Retroalimentación entre pares: experiencia en el aula

Peer feedback. Classroom experience

Feedback dos pares: experiência em sala de aula

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Resumen

La retroalimentación entre pares promueve oportunidades de diálogo y la autonomía del estudiantado sobre su aprendizaje, aunque estudios recientes revelan que este tipo de retroalimentación es poco frecuente. Para conocer cuál fue la percepción de los estudiantes de la Escuela Superior de Cómputo del Instituto Politécnico Nacional durante la retroalimentación entre pares sobre un prototipo de sistema desarrollado en la unidad de aprendizaje "Formulación y evaluación de proyectos informáticos", así como para identificar el impacto que dicha actividad tuvo en su aprendizaje, se diseñó esta investigación exploratoria con la participación de ciento ocho estudiantes, durante enero-junio del 2023. Los resultados muestran que solo 78% de los estudiantes proporcionó retroalimentación a sus compañeros y, de estos, 88% consideró que lo hizo con una actitud asertiva y propositiva.

Del total de estudiantes, 21% manifestó que prefieren no retroalimentar por miedo a ser juzgados, criticados o descalificados. Al recibir retroalimentación 56% experimentó sentimientos de seguridad, 26% consideró que estuvo a la defensiva, 20% se sintió desmotivado; 73% aceptó con facilidad la retroalimentación de sus compañeros, mientras que al 27% no le fue fácil aceptarla.

La investigación exploratoria da muestra de que la retroalimentación entre pares sirvió para mejorar o corregir algunos elementos de los prototipos evaluados; así la calidad educativa se verá incrementada en beneficio de los estudiantes y de la sociedad. Los estudiantes sí valoran las aportaciones de sus pares; no obstante, hay que trabajar sobre aspectos emocionales negativos como temor o inseguridad y enfatizar el impacto positivo que la retroalimentación tiene para su formación.

Palabras clave: matriz de retroalimentación, procesos de enseñanza – aprendizaje, prototipo, retroalimentación, retroalimentación entre pares.

Abstract

Peer feedback promotes opportunities for dialogue and student autonomy over their learning, although recent studies reveal that this type of feedback is rare. To know what the perception of the Escuela Superior de Cómputo students of the Instituto Politécnico Nacional was during the peer feedback on a system prototype developed in the learning unit Formulation and evaluation of computer projects, as well as to identify the impact that said activity had on their learning, this exploratory research was designed with the participation of one hundred eigth students, during January - June 2023. The results show that only 78% of the students provided feedback to their classmates and of these, 88% considered that they did so with an assertive attitude. and purposeful. 21% stated that they prefer not to provide feedback for fear of being judged, criticized or disqualified. When receiving feedback, 56% experienced feelings of security, 26% considered they were defensive, 20% felt unmotivated; 73% easily accepted feedback from their colleagues while 27% did not find it easy to accept it.

The exploratory research shows that peer feedback served to improve or correct some elements of the evaluated prototypes; Thus, educational quality will be increased for the benefit of students and society. Students do value the contributions of their peers; however, we must work on negative emotional aspects such as fear or insecurity and emphasize the positive impact that feedback has on their learning process.

Resumo

O feedback entre pares promove oportunidades de diálogo e autonomia dos alunos sobre a sua aprendizagem, embora estudos recentes revelem que este tipo de feedback é raro. Conhecer qual foi a percepção dos alunos da Escola Superior de Computação do Instituto Politécnico Nacional durante o feedback dos pares sobre um protótipo de sistema desenvolvido na unidade curricular "Formulação e avaliação de projectos informáticos", bem como identificar o impacto que tal disse atividade de feedback teve sobre sua aprendizagem, esta pesquisa exploratória foi desenhada com a participação de cento e oito alunos, durante janeiro-junho de 2023. Os resultados mostram que apenas 78% dos alunos forneceram feedback aos colegas e, destes, 88% consideraram que o fizeram com uma atitude assertiva e proposital. Do total de alunos, 21% afirmaram preferir não dar feedback por medo de serem julgados, criticados ou desqualificados. Ao receber feedback, 56% experimentaram sentimentos de segurança, 26% consideraram que estavam na defensiva, 20% sentiram-se desmotivados; 73% aceitaram facilmente o feedback dos seus pares, enquanto 27% não acharam fácil aceitá-lo.

