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# Online peer feedback patterns of success and failure in argumentative essay writing

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**ABSTRACT**

In peer feedback literature, little is known about the patterns of success for peer feedback activities in online learning environments. This study aims to explore the peer feedback patterns of successful, less successful, and unsuccessful higher education students for argumentative essay writing. In this exploratory study, 330 higher education students were asked to perform three tasks in three consecutive weeks. In the first week, they were asked to write an argumentative essay. In the second week, students provided two sets of feedback on their peers' argumentative essays based on the given criteria. In the third week, students were asked to revise their argumentative essay based on the received feedback. The findings revealed that unsuccessful and less successful students significantly received more affective and descriptive feedback from their peers, while successful students received more feedback related to the identification of the problem from their peers. Furthermore, descriptive and constructive features of feedback were predictors of students' success in the improvement of argumentative essay writing. The findings of this study provide practical implications for the effective design of peer feedback strategies for improving students' argumentative essay writing in online learning environments.

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Argumentative essay writing; higher education; online learning; peer feedback pattern; peer feedback uptake

## Introduction

As in higher education, the class sizes continue to grow every year (Shi, 2019), it becomes more difficult for educators to provide one-by-one feedback (Noroozi & Hatami, 2019). This means that for classes with a large number of students, feedback from educators is not practically feasible due to a high workload (Er et al., 2020). In such situations, peer feedback can be used instead of teacher feedback as an effective instructional strategy (Ruegg, 2015; Tian & Zhou, 2020). Using peer feedback as a process-oriented pedagogical activity in classrooms can provide students with a challenging and collaborative learning environment to learn from one another (Kollar & Fischer, 2010; Nicol et al., 2014). In the peer feedback process, students are expected to critically review their peers' work, identify gaps and problems, and suggest points for improvements in an emotionally friendly way (Latifi et al., 2021; Liu & Carless, 2006; Topping, 2009). This process for peer feedback implies that quality feedback can contain affective features such as encouraging words in order to prevent emotional conflicts. Peer feedback can also contain feautures that help with identifications

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of problems in the work and suggestions for improvements (Nelson & Schunn, 2009; Wu & Schunn, 2020a). A review of prior studies reveals that using peer feedback in higher education can result in students' learning (e.g. Gielen et al., 2010; Reinholz, 2018), improving critical thinking skills (e.g. Ekahitanond, 2013; Novakovich, 2016), increasing engagement (e.g. Devon et al., 2015; Fan & Xu, 2020), motivation (e.g. Hsia et al., 2016; Zhang et al., 2014), and satisfaction (e.g. Donia et al., 2021; Zhang et al., 2014).

Recently, one of the areas in which peer feedback has been commonly used is for improving students' writing performance (e.g. Huisman et al., 2018; Tian & Zhou, 2020), especially in argumentative essay writing contexts (e.g. Latifi et al., 2020, 2021; Latifi & Noroozi, 2021; Noroozi et al., 2016, 2020). Being able to write a good argumentative essay is a critical skill for higher education students but also a complex and challenging learning activity (Fan & Chen, 2019; Ferretti & Graham, 2019; Wingate, 2012). Studies have shown that students lack argumentation knowledge or even with the existence of such knowledge they have challenges in transforming such knowledge into application in their essays (Latifi et al., 2021; Noroozi et al., 2016). This indicates that writing a high-quality essay is not easy for students and studies have shown that educators are not satisfied with the quality of students' argumentation competence in essay writings (e.g. Latifi et al., 2021; Noroozi et al., 2016; Qin & Karabacak, 2010). In the literature, peer feedback strategies were found as an effective learning activity in higher education for the sake of improving students' argumentative essay writing skills (Latifi et al., 2020, 2021; Latifi & Noroozi, 2021; Noroozi et al., 2016; Noroozi & Hatami, 2019; Valero Haro et al., 2020). For example, Latifi and Noroozi (2021) used a supported peer feedback tool to improve students' argumentative essay writing performance. This supported peer feedback guided students to engage in the learning process by allowing them to review the quality of peers' essays, discover gaps in their essays, and recommend suggestions for improvements based on the given criteria (Latifi et al., 2021; Lizzio & Wilson, 2008; Noroozi & Hatami, 2019; Topping, 2009).

