	Suggesting solutions to self-regulating teaching activities which are specific, systematic, well-ground and fit to certain situations

#### 4. Findings and discussions

##### 4.1. The effectiveness of feedback skills training in the assessment of learning outcomes

From survey data collected from 110 students of Biology pedagogy, we calculated the Cronbach's alpha coefficient to determine the factors affecting the feedback skill in assessing learning outcomes. Table 3 shows the conversion coefficients of Cronbach's alpha in surveying factors affecting feedback skills in assessing learning outcomes.

**Table 3: Cronbach's alpha values in the pilot study**

No.	Variable	Cronbach's alpha values
1	Pedagogical Training	.849
2	Classroom experience	.960
3	Mentorship	.789
4	Confidence	.759
5	Feedback culture	.899

Regarding the factors affecting feedback skills in assessing learning outcomes, the Cronbach's alpha value of the first variable, the classroom experience factor, is .960. The second and third variables, namely feedback culture and pedagogical training, recorded Cronbach's alpha values of .899 and .849,

respectively. The last, the Cronbach's alpha values for the 4th and 5th variables, mentorship and confidence, are .789 and .759, respectively.

The survey shows the factors that must be affected to develop feedback skills in learning-outcome assessment. From there, the research is oriented to the experimental arrangement of the feedback skills training process based on experiential learning experience and content to practice skills training for future teachers.

#### 4.2. The procedure of training feedback skills based on experiential learning

Skills are only developed and demonstrated through the subject's activities in specific situations and real-world tasks by applying knowledge and skills flexibly following the problem context. Therefore, to develop the skill of user feedback, it is necessary to create conditions for FTs to experience situations and contexts that reflect actual assessment activities. When FTs are placed in specific cases, actively implementing teachers' feedback activities in real-life simulations will stimulate them to apply their knowledge and skills differently, depending on their cognitive abilities and social experiences.

To meet the basis of experiential learning, the research developed a procedure for training skills by using feedback for FTs based on applying D. Kolb's model of experiential learning (Kolb, 2015). The basic concept of this model is that learners' learning activities must come from actual experiences, through actions and feelings, to form experiences, thereby selecting and transforming these experiences together with existing knowledge to create new knowledge, from which learners develop cognitive and application competencies. Accordingly, the procedure of training skill of using feedback in learning-outcome assessment is based on an experiential learning cycle with four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

**Table 4: Experiential learning activities to practice feedback skills in the assessment of learning outcomes**

Stage	Features of each stage (primarily learning activities)	Corresponding activity in the procedure of training skills of using feedback
1. Concrete experience	Experiencing specific activities or manipulations directly, forming initial experiences	Mobilizing personal experiences, experiencing feedback activities that simulate real-world situations.
2. Reflective observation	Contemplating, reflecting on the activities and experience results, analyzing and evaluating experiences	Discussing to reflect and share the process and experience results, analyzing the experiences with the lecturer's direction
3. Abstract conceptualisation	Generalizing acquired experiences to build theories (turning experience into knowledge)	Building models of skill procedure, generalizing principles and strategies, meeting the requirements when implementing the skill

4.Active experimentation	Using theories in conducting practical activities for positive verification, application, and adjustment	Applying developed procedure and strategies to practice in training tasks with similar or new situations.
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The training of skills in giving and using feedback in the learning-outcome assessment is executed through the following steps:

1. Step 1: Research background knowledge.

The lecturer asks future teachers (FTs) to repeat the basic functions of assessment in teaching → Places emphasis on two primary purposes when using assessment information: confirming students' learning outcomes and supporting teaching activities to improve student's learning outcomes.

Lecturer directs FTs to focus on studying the use of assessment information to provide feedback and support teaching and learning activities → Asks FTs to study curriculum materials and apply learned knowledge to analyze the roles of feedback in assessment → Lecturer introduces to FTs the model of effective feedback (Hattie & Timperley, 2007) → Lecturer redirects FTs to the experiential task to learn how to build effective feedback according to the above model.