A pesquisa exploratória mostra que o feedback dos pares serviu para melhorar ou corrigir alguns elementos dos protótipos avaliados; Assim, a qualidade educacional será aumentada em benefício dos alunos e da sociedade. Os alunos valorizam as contribuições dos seus pares; No entanto, devemos trabalhar os aspectos emocionais negativos como o medo ou a insegurança e enfatizar o impacto positivo que o feedback tem na sua formação.

Introduction

In the educational field, a concern has always been to achieve student learning. Scholars in the field agree that one of the factors that positively affects learning is feedback, which is why special attention has been given to it in recent decades. In previous teaching approaches, students only received feedback from their teachers; today, with new approaches, peer feedback is privileged, where the students themselves are configured as contributors of proposals for improvement for the work of their classmates.

However, studies show that peer feedback is sometimes not well received or not implemented regularly (Anijovich & Cappelletti, 2020), so students lack the tools and skills to provide it with the required objectivity. Therefore, it is the teacher's responsibility to design and implement strategies aimed at students providing and receiving feedback on their performance, especially when working in teams.

Calderón (2020) reflects on the importance of learning activities in the classroom, a process based on the metacognitive capacity of students, by seeking collaborative, meaningful and autonomous learning. These activities must be supported by an appropriate curriculum and teaching staff trained to manage strategies that facilitate their development.

Specifically, the feedback process is analyzed in the Learning Unit "Formulation and evaluation of computer projects" of the Higher School of Computing, where students build a prototype of a computer system, which must focus on a value proposition for the end user; that is, a prototype of a product or service that shows a differentiating character with what exists in the market. The objective is to develop creative, viable and valuable solutions; thus, feedback will be essential for the development of soft skills that are increasingly valued in the workplace.

It is considered that feedback from different actors (clients, bosses, colleagues) throughout their professional career will allow them to improve the quality of processes, products and services, among others. However, the advantages of feedback have been documented by Moreno (2021); Guzmán and Castillo (2022); Álvarez and Difabio (2020); Castro *et al.* (2016); Anijovich and Cappelletti (2020); Canaval and Margalef (2019); Quezada and Salinas (2021) there is still little socialization and discussion of projects among peers, which indicates the low participation of peers in the feedback process, limiting the growth process of students (López-León, 2021).

For feedback to be effective, Shute (2008, as cited in Lozano and Tamez, 2014) points out that it should focus on the task performed by the student and not on his or her personal

characteristics. Therefore, it is essential to encourage the acceptance of comments among peers and to recognize the difficulty that students face in offering objective feedback, focused on the learning products and not on the people.

According to López-León (2021), a study carried out with university students showed that a high percentage of them do not recognize the benefits of feedback or prioritize the implementation of changes indicated by the teacher even against their own perspective. Additionally, teachers do not know instruments that contribute to the peer feedback process.

The research questions were: What is the perception of students about peer feedback? How can peer feedback be promoted? Does peer feedback influence the improvement of the prototype that students deliver as a final product?

To answer these questions, the following premise was used: if students reflect on the importance of peer feedback, they might be willing to accept it; that is, if they are aware of this, then learning with greater autonomy could be encouraged. In this way, it will be possible to change their perception of the formative intention of peer feedback.

Within this context, the research aimed to explore students' perception of the peer feedback process.

Theoretical-contextual references

In order to establish the theoretical-contextual bases necessary for the development of this research, the teaching - learning processes, feedback and the information receiving network as a feedback tool will be briefly addressed.

Teaching processes – learning

Teaching and learning are interrelated processes; their conception depends on the educational paradigm with which the teaching staff and the educational institution to which they belong identify. The new educational paradigms focus on the student and therefore on their learning; in this sense, this is conceived as a process of knowledge construction in which social interaction and cooperative work are of utmost importance (Tigse, 2019, as cited in Guzmán and Castillo, 2022). According to the authors, learning is cumulative and transformative. Likewise, James (2019) emphasizes that:

> Learning is a way of opening up to the world; it is much more than knowing; it is a complex process of transformation and incorporation of new things through which the subject acquires knowledge that enriches him. In his exchanges with different contexts, he comes into contact with the meaning of objects, institutions, customs and all kinds of sociocultural productions (p. 211).

While teaching can be understood as a process of organization and provision of conditions that facilitate learning; it is not an act of transmitting knowledge, but rather a creative act of research, innovation and planning (Tintaya, 2016).