Despite peer feedback advantages for improving students' essay writing performance, this learning activity is typically seen as a complex learning activity that requires deep cognitive thinking skills (Latifi et al., 2021; Liu & Lin, 2007; van Popta et al., 2017). Prior studies have shown that even when the peer feedback is supported by appropriate instructional strategies, students may still struggle with engaging in deep cognitive thinking skills during peer feedback processes which in turn may cause some students to be less successful or even unsuccessful regarding their writing performance (Huisman et al., 2018; Noroozi et al., 2020). Such a situation happens especially when students find the feedback quality of their peers at a low level (Dominguez et al., 2012; Misiejuk et al., 2021). This implies that the features and the types of feedback received from peers play a key role in the uptake of the feedback by the students (Nelson & Schunn, 2009). This can become more complicated if we perform peer feedback activity in online learning settings where there is an opportunity for anonymous feedback which can influence feedback providers' honesty, level of criticism, and also emotional responses from the feedback receivers (Aghaee & Hansson, 2013; Coté, 2014; Noroozi et al., 2020), In addition, in online learning settings, students could feel more free to provide feedback as they can have access at anytime from anywhere (Du et al., 2019).

In general, the success of feedback mainly depends on its quality (Carless et al., 2011; Er et al., 2020; Hattie & Timperley, 2007; Shute, 2008). For feedback to be effective, it should contain features such as affective statements (e.g. praise or compliment), a summary explanation of the work, identification and localization of the problem(s), and solutions to the identified problem(s) and action plans for further improvements (Lu & Law, 2012; Patchan et al., 2016; Wu & Schunn, 2021). If the received feedback lacks quality features such as identification of the problems in the essay and suggestions for improvements, the feedback tends to be neglected rather than implemented by students (Dominguez et al., 2012; Patchan et al., 2016; Wu & Schunn, 2020b). That is why in some studies even though all students have been asked to provide feedback based on the same feedback criteria on their peers' essays, some students have failed to provide high-quality feedback which in turn resulted in poor argumentative essay quality (e.g. Noroozi et al., 2016, 2020).

The review of the literature suggests that although quite a large number of studies have focused on investigating the effects of peer feedback activities on students' learning performance (e.g. Huisman et al., 2018; Gielen et al., 2010; Latifi et al., 2021; Noroozi et al., 2016), only a few studies have aimed to explore the impacts of the nature and quality of peer feedback on students' uptake of peer feedback in the learning process and performance (e.g. Misiejuk et al., 2021; Nelson & Schunn, 2009; Patchan et al., 2016; Wu & Schunn, 2020b; 2021). For example, Nelson and Schunn (2009) found that if students provide a summary of a peer's performance, locate the problem in the peer's performance, and suggest solutions to this problem, therefore, the feedback receiver can better understand the provided feedback and is more willing to implement it. Similarly, Wu and Schunn (2021) revealed that receiving feedback with specific solutions is associated with the actual implementation of the feedback. Although prior studies highlight the role of different feedback features in uptaking feedback and improving learning performance, they did not provide insights into the differences in performance patterns between successful and less successful students with regard to the nature and quality of the received peer feedback, particularly in the context of argumentative essay writing in online settings. The literature does not provide a clear understanding of the received feedback pattern of successful, less successful, and unsuccessful students' when it comes to argumentative essay writing. Therefore, this study was conducted to gap the literature in this regard by exploring the online received peer feedback patterns of success and failure in argumentative essay writing contexts. Discovering such patterns of success and failure would help educational designers to come up with appropriate strategies that could guide students to engage in a desirable type of peer feedback process which in turn helps students achieve intended learning outcomes. Thus, this study was conducted to further explore and address these issues by answering the following research questions:

- RQ1. How do peer feedback patterns of successful, less successful, and unsuccessful students differ in online learning environments for argumentative essay writing?
- RQ2. Which types of peer feedback features can predict students' success and/or failure in online learning environments for argumentative essay writing?

## Materials and methods

### *Participants*

This exploratory study took place in the 2020–2021 academic year with 330 higher education students at a medium-sized university in the Netherlands in the domain of life sciences. However, only 284 students fully completed the study (Female = 195, 68%, Male = 89, 32%;) from five different courses at bachelor (N = 148, 52%) and master (N = 136, 48%) levels. The selected courses were from different course domains including Course A (Social Sciences – N = 56, 20%, Female = 27, Male = 29), Course B (Plant Sciences – N = 29, 10%, Female = 20, Male = 9), Course C (Health & Social Sciences - N = 47, 16%, Female = 31, Male = 16), Course D (Environmental Sciences – N = 101, 36%, Female = 70, Male = 31), and Course E (Food Sciences – N = 51, 18%, Female = 37, Male = 14). All participants were informed that their data will be used anonymously. Students were assured that no one would be able to relate the results to any particular student. Students were given the option to leave the study and to ask for omitting their collected data. Finally, students gave consent to collect and use their data for research purposes. Ethical approval was received from the Social Sciences Ethics Committee of the home university for this research.