2. Step 2: Experiencing the skill

Lecturer assigns the task to a case study:

*Study the teacher's assessment activity when teaching the topic "Photosynthesis in plants" (Biology, Grade 11), using the exercise "Groups of pigments that make up colors in plants" on the worksheet when consolidating and practicing at the end of lesson 1. After synthesizing the obtained assessment results, the teacher needs to do the following things:*

*a) Determining the time to give feedback, the object receiving the feedback, and the appropriate form of feedback (spoken and written) to be used in these activities.*

*b) Determining the necessary contents of the feedback to students in these activities (Hint: What will you say/write to help students see their learning outcomes and support students to adjust and improve their learning outcomes?).*

*c) Reviewing the teaching-assessment plan of the topic "Photosynthesis in plants," thereby proposing several solutions to improve teaching activities and improve students' learning outcomes in the remaining time of the topic (Hint: The answers may require adjustment of some objectives, content, teaching methods and techniques, even planned assessment activities).*

FTs receive the task and join group discussions to complete it. The lecturer should suggest FTs connect the content of learned background knowledge in step 1 to implement the tasks in the above situation: For the time and form of feedback, please use past experiences to predict the teacher's conduct in this situation (Note: explain the basis for making those predictions); For the feedback content, apply the theory of Hattie - Timberly and answer three questions yourself: Where are students going? How are students going? Where to next?; For the proposal to improve teaching and learning activities, analyses should be noted: After those assessment activities, what content will students continue to

learn on the topic? Are there any opportunities for improvement when learning the following content? How to improve (what should students do, must teachers do...)?

### 3. Step 3: Reflecting on the results of skill implementation

Lecturer organizes groups of FTs to present the results of the experiential tasks, then asks FTs to comment on and compare the results among the groups. The lecturer asks the groups to observe the suggested answers (the feedback, the solutions developed by the teacher in the situation) so that the FTs can compare, contrast and reflect on their group's results.

Lecturer asks FTs to exchange and share about the process of implementing the experiential task through suggested questions:

Based on which theoretical basis did you develop the feedback and propose solutions to adjust teaching and learning activities? Were there any other bases? Were there any difficulties in the process of doing those jobs?

What do you think about your group's results (compared to other groups and compared with the results given by the teacher in the situation)? What are the strong and weak points of the results (accuracy, granularity, specificity of the feedback, scientificity, and ability to implement improvement solutions...)? What experiences have you learned from the analysis of the teacher in the situation and other groups?

### 4. Step 4: Generalizing the implementation procedure of the skill

Lecturer directs FTs to synthesize lessons and experiences analyzed from experiential tasks → Generalize theoretical contents related to the craft of using assessment feedback to support teaching and learning activities (the implementation procedure and requirements, notes... during implementation to ensure effectiveness). Lecturer leads FTs to use the built-in theories to supplement and complete the results from the above task.

### 5. Step 5: Practicing training the skill

Lecturer assigns practical exercises to FTs, requiring them to give feedback and use the results of the assessment to support teaching and learning activities in other situations.

FTs receive the tasks and implement the tasks in groups within a certain amount of time allotted (inside and outside class). During that process, the lecturer monitors, allows the groups to report the preliminary exercise results, and gives further instructions to the groups to complete the tasks before completing the final report.

### 6. Step 6: Assessing the results of skill training

Lecturer has groups of FTs report on the results of practical exercises, using the assessment sheets for groups' self-assessment and peer-assessment among groups.