In short, researching teaching involves investigating learning and its processes. According to Abreu *et al. (2018) the* teaching - learning process (TLP):

> It is conceived as the space in which the main protagonist is the student and the teacher plays the role of facilitator of the learning processes. It is the students who build knowledge through reading, contributing their experiences and reflecting on them, exchanging their points of view with their classmates and the teacher. In this space, the aim is for the student to enjoy learning and commit to it for life (p. 611).

As Rochina *et al. (2020)* point out, efficient teaching-learning processes place students in situations that represent a challenge to their way of thinking, feeling and acting.

Feedback

Historically, feedback given to students focused primarily on correcting errors; it was unidirectional, from the teacher to the students; it had little impact on improving learning and an interest associated only with grading (Anijovich and Cappelletti, 2020; Lozano and Tamez, 2014). Currently, we are faced with another conception of feedback, focused on improving learning, which proposes actively involving students in this process and that its purpose is not to justify a grade.

The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020) states that feedback "should refer to the learning that is expected to be achieved and focus on the evaluation criteria and indicators that were established; it should guide progress: what should the student do, practice, review, now to improve?" (p.10). Likewise, Valdivia (2014) emphasizes that feedback is a fundamental element during class that can generate a climate of trust and participation, where questions and answers enrich learning. On the other

hand, Canabal and Margalef (2017); Anijovich and Cappelletti (2020) point out that feedback is not limited to identifying and correcting errors or pointing out successes, but also fulfills the essential function of enhancing future performance throughout the academic and professional career; In addition, William (2011, as cited in Canabal and Margalef 2017) draws attention to the fact that the purpose of feedback is formative and that this strategy requires considering the quality of interactions between teachers and students. In short, feedback must be timely, intentional, constructive, encouraging, focused and linked to criteria.

Feedback in teaching-learning processes can be provided on the product or performance; on the learning process and on self-regulation (Valdivia, 2014; Anijovich and Cappelletti, 2020); on the other hand, Castro *et al.* (2016) point out that the sources of feedback are as varied as the feedback itself. Hattie and Timperley (2007, as cited in Lozano and Tamez, 2014) highlight that different actors could participate in the feedback of learning, such as the teacher (hetero-assessment), the student himself (self-assessment), a teammate and/or classes (co-assessment or between peers). Feedback between peers is the process of horizontal interaction between equals, in this case between students, in which an analytical and critical stance is favored that should allow reflection and, where appropriate, the improvement of the quality of the learning products of the peers.

Thus, peer feedback is configured as the strategy that allows recognizing the potential of students and assuming themselves as actors of their own learning, allowing them to appreciate their achievements and their areas of opportunity or areas for improvement (Castro *et al.,* 2016). Finally, among its advantages are the opportunities to establish a constructive dialogue, the development of analytical, critical and reflective thinking skills; and less dependence on teachers; that is, greater student autonomy (Sadler, 2010, as cited in Anijovich and Cappelletti, 2022). However, some contributions from research carried out by Anton Havnes , Kuri Smith, Olga Dysthe and Kristine Ludvigsen (2012, as cited in Anijovich and Cappelletti, 2022) reveal that peer feedback is rare.

Feedback matrix

The feedback matrix or information receiving mesh is a tool used for testing innovation prototypes in the *Design thinking methodology*; is used to represent in a systematic, orderly and visual way the observations and/or comments that selected users have (diNNgo). When researching peer feedback tools, no references were found on their use in

the educational field; however, in this research the feedback matrix was used to collect valuable information on the appreciation of the computer prototype developed by the students.

The feedback matrix allows the development of the ability to work cooperatively, since it can be worked on as a team; it is represented by a canvas divided into four equal quadrants as shown in Figure 1. It should be noted that in order to obtain valuable information it is important not to lose sight of the idea that you want to test; it must be well focused and visible at all times.