### *Procedure*

A module called "*Argumentative Essay Writing*" was designed and embedded in an online learning platform called Brightspace in the selected courses. The module was followed in three consecutive

weeks and in each week students performed one task. In week one, students were provided with an introduction to the module, and then they were asked to write an argumentative essay on one of the offered three topics (task 1). The topics for each course were as follows: Course A (children and video games, genetically Modified Organisms, and climate change), Course B (the use of RNAi-based biopesticide, ban of glyphosates, and use of gene drives for agricultural pest control), Course C (sugar tax, COVID-19 vaccines, and brain drain), Course D (the long-term impacts of Covid-19 on the environment, the role of private actors in funding local and global biodiversity, and bans on the use of single-use plastics), and Course E (scientists with links to food industry should not be involved in risk assessment, powdered infant formula should be sterile, and preparation is the responsibility of the caregiver). Students were given an equal opportunity to select one among three topics based on their preferences. The reason behind such a choice was to decrease any potential bias regarding students' domain-specific knowledge on a specific topic as some students could have extensive content knowledge in one specific topic, while others may have not. In week two, students were asked to provide feedback on two argumentative essays of their peers based on the criteria embedded in the online learning environment (task 2). By using the FeedbackFruits tool, students were assigned automatically and randomly to provide two sets of feedback on their peers' argumentative essays. FeedbackFruits is an external EdTech tool embedded in Brightspace to drive students' engagement through different peer collaboration strategies. This tool has many functionalities including peer review, assignment review, automated feedback, etc (Noroozi et al., 2022). In week 3, students were requested to revise their essays according to the two feedback sets received from their learning peers (task 3).

## Measurements

### Students' argumentative essay performance

A coding scheme developed by Noroozi et al. (2016) was used in this study to analyze the quality of students' argumentative essays. This coding scheme was built on the elements of high-quality argumentative essay writing (e.g. Noroozi et al., 2016) including eight elements: (1) introduction on the topic, (2) taking a position on the topic, (3) arguments for the position, (4) justifications for arguments for the position, (5) arguments against the position (counter-arguments), (6) justifications for arguments against the position, (7) response to counter-arguments, and (8) conclusion and implications. The coding scheme is scored from zero (the lowest quality level) to three (the highest quality level) for each element (see Table 1). All the points obtained by students for these elements were summed up together and indicated students' overall score for the quality of the written argumentative essay. Students' argumentative essays were assessed in two steps as the original argumentative essay and the revised essay. Five coders with education expertise contributed to code the quality of written argumentative essays. Since there were more than two coders, Fleiss' Kappa statistic was used to determine the inter-rater reliability between coders (Fleiss, 1971), and the agreement was found to be 75% ($Fleiss'\ Kappa = 0.75\ [IC\ 95\%: 0.70\text{-}0.81];\ z = 26.08;\ p < 0.001$) indicating significant agreement between the coders.

### Quality of students' received peer feedback

The authors developed a coding scheme to assess the quality of students' peer feedback performance based on a review of relevant recent studies (e.g. Nelson & Schunn, 2009; Patchan et al., 2016; Wu & Schunn, 2020b). This coding scheme analyzes the features of peer feedback which includes three elements: (1) affective (inclusion of positive emotions such as praise or compliments and negative emotions such as anger or disappointments) (2) cognitive (description: summary statement of the essay), (identification: identification and localization of the problem in the essay), and (justification: elaborations and justifications of the identified problem), and (3) constructive (inclusion of recommendations but not action plans for further improvements) (see Table 2). The feautures of this coding scheme was scored from zero (poor quality) to two (good quality). All the given points were summed up and represented the students' overall score for the quality of received peer