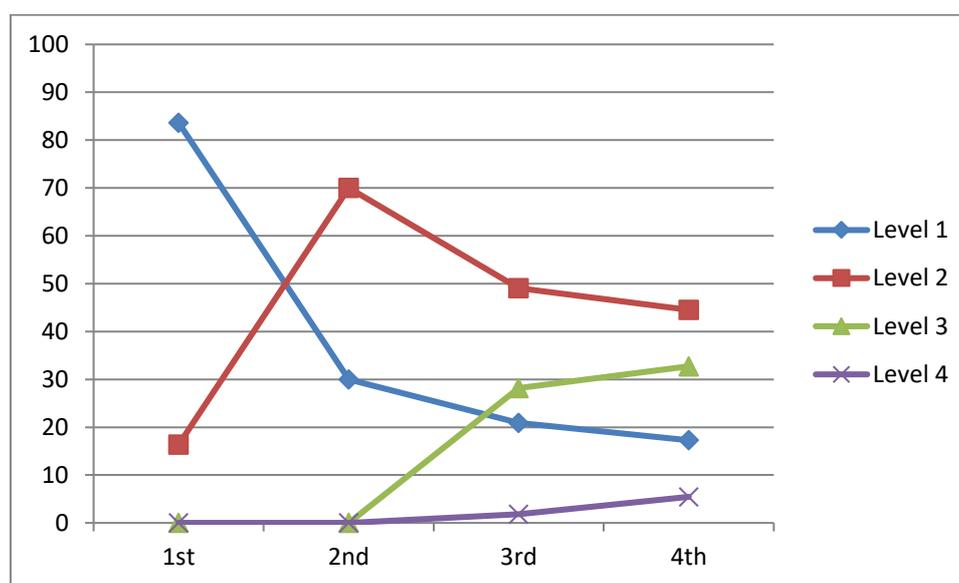
## **4.3. Results of training feedback skills in assessing learning outcomes for students**

The study assessed future teachers' skills four times in testing the content and measures to develop feedback skills in assessing learning outcomes. The following results:

- Criterion D1 – Feedback and guide students to adjust learning activities

**Table 5: Quantitative assessment results for criterion D1 – Feedback and recommend students to adjust learning activities**

Assessment time	Total number of FTs	Number and percentage (%) of FTs that reached at levels of criterion D1							
		Level 1		Level 2		Level 3		Level 4	
		No	%	No	%	No	%	No	%
1 <sup>st</sup> time	110	92	83.64	18	16.36	0	.00	0	.00
2 <sup>nd</sup> time	110	33	30.00	77	70.00	0	.00	0	.00
3 <sup>rd</sup> time	110	23	20.91	54	49.09	31	28.18	2	1.82
4 <sup>th</sup> time	110	19	17.27	49	44.55	36	32.73	6	5.45



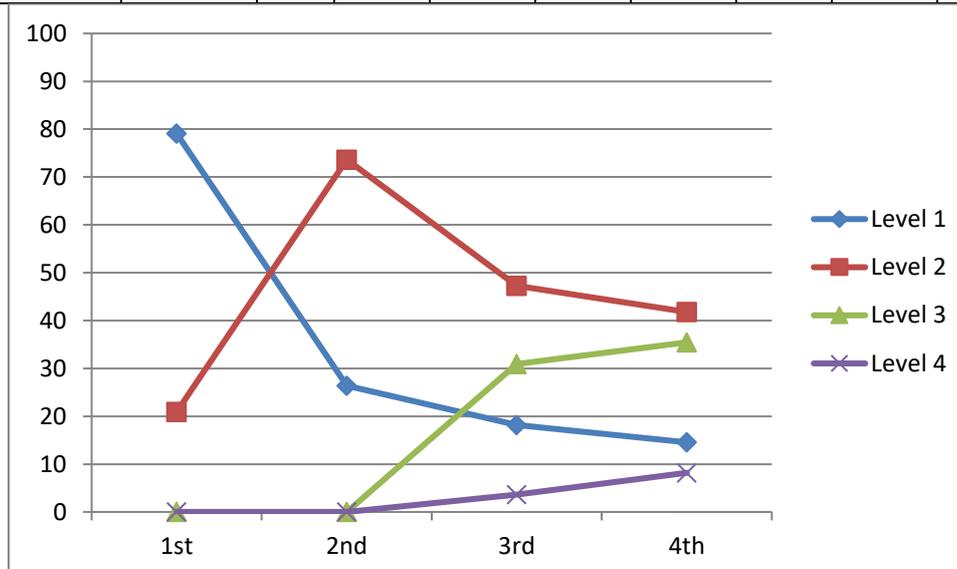
**Figure 1: The graph shows the variation in the percentage of students meeting the criteria levels D1 – Feedback and guide students to adjust learning activities**

The results presented above show an improvement in criterion D1 during competency training. In the first assessment (before the experiment), most future teachers only met criterion D1 level 1 (83.6%), clearly because they did not have enough knowledge and experience on the feedback topic. After studying the theory of feedback model in assessment, future teachers were able to present a part of the feedback content following the experience situation based on the theory, so the percentage of future teachers reached the high level of 2 (reaching 70.00 %). Next, after the process of reflection and learning from experience, some future teachers made better progress in the 3rd assessment, moving from level 2 to levels 3 and 4. However, the percentage of future teachers who reached levels 3 and 4 is generally low and does not change much in 2 assessments 3rd and 4th; many future teachers are still at level 2 and level 1. It shows that criterion D1 is tricky for future teachers; the theory provision must also increase opportunities to practice real-life feedback situations to improve training effectiveness.