Figure 1. Feedback matrix or information receiving mesh
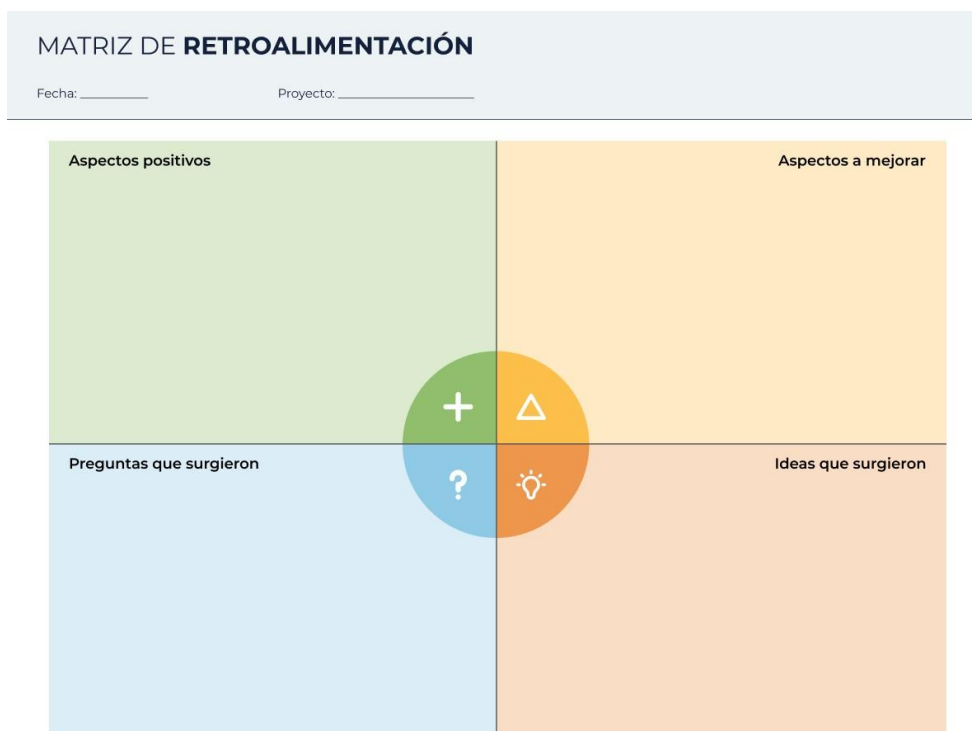
Source: Own elaboration based on https://www.youtube.com/watch?v=CIxG3-
Dkxnw&list=RDLVCIxG3-Dkxnw

In the first quadrant, top left, positive and interesting comments and the strengths of the product (prototype) are written, highlighting the value proposition identified by the group's colleagues.

In the upper right quadrant, contributions are noted that can help correct errors, inconveniences or omissions in the prototype design that contribute to improving it.

The quadrant located at the bottom left is used to detail any doubts or questions that classmates have.

Finally, in the lower right quadrant, new ideas that have emerged during the testing process are written.

As can be seen, the feedback matrix allows to quickly and efficiently locate the relevant information that adds value to the tested project.

Methodology

The type of research that followed the development of this work was applied research. For Murillo (2008, as cited in Vargas, 2009):

> Applied research is called practical or empirical research, which is characterized by seeking the application or use of acquired knowledge, while acquiring other knowledge, after implementing and systematizing the practice based on research (p. 159).

Practical research, with an exploratory scope, allowed us to investigate the perception that students have about the process of teacher and peer feedback, specifically in the design of a computer prototype for the learning unit of Formulation and evaluation of computer projects; where feedback becomes an ally for achieving innovative and viable solutions that provide value for end users; that is, a prototype of a product or service that shows a differentiating character with what exists in the market. The objective of the prototype is to develop creative, viable and valuable solutions considering various points of view; since students in their professional performance will be faced with questions from clients, users, colleagues and/or bosses that will allow them to improve the quality of processes, products and services, among others.

As a first step, the requested prototype is the minimum viable one, its construction must be economical. Later, said prototype is presented in the classroom under the guidance of the teacher who previously establishes the guidelines based on which the students will give feedback on the product of their classmates to promote the creative part and for the students to reflect on the value of the product. Additionally, collaborative work is encouraged for the development of assertive communication skills, leadership, teamwork, and openness to diverse opinions on performance.

Prior to the presentation to the group, a template of the feedback matrix tool is provided and instructions are given to students and teams. For the whole group the instructions are:

- Complete the matrix with the intention of contributing ideas to improve the prototype.
- They will be able to investigate whether the proposal presented is a creative solution or if it already exists on the market; if the problem is well identified in its causes and consequences.
- All reflections on the presentation must be reflected in the feedback matrix and delivered to the exhibitors, in addition to the questions asked in the classroom.

For the teams that are exhibiting their prototype, they are instructed in:

- Emphasize the value proposition.
- Do not defend the solution presented.
- Don't try to convince your colleagues how "good" your solution is.
- Allow colleagues to offer feedback without dismissing or disqualifying different opinions, that is, accepting opinions a priori without making value judgments.
- They will then have time to analyse and reflect on the contributions received and incorporate new ideas that improve their solution; or failing that, to argue why the contributions will not be reflected in the final prototype.