**Table 1.** Coding scheme details to analyze the quality of students' argumentative essay.

| Variables | Points | Labels | Descriptions |
|---|---|---|---|
| Introduction on the topic | 0 | Not mentioned at all | Introduction on the topic is not presented at all. |
| | 1 | Just mentioned | Introduction on the topic is just presented, but not elaborated and justified. |
| | 2 | Mentioned and elaborated | Introduction on the topic is presented and elaborated, but not justified. |
| | 3 | Mentioned, elaborated, and justified | Introduction on the topic is presented, elaborated, and justified. |
| Taking a position on the topic | 0 | Not mentioned at all | Position on the topic is not presented at all. |
| | 1 | Just mentioned | Position on the topic is just presented, but not elaborated and justified. |
| | 2 | Mentioned and elaborated | Position on the topic is presented and elaborated, but not justified. |
| | 3 | Mentioned, elaborated, and justified | Position on the topic is presented, elaborated, and justified. |
| Arguments for the position | 0 | Not mentioned at all | No argument in favor of the position is presented. |
| | 1 | Mentioned to a small extent | Only one argument in favor of the position is presented. |
| | 2 | Mentioned to a moderate extent | Only two arguments in favor of the position are presented. |
| | 3 | Mentioned to a great extent | More than two arguments in favor of the position are presented. |
| Justifications for arguments for the position | 0 | Not justified at all | Justification for arguments for the position is not presented at all. |
| | 1 | Justified to a small extent | Only one argument for the position is justified. |
| | 2 | Justified to a moderate extent | Some but not all arguments for the position are justified. |
| | 3 | Justified to a great extent | All arguments for the position are justified. |
| Arguments against the position (counter-arguments) | 0 | Not mentioned at all | No argument against the position is presented. |
| | 1 | Mentioned to a small extent | Only one argument against the position is presented. |
| | 2 | Mentioned to a moderate extent | Only two arguments against the position are presented. |
| | 3 | Mentioned to a great extent | More than two arguments against the position are presented. |
| Justifications for arguments against the position | 0 | Not justified at all | Justification for arguments against the position is not presented at all. |
| | 1 | Justified to a small extent | Only one argument against the position is justified. |
| | 2 | Justified to a moderate extent | Some but not all arguments against the position are justified. |
| | 3 | Justified to a great extent | All arguments against the position are justified. |
| Response to counter-arguments | 0 | Not mentioned at all | Response to counter-arguments is not presented at all. |
| | 1 | Just mentioned | Response to counter-arguments is just presented, but not elaborated and justified. |
| | 2 | Mentioned and elaborated | Response to counter-arguments is presented and elaborated, but not justified. |
| | 3 | Mentioned, elaborated, and justified | Response to counter-arguments is presented, elaborated, and justified. |
| Conclusion and implications | 0 | Not mentioned at all | Conclusion and/or implications are not presented at all. |
| | 1 | Just mentioned | Conclusion and/or implications are just presented, but not elaborated and justified. |
| | 2 | Mentioned and elaborated | Conclusion and/or implications are presented and elaborated, but not justified. |
| | 3 | Mentioned, elaborated, and justified | Conclusion and/or implications are presented, elaborated, and justified. |

feedback. Since each student received two sets of feedback, the average score from the two sets of feedback was considered as the overall score for the quality of received peer feedback. The same five coders participated in the coding process of the received peer feedback. The inter-rater reliability between the coders was 65% (*Fleiss' Kappa = 0.65 [IC 95%: 0.66-0.84]; z = 16.42; p < 0.001*) indicating a good level of agreement between the coders.

**Table 2.** Coding scheme to analyze features of received peer feedback.

| Nature of feedback | Feedback features | Points | Label | Description |
|---|---|---|---|---|
| Affective | | 0 | Poor – discouraging | The comment included discouraging and negative emotions such as anger or disappointments |
| | | 1 | Average – neutral/not mentioned | The comment did not include either negative or positive emotions |
| | | 2 | Good – encouraging | The comment included encouraging and positive emotions such as praise or compliments |
| Cognitive | Description | 0 | Poor – not mentioned | The comment did not include a summary statement such as description of content or taken action |
| | | 1 | Average – mentioned to small extent | The comment included a summary statement such as description of content or taken action but to a small extent |
| | | 2 | Good – mentioned to a large extent | The comment included a summary statement such as description of content or taken action to a large extent |
| | Identification | 0 | Poor – not mentioned | The comment did not include explicit identification of problem |
| | | 1 | Average – mentioned but not localized | The comment included identification of problem without localization of identified problem |
| | | 2 | Good – mentioned and localized | The comment included explicit and localized identification of problem |
| | Justification | 0 | Poor – not mentioned | The comment did not include elaborations and justifications of identified problem |
| | | 1 | Average – mentioned, elaborated, but not justified | The comment included elaborations but not justifications of identified problem |
| | | 2 | Good – mentioned, elaborated, and justified | The comment included elaborations and justifications of identified problem |
| Constructive | | 0 | Poor – not mentioned | The comment did not include any recommendations or action plans for further improvements. |
| | | 1 | Average – only recommendation is mentioned | The comment included recommendations but not action plans for further improvements. |
| | | 2 | Good – both recommendation and action plan are mentioned | The comment included recommendations and action plans for further improvements. |