- Criterion D2 – Develop measures to adjust teaching activities

**Table 6: Quantitative assessment results for criterion D2 - Developing standards to adjust teaching activities**

Assessment time	Total number of FTs	Number and percentage (%) of FTs that reached levels of criterion D2							
		Level 1		Level 2		Level 3		Level 4	
		No	%	No	%	No	%	No	%
1 <sup>st</sup> time	110	87	79.09	23	20.91	0	.00	0	.00
2 <sup>nd</sup> time	110	29	26.36	81	73.64	0	.00	0	.00
3 <sup>rd</sup> time	110	20	18.18	52	47.27	34	30.91	4	3.64
4 <sup>th</sup> time	110	16	14.55	46	41.82	39	35.45	9	8.18



**Figure 2: The graph shows the variation in the percentage of students meeting the criteria levels D2 - Developing measures to adjust teaching activities**

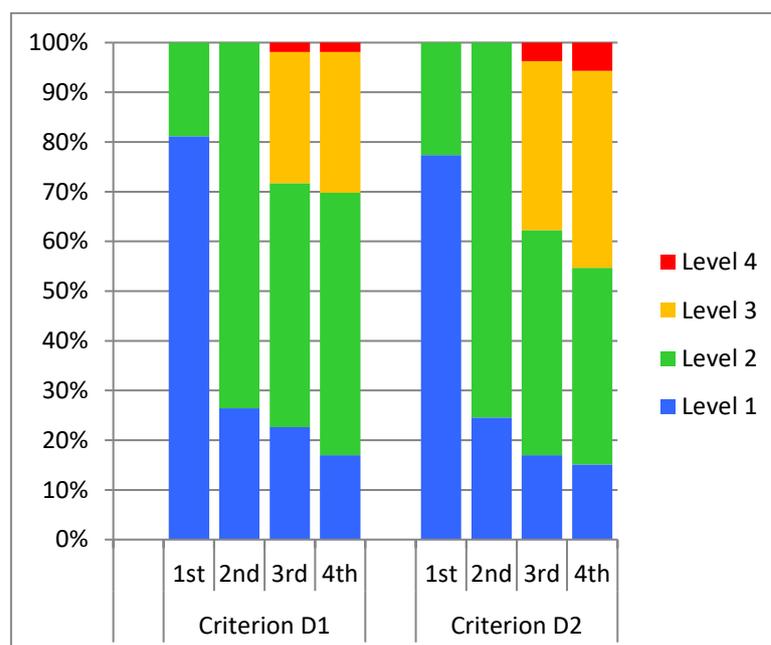
For criterion D2, the improvement in future teachers' performance through training has a similar increase as criterion D1. Specifically, at the second assessment after theoretical research, the percentage of future teachers reaching level 2 quickly prevailed (73.64%), then some future teachers continued to show progress through learning from the experiential situation and move to level 3, and 4 in subsequent assessments. At the time of after training (assessment 4), the percentage of future teachers achieving levels 3 and 4 is somewhat higher than the corresponding rates in criterion D1 (35.5% and 8.18%, respectively) even though the percentage of future teachers at level 2 is still the largest (41.82%). It can be seen that there is a certain correlation in the expression trend of two criteria D1 and D2; when future teachers identify measures to adjust students' learning, it will also be easy to identify adjustments in teaching activities on the part of teachers.

However, to verify the true development level of future teachers during 3 years of experiment, we conduct a year-by-year analysis and use the Paired-Sample T-tool to analyze the difference in mean values.