Finally, they were provided with an 18-question questionnaire, which they answered in *Forms on the Microsoft Teams* platform. Of the total number of questions, twelve were aimed at exploring perceptions when giving and receiving feedback, since feedback, to be considered effective, must be a two-way process; while four questions focused on knowing the usefulness that students find in the feedback process and the remaining two focused on knowing the challenges and the students' experience regarding said process.

Results

For the presentation of the results of the questionnaire applied to the students, the responses were grouped into:

- Receiving feedback;
- Provide feedback;
- Utility they confer on feedback;
- The challenges they faced with the activity and;
- Finally, what has been your experience with feedback?

Regarding the reception of feedback: 95% answered that after the feedback they still consider that their prototype does have a value proposition, while 5% considered that with the feedback they realized that their prototype does not have a value proposition; 98% said that they took into account the ideas that came from their peers to improve the prototype, considering that they were very enriching. 87% perceived the feedback from their peers as an opportunity to improve their prototype, 6% as aggression and the remaining 7% found it indifferent.

Of the total respondents, 56% expressed having experienced security and empowerment when receiving feedback from their peers, 10% felt demotivated, 6% experienced anger, 21% experienced insecurity, fear and shame; and the remaining 7% expressed disagreement with the feedback received from their peers; 80% easily accepted the feedback while 20% accepted the feedback, but found it difficult to accept.

Additionally, 96% felt that the feedback they received from the professor was assertive and purposeful and 4% said that the feedback was poor and not useful.

In relation to the moment of giving feedback, 78% provided feedback to their peers when presenting their prototype, while 22% did not provide any feedback at all. 46% considered themselves to have had an assertive attitude and 42% a proactive attitude when providing feedback to their peers, while 12% indicated that they had not been assertive. 49% provided feedback through suggestions and recommendations, 46% did so by asking questions, and 8% offered their approval of the prototype presented by their classmates. 56% responded that they had not previously participated in a peer feedback activity, while 44% had. However, 45% felt that they still need to develop communication skills to provide feedback to their peers, 21% expressed that they prefer not to do so for fear of being judged, criticized, or disqualified, 32% considered themselves assertive when providing feedback, and 2% showed no interest in the activity.

Regarding the usefulness of the feedback process, it was identified that for 82% of the students surveyed the experience was enriching for their training, 17% believed that the activity represented few contributions and only one student did not find any meaning in the activity of giving feedback to his classmates.

Likewise, 39% felt it allowed them to reflect on the importance of feedback; 27% felt it helped them to respect the ideas of others; 13% felt it helped them to put tolerance into practice; and 21% felt it helped them to develop communication skills.

On the other hand, 35% were able to identify opportunities for improvement, 20% identified the strengths of their prototype, 27% identified its shortcomings, 17% identified errors, and only 1% did not identify any usefulness. 93% believed that peer feedback is as important as feedback provided by the teacher, and 7% believed that feedback provided by the teacher is more important.

Regarding challenges, 39% of students reported that some of the challenges they faced in the feedback session were positively accepting their peers' observations and comments, 28% said it was trying not to defend their prototype, while 33% said it was losing their fear of providing feedback to their peers.

Finally, 52% said that the most common experience they have in the classroom is that only the teacher gives feedback on their learning products, 17% said that they only receive feedback from peers, 18% that both teachers and students give feedback, and 13% said that the most common experience they have had is that there is no feedback.

Discussion

The results of the research will be discussed taking into account the scope that an exploratory study allows.

The primary purpose of feedback on learning products is to promote the metacognitive capacity that will allow students to reflect on the results of their products produced in the different learning units; in this sense, Calderón (2020) emphasizes that feedback must be based on a curriculum that favors the active participation of students. The results show that, unlike what was stated by López-León (2021), the majority of the students questioned valued the feedback from their peers and made them reflect on the opinions expressed by them; it is important to highlight that such assessment does not mean *perceiving the results of their peers. I know* they changed their prototype, although 80% acknowledge having incorporated the contributions.