## Analysis

In this study, we first controlled the effects of students' education level and course domain on the relationship between the independent grouping variable and the continuous dependent variables. Second, based on the improvements from pre-test to post-test, we used a percentile rank measurement to categorize students into three groups including successful (students whose progress in argumentative essay writing from pre-test to post-test was higher than 67th percentile) (N = 105, 39%), less successful (students whose progress in argumentative essay writing from pre-test to post-test was between 33th to 67th percentile) (N = 62, 22%), and unsuccessful students (students whose progress in argumentative essay writing from pre-test to post-test was between less than 33th percentile) (N = 110, 39%).

Then, the MANCOVA test was conducted to compare the differences in the quality of received peer feedback features of the successful, less successful, and unsuccessful students. Since the sample sizes were unequal, we used the Tukey–Kramer test to determine the pairwise comparisons. Multinomial logistic regression was conducted to predict students' success in argumentative essay writing from pre-test to post-test based on the received peer feedback quality. In addition, homogeneity and normality tests had to be administered. As a result, the Levene test was used to determine group homogeneity, and the Kolmogorov–Smirnov test was used

to determine data normality. It was determined that the groups were homogeneous and the data were normally distributed ($p > 0.05$) after assessing the scores using the Levene and Kolmogorov–Smirnov tests.

## Results

RQ1. How do peer feedback patterns of successful, less successful, and unsuccessful students differ in online learning environments for argumentative essay writing?

The results showed that unsuccessful, less successful, and successful students differ in terms of mean quality scores of their received peer feedback (Pillai's Trace = 0.07, $F(10, 532) = 1.98$, $p < 0.05$, $\eta 2 = 0.04$). This difference was mainly due to the affective, descriptive, and identification of the problem features of feedback. Unsuccessful students received more affective and descriptive feedback types than successful students. Less successful students received more affective peer feedback than successful students. Successful students received more feedback related to the identification of the problem than unsuccessful students (see Table 3).

RQ2. Which types of peer feedback features can predict students' success in online learning environments for argumentative essay writing.

The results showed that students' improvements in argumentative essay writing can be predicted by the received peer feedback features ($\chi^2 = 33.26$, $p < 0.05$). Descriptive and constructive features of received feedback were predicters students' success in argumentative essay writing (see Table 4).

**Table 3.** Differences among successful, less successful, and unsuccessful students in terms of mean scores for received peer feedback quality.

| Variables | | Group | Peer feedback received quality | | pairwise comparisons | Difference between among unsuccessful, less successful, and successful statistics |
|---|---|---|---|---|---|---|
| | | | Mean | SD | | |
| Affective | | Unsuccessful | 1.64 | 0.17 | Successful < Unsuccessful ** | F (2, 269) = 5.1, $p < 0.01$**, $\eta 2 =$ 0.03 |
| | | Less successful | 1.63 | 0.17 | Successful < Less successful * | |
| | | Successful | 1.57 | 0.17 | | |
| | | Total | 1.61 | 0.17 | | |
| Cognitive | Description | Unsuccessful | 1.32 | 0.33 | Successful < Unsuccessful ** | F (2, 269) = 4.80, $p < 0.01$**, $\eta 2 =$ 0.03 |
| | | Less successful | 1.28 | 0.35 | | |
| | | Successful | 1.18 | 0.34 | | |
| | | Total | 1.26 | 0.34 | | |
| | Identification | Unsuccessful | 0.53 | 0.29 | Successful > Unsuccessful * | F (2, 269) = 2.92, $p < 0.05$*, $\eta 2 =$ 0.02 |
| | | Less successful | 0.58 | 0.32 | | |
| | | Successful | 0.65 | 0.41 | | |
| | | Total | 0.59 | 0.35 | | |
| | Justification | Unsuccessful | 0.04 | 0.08 | | F (2, 269) = 2.01, $p = 0.13$ |
| | | Less successful | 0.06 | 0.09 | | |
| | | Successful | 0.08 | 0.13 | | |
| | | Total | 0.06 | 0.10 | | |
| Constructive | | Unsuccessful | 0.79 | 0.34 | | F (2, 269) = 1.61, $p = 0.20$ |
| | | Less successful | 0.87 | 0.32 | | |
| | | Successful | 0.87 | 0.36 | | |
| | | Total | 0.84 | 0.34 | | |