**Table 7: Results of future teachers' feedback skills assessment in round 1 (53 4th-year future teachers, 2019)**

Criteria	Assessment time	Number and percentage (%) of FTs that reached levels of criteria							
		Level 1		Level 2		Level 3		Level 4	
		No	%	No	%	No	%	No	%
1. Providing feedback and conducting students to improve learning activities	1 <sup>st</sup>	43	81.132	10	18.868	0	.000	0	.000
	2 <sup>nd</sup>	14	26.415	39	73.585	0	.000	0	.000
	3 <sup>rd</sup>	12	22.642	26	49.057	14	26.415	1	1.887
	4 <sup>th</sup>	9	16.981	28	52.830	15	28.302	1	1.887
2. Constructing solutions to improve teaching activities	1 <sup>st</sup>	41	77.358	12	22.642	0	.000	0	.000
	2 <sup>nd</sup>	13	24.528	40	75.472	0	.000	0	.000
	3 <sup>rd</sup>	9	16.981	24	45.283	18	33.962	2	3.774
	4 <sup>th</sup>	8	15.094	21	39.623	21	39.623	3	5.660

Intuitively, the data in Table 7 is plotted on the graph of the percentage of future teachers achieving the levels in each criterion across four times of assessments as follows:



**Figure 3: Chart about results of future teachers' feedback skills assessment in round 1 (53 4th-year future teachers, 2019)**

Table 7 and figure 3 show that the skill training results of future teachers have changed positively through the assessments before, during and after the experimental process. In the pre-impact test, 100% of future teachers only achieved levels 1 and 2 in all criteria. However, later on, the percentage of future teachers achieving levels 3 and 4 increased and accounted for a high rate.

To check the actual development level of future teachers in each criterion, the research performed a statistical hypothesis test to compare the average value of the scores achieved through the assessments using the *Paired Sample T-test*. The test results are summarized in the following table (here only two indicators are presented, the mean difference – Mean and the tested coefficient Sig. (2-tailed)):

**Table 8: Results of testing the difference in the average value of skill training scores across assessments of 53 future teachers in 2019**

Criteria	Comparison 2 <sup>nd</sup> time - 1 <sup>st</sup> time		Comparison 3 <sup>rd</sup> time - 2 <sup>nd</sup> time		Comparison 4 <sup>th</sup> time - 3 <sup>rd</sup> time		Comparison 4 <sup>th</sup> time - 1 <sup>st</sup> time	
	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)
D1	.547	.000	.340	.000	.075	.376	.962	.000
D2	.528	.000	.491	.000	.113	.277	1.132	.000

Analysis of the above results draws some trends:

When comparing the average score of achieving the criteria in the following assessments with the previous ones, the indicators of mean difference (Mean) are all positive (Mean > 0), showing that all scores increase through assessments. Sig. (2-tailed) calculated from 6/8 tests have a value less than .050, showing that in most of the comparisons, the difference in the mean value of the following score from the previous score is statistically significant (with 95% confidence), which indicates that training results have indeed increased.

There are 2/8 tests with Sig value. (2-tailed) have a value of more than .050, indicating that the training results did not improve in 2 criteria at the 4<sup>th</sup> assessment (compared to the 3<sup>rd</sup> assessment). This is explained because feedback skills require future teachers to perform complex operations, including applying unfamiliar theoretical basis, and making the connection between learning outcomes to current/ next objectives to identify opportunities and strategies to improve student's learning outcomes through teaching and learning. In the short training process, future teachers do not have much time to reflect and learn from the results of practical exercises.

However, in general, the coefficient of Sig. (2-tailed) compared the post-test scores (4<sup>th</sup> assessment) to pre-test score (1<sup>st</sup> assessment) are less than .050. It confirms that the difference in future teachers' feedback skills after and before training is statistically significant.