More than half of the students experienced security and empowerment when both receiving and giving feedback, 21% faced insecurity, fear and shame. What was more worrying, for an educational approach that aims to build knowledge from collaborative work arising from social interaction (Tigse , 2019, as cited in Guzmán Castillo, 2022), is that 6% felt feedback from their peers as aggression, even though care was taken in the session to ensure that the language was assertive and focused on objectivity; and 7% showed no interest in feedback. Therefore, it is considered that there is still a need to strengthen the skills so that

students receive feedback as an opportunity for improvement to enrich their learning, and thus the relevance of the peer feedback process could be redefined.

As for giving feedback to their peers, eight out of ten students questioned did provide it , but there are still students who, despite the fact that the activity was supervised, chose not to give it. Almost half considered that their attitude when giving feedback was assertive and/or proactive, issuing their suggestions and recommendations through questions that allowed their peers to reflect on the areas of opportunity of their prototypes. The students who chose not to give feedback expressed that they did not do so for fear of being judged or disqualified.

This research reveals that peer feedback remains rare, in agreement with A. Havnes , *et al*. (2012, as cited in Anijovich and Cappelletti, 2020), since six out of ten students expressed that they had never participated in a similar activity.

Likewise, forty-eight students emphasized that they lack communication skills and recognize that they must work on this aspect, this could be derived from the fact that feedback is not implemented regularly (Anijovich and Cappelletti, 2020). This would represent a challenge for teachers to contribute to the development of these skills, considering that the teaching-learning process is an opportunity to reconfigure the way of thinking, feeling and acting (Rochina , *et al*, 2020).

The experience regarding peer feedback is that only 40% of participating students actually practiced it in their learning units, however 60% had not experienced giving and/or receiving feedback, so it is worrying that despite being a requirement or recommendation of UNESCO (2020) and the new educational approach, teachers have not implemented peer feedback as part of the assessment process of learning products and it is most common that only the teacher gives feedback; 13% say they do not receive feedback on their learning products, not even from the teacher.

Among the challenges identified by students, related to peer feedback, the following were, firstly, "accepting observations positively"; "overcoming the fear of providing feedback to my peers"; secondly, "not trying to defend or convince others of the prototype"; as can be seen, these responses have a strong emotional component.

Regarding the usefulness of the feedback process, the majority felt that the experience was enriching for their training, although eighteen students stated that the activity provided them with few benefits for improving their prototype. On the other hand, forty-eight students were able to visualize the shortcomings and errors, thirty-eight were able to identify

opportunities to improve their prototype, and twenty-two students were able to identify the strengths of their prototype; which opens up the panorama and opportunities that had not been contemplated that give rise to creativity.

Conclusions

The feedback process, which requires interaction between people, is complex, especially when students have not been prepared with the objective and instructions they must follow to achieve their goal of improving learning products. The fact that higher education students, even at this stage of their academic career, feel fear or insecurity when receiving feedback from their peers gives us a clear indication of an area of opportunity for their training; that is, if the teaching staff implements strategies that allow other views of the learning results, it will undoubtedly contribute to developing a good attitude towards the opinions and contributions of others.

Exploratory research shows that peer feedback served to improve, add, remove or correct some elements of the evaluated prototypes; thus, little by little, educational quality will be increased to the benefit of students and society. Students do value the contributions of their peers, however, it is necessary to work on some negative emotional aspects that were presented, such as fear or insecurity, as well as to emphasize the positive impact that feedback has on their training.

This research presents a template that could be useful for teachers to allow their students to carry out peer assessments. Although this template was developed to assess creativity and innovation, each teacher can easily adapt it to their particular feedback needs. Additionally, it offers the advantage that students can have access to their classmates' questions or contributions, since it concentrates the information, and the templates are given to the teams so that they can reflect and analyze them in greater depth.

Future lines of research

Given its high impact on formative education and lifelong learning, the feedback process is essential to improve educational quality. Based on the results of this study, it is recommended as a future line of research to carry out descriptive and explanatory studies that delve into the variables involved, the relationships between them, and the effects that this process has on both academic performance and students' self-esteem. In addition, it would be relevant to investigate the reasons why teachers do not implement peer feedback, despite

it being a requirement of the current educational approach, and to design teacher training programs focused on its effective application. Likewise, it is suggested to work on raising students' awareness of the importance of fostering a culture that promotes both offering and receiving constructive feedback among peers. Another possible line of research could focus on the development of tools that facilitate feedback and contribute to achieving the expected learning outcomes.

It is considered that this would increase knowledge of peer feedback and its educational advantages, which would have an impact on reducing the negative halo that this process currently has.

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