($P < 0.01$)**, ($P < 0.05$)*

## Discussion

In this study, we explored the patterns of the received peer feedback for successful, less successful, and unsuccessful students in an online learning setting within a higher education context. The results of the first research question have led us to know what are the features of the received feedback that cause distinctions among successful, less successful, and unsuccessful students for the argumentative essay writing performance. It was found that affective and descriptive feedback types did not contribute to students' success for argumentative essay writing task. However, when students recieved feedback related to the identification of the problem, they could improve their argumentative essays. These findings are consistent with and supported by previous research indicating that the effectiveness of peer feedback depends on its type and feature (see Carless et al., 2011; Hattie & Timperley, 2007; Shute, 2008; Wu & Schunn, 2020a). For example, Wu and Schunn (2020) found that affective feedback plays a less important role compared to constructive feedback in the improvement of the work. Similarly, Hattie and Timperley (2007) and Nelson and Schunn (2009) reported that feedback with only emotionally positive words is less effective than suggested, justified, and constructive feedback. In another study, van der Pol et al. (2008) found that the feedback that did not include revision suggestions is less likely to be implemented.

In addition, some other scholars found the feedback that is elaborated and justified is effective in improving the work because this type of feedback is better perceived by peers (Lizzio & Wilson, 2008; Strijbos et al., 2010). Likewise, Gielen et al. (2010) found that students who received justified comments in feedback performed better in their revised work. This can be due to the convincing role of justification of the problem in the feedback that can clarify why this particular part of the work needs to be revised. In other words, students who explain and justify their ideas can help their peers better understand the problems and errors in their essays.

All these findings suggest that peer feedback should not only focus on the affective part but mainly focus on the cognitive and constructive part. However, these findings do not suggest that feedback should not contain affective or emotional words, but rather cognitive and constructive.

**Table 4.** Multinomial logistic regression the essay writing improvement and received peer feedback quality.

| | | | | | | 95% CI for Exp (B) | |
|---|---|---|---|---|---|---|---|
| Improvement categories | Peer feedback features | | B | SE | Exp (B) | Lower bound | Upper bound |
| Less successful | Affective | | 0.30 | 1.19 | 1.34 | 0.14 | 13.97 |
| | Cognitive | Description | −0.97 | 0.60 | 0.37 | 0.12 | 1.24 |
| | | Identification | 0.11 | 0.64 | 1.12 | 0.36 | 3.60 |
| | | Justification | 0.80 | 2.41 | 2.23 | 0.03 | 260.19 |
| | Constructive | | −1.18 | 0.98 | 0.30 | 0.05 | 2.12 |
| | Course | Course A | −0.08 | 0.70 | 0.92 | 0.23 | 3.66 |
| | | Course B | −0.25 | 0.67 | 0.77 | 0.20 | 2.88 |
| | | Course C | −0.04 | 0.54 | 0.96 | 0.33 | 2.77 |
| | | Course D | 0.03 | 0.50 | 1.03 | 0.38 | 2.78 |
| | Educational level | | −0.07 | 0.35 | 0.92 | 0.46 | 1.84 |
| Successful | Affective | | −1.40 | 1.08 | 0.25 | 0.03 | 2.09 |
| | Cognitive | Description | −1.58 | 0.54 | 0.20** | 0.07 | 0.61 |
| | | Identification | −0.07 | 0.57 | 0.93 | 0.34 | 2.71 |
| | | Justification | 2.75 | 2.09 | 15.78 | 0.42 | 1085.633 |
| | Constructive | | −1.76 | 0.87 | 0.17* | 0.03 | 0.99 |
| | Course | Course A | −0.31 | 0.62 | 0.73 | 0.21 | 2.50 |
| | | Course B | −0.51 | 0.58 | 0.60 | 0.18 | 1.88 |
| | | Course C | −0.27 | 0.48 | 0.76 | 0.29 | 1.97 |
| | | Course D | −0.09 | 0.45 | 0.90 | 0.37 | 2.19 |
| | Educational level | | −0.03 | 0.31 | 0.96 | 0.52 | 1.78 |