**Table 9: Results of future teachers' feedback skills assessment in round 2 (33 4th-year future teachers, 2020)**

Criteria	Assessment time	Number and percentage (%) of FTs that reached levels of criteria							
		Level 1		Level 2		Level 3		Level 4	
		No	%	No	%	No	%	No	%
1. Providing feedback and conducting students to improve	1 <sup>st</sup>	28	84.848	5	15.152	0	.000	0	.000
	2 <sup>nd</sup>	13	39.394	20	60.606	0	.000	0	.000
	3 <sup>rd</sup>	8	24.242	16	48.485	8	24.242	1	3.030

learning activities	4 <sup>th</sup>	7	21.212	13	39.394	11	33.333	2	6.061
2. Constructing solutions to improve teaching activities	1 <sup>st</sup>	28	84.848	5	15.152	0	.000	0	.000
	2 <sup>nd</sup>	10	30.303	23	69.697	0	.000	0	.000
	3 <sup>rd</sup>	7	21.212	16	48.485	9	27.273	1	3.030
	4 <sup>th</sup>	4	12.121	16	48.485	11	33.333	2	6.061

The data in Table 9 is also shown visually on the graph of the percentage of students achieving the levels in each criterion through 4 times assessment as follows:

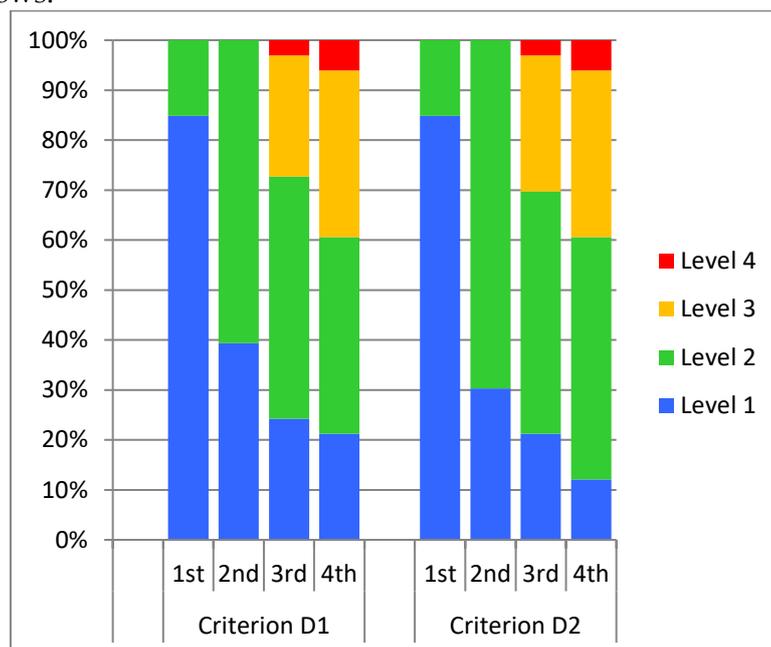


Figure 4: Chart about results of future teachers' feedback skills assessment in the second test (33 4th-year future teachers, 2020)

The results from table 9 and figure 4 also show the trend of progressive change in the training results of future teachers through this training process, reflected in the percentages of future teachers achieving levels 1 and 2 in criteria are decreasing, even then, the percentages of future teachers achieving levels 3 and 4 are increasing and accounts for a high rate through the experimental assessments.

To check the actual development level of future teachers in each criterion, the research performed a statistical hypothesis test to compare the average value of the scores achieved through the assessments using the Paired Sample T-test. The test results are summarized in the following table:

**Table 10: Results of testing the difference in the average value of competency training scores across the assessment times of 33 students in 2020**

Criteria	Comparison 2 <sup>nd</sup> time - 1 <sup>st</sup> time		Comparison 3 <sup>rd</sup> time - 2 <sup>nd</sup> time		Comparison 4 <sup>th</sup> time - 3 <sup>rd</sup> time		Comparison 4 <sup>th</sup> time - 1 <sup>st</sup> time	
	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)
D1	.455	.000	.455	.000	.182	.136	.091	.000
D2	.545	.000	.424	.000	.212	.090	.182	.000

Analysis of the above results draws some trends:

When comparing the average score of achieving the criteria in the following assessments with the previous ones, the indicators of mean difference (Mean) are all positive (Mean > 0), showing that all scores increase through assessments. Sig. (2-tailed) calculated from 6/8 tests have a value less than .050, showing that in most of the comparisons, the difference in the mean value of the following score from the previous score is statistically significant (with 95% confidence), which indicates that training results have indeed increased.

There are 2/8 tests with Sig value. (2-tailed) have a value of more than .050, indicating that the training results did not improve in 2 criteria at the 4<sup>th</sup> assessment (compared to the 3<sup>rd</sup> assessment). Specifically, in comparison of the 4<sup>th</sup> assessment score to 3<sup>rd</sup> score, the Sig values. (2-tailed) in 2 criteria D1 and D2 are .136 and .090 respectively, smaller than the corresponding values in round 1, but still greater than .050. This results from adjusting the procedure of training feedback skills, specifically in steps 5 and 6, to increase the duration of activities to guide future teachers in self-assessment as well as encourage them to share and exchange experiences. However, the results of the above statistical analysis still show that future teachers still have not improved their feedback skills conspicuously.

However, as a whole, the coefficient Sig. (2-tailed) compared the post-test scores (4<sup>th</sup> assessment) to pre-test score (1<sup>st</sup> assessment) are less than .050 (similar to results in round 1). It proves that the difference in the scores of future teachers' feedback skills after and before training is statistically significant.

**Table 11: Results of future teachers' feedback skills assessment in round 3 (24 4<sup>th</sup>-year future teachers, in 2021)**

Criteria	Assessment time	Number and percentage (%) of FTs that reached levels of criteria							
		Level 1		Level 2		Level 3		Level 4	
		No	%	No	%	No	%	No	%
1. Providing feedback and conducting students to improve learning activities	1 <sup>st</sup>	21	87.500	3	12.500	0	.000	0	.000
	2 <sup>nd</sup>	6	25.000	18	75.000	0	.000	0	.000
	3 <sup>rd</sup>	3	12.500	12	50.000	9	37.500	0	.000
	4 <sup>th</sup>	3	12.500	8	33.333	10	41.667	3	12.500
2. Constructing	1 <sup>st</sup>	18	75.000	6	25.000	0	.000	0	.000

solutions to improve teaching activities	2 <sup>nd</sup>	6	25.000	18	75.000	0	.000	0	.000
	3 <sup>rd</sup>	4	16.667	12	50.000	7	29.167	1	4.167
	4 <sup>th</sup>	4	16.667	9	37.500	7	29.167	4	16.667

Figure 5 also visually shows the results in Table 11 as follows:

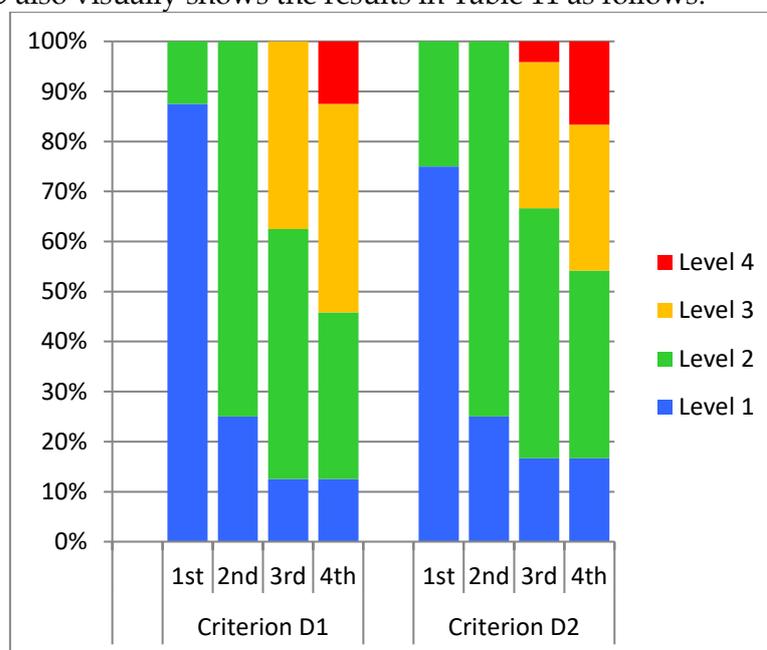


Figure 5: Chart about results of future teachers' feedback skills assessment in round 3 (24 4<sup>th</sup>-year students, in 2021)

The data from table 11 and chart 3.5 above also show the trend of improvement in future teachers' training results through round 3; when the percentages of future teachers achieving levels 1 and 2 in the criteria gradually decrease, while percentages of future teachers achieving levels 3 and 4 is increasing and accounts for a high percentage through 4 assessment times. To check future teachers' actual development in each criterion, the research continues to test with the *Paired Sample T-test*. The test results are summarized in the following table:

Table 12: Results of testing the difference in the average value of competency training scores across assessments of 24 students in 2021

Criteria	Comparison 2 <sup>nd</sup> time - 1 <sup>st</sup> time		Comparison 3 <sup>rd</sup> time - 2 <sup>nd</sup> time		Comparison 4 <sup>th</sup> time - 3 <sup>rd</sup> time		Comparison 4 <sup>th</sup> time - 1 <sup>st</sup> time	
	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)	Mean	Sig.(2-tailed)
D1	.625	.000	.500	.000	.292	.030	1.417	.000
D2	.500	.000	.458	.001	.250	.036	1.208	.000

Analysis of the above results draws some trends:

The indicators of mean difference (Mean) are all positive (Mean > 0), showing that the scores have increased over the assessment times. This is similar to the experimental results in the previous two rounds.

Sig. (2-tailed) calculated from 8/8 tests with a value less than .050, showing that in all comparisons, the difference in the mean value of the following score from the previous score is statistically significant (with 95% confidence). Especially, the difference between the 4th assessment score compared to the 3rd showed a substantial improvement in statistics. This expresses the effectiveness of improving the procedure of training feedback skills in steps 5 and 6, which is aimed to enhance the future teachers' self-assessment and experience sharing.

The results from all three rounds of pedagogical experiments in the above three years of research show that developing feedback skills in learning-outcome assessment is effective.

## 5. Conclusion

In conclusion, this research describes the factors affecting feedback skills in the learning-outcome assessment of future teachers, which are analyzed based on the answers to the questionnaires of the future teachers in the pedagogical university. The results show that the classroom experience is the most influential factor (of the factors: classroom experience; feedback culture; pedagogical training; mentorship; confidence) in developing future teachers' feedback skills. Since then, the research has proposed and tested measure to develop this skills for future teachers, which is geared towards skill training based on experiential learning. Specifically, future teachers go through a process that includes the following steps: Researching background knowledge; Experiencing skills; Reflecting on the results of skill implementation; Generalizing the implementation procedure of the skill; Practicing training the skill; Assessing the results of skill training. The experiment was quantitatively analyzed through the statistical indicators of the future teachers' training results before, during, and after the experiment, proving that the method used by the research was compelling. Changes in measures to train pedagogical skills, especially feedback skills in assessment based on experiential learning, need to be implemented effectively to suit learning in the 21st-century environment. The findings of this study can be implemented and applied in future teacher training programs.

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## Appendix 1

Factors that affect the effectiveness of feedback in teaching

Instructions: Mark (x) in the column provided for each item based on the score chart in the table below

Level	Score
"Strongly Disagree" (FTS)	1
"Do not agree" (IS)	2
"Not sure" (TP)	3
"Agrees" (S)	4
"Strongly agree" (SS)	5

No.	Question	Score				
		1	2	3	4	5
<b>A. Pedagogical Training</b>						
1	Pedagogical training has a significant impact on the quality of feedback I give to students					
2	I need training on feedback skills in performance assessment					
<b>B. Classroom experience</b>						
1	My classroom experience affects the type of feedback I provide to students					
2	I feel comfortable giving feedback to students in the classroom					
<b>C. Mentorship</b>						
1	Mentorship has played a role in developing my feedback skills					
2	The mentor helps me practice and correct my skills					
3	The mentor helps me assess my skills					
<b>D. Confidence</b>						
1	My confidence in providing feedback affects its effectiveness					
2	I feel that my confidence level has improved over time with more experience in giving feedback					
<b>E. Feedback culture</b>						
1	The culture of feedback in my workplace/educational institution has a strong impact on my approach to providing feedback					
2	My school or organization I work for values feedback and encourages its use					
3	I feel that the feedback I provide to students is well received and valued by them					