Note: Model $\chi^2 = 33.26$; $P < 0.05$, −2 log likelihood = 557.28, Pearson $\chi^2 = 548.97$, $p > 0.05$; Deviance $\chi^2 = 557.28$, $p > 0.05$; Pseudo $R^2$ (Cox and Snell = 0.11, Nagelkerke = 0.12, McFadden = 0.05).
Improvement categories: dependent variable; Peer feedback features: independent variable
The reference category is: unsuccessful

Affective feedback can provoke peers' emotional reactions and may affect their willingness to uptake the received feedback (Sargeant et al., 2006).

The findings of this study also showed that, in general, students provided more affective feedback compared to cognitive and constructive feedback. These findings are consistent with the findings of Cheng and Hou (2015) and Tsai and Liang (2007). Similarly, Foo (2021) found that students' feedback lacks constructive solutions for further improvements. A plausible reason to explain this finding is that providing cognitive and constructive feedback requires students to have high-cognitive thinking skills to critically evaluate and analyze the quality of the essay, see the problems, and creatively offer recommendations for further improvements (Lafiti et al., 2021). In addition, to evaluate the quality of the essay, students need to have a high level of domain-specific knowledge, so they can provide cognitive and constructive feedback (Valero Haro et al., 2019, 2020; van Zundert et al., 2012). Similarly, Li et al. (2010) and McCarthy (2017) explain that students may not have the necessary skills to provide constructive feedback due to a lack of content knowledge. This suggests that to assist students to provide cognitive and constructive feedback, they should be supported in the peer feedback process in different ways including providing some educational support on how to provide quality feedback and also supports on how to get the required domain-specific knowledge on the topic to be able to evaluate the quality of the essay.

Furthermore, we found that students' success in essay writing was predicted by descriptive and constructive features of received peer feedback. This indicates that students who received a summary statement of their essay and points for improvement from their peers were more likely to improve their essay in the revised version. This is in line with the prior studies that highlight the importance of descriptive and constructive features of feedback for peers' work improvement (Winstone et al., 2016; Yuan & Kim, 2015). For example, Gielen et al. (2010) showed that feedback with clear suggestions results in better learning outcomes. In line with this study, Lu and Law (2012) pointed out that high-quality feedback entails a summary of the work and suggestions for improvements. These results indicate that both descriptive and constructive feedback features play a key and effective role in student success in peer feedback performance.

## Conclusion, limitations, and future research

This study contributes to extending our knowledge of students' peer feedback process and performance and provides insights into how successful, less successful, and unsuccessful students differ in their peer feedback performance for argumentative essay writing. This study revealed that the nature of received feedback plays a critical role in students' success in argumentative essay writing. Feedback with descriptive information (cognitive feedback) and suggestions for further improvements (constructive feedback) was found to be more effective in improving students' argumentative essay writing. This study suggests that for a good performance in argumentative essay writing, students should be encouraged to provide more cognitive and constructive feedback than affective feedback. Despite the effectiveness of the cognitive and constructive feedback, students typically tend to provide more affective feedback. This implies that students should be supported in to provide higher-order types of feedback.

In this study, students had a choice to select one topic among three offered topics. It is possible that the selection of a topic based on students' choices may have influenced the findings of this study. Therefore, the findings of this study should be interpreted with respect to this matter. For future studies, we suggest exploring how different topics may result in different received feedback patterns and uptake among successful, less successful, and unsuccessful students. In addition, although we explored what features of the received feedback can predict students' success or failure in their argumentation performance in essay writing in the present study, we did not explore the role of provided feedback features in students' argumentative essay writing. It would be interesting to explore this in future studies and compare the effectiveness of the received and provided feedback features on students' performance in argumentative essay writing. This can

provide insights into the role of the assessor and assessee in the feedback process and its impacts on students' performance in the context of essay writing in higher education.

Prior studies suggest that students' performance in peer feedback can be influenced by their gender identity (Noroozi et al., 2020), self-efficacy (Wang & Wu, 2008), motivation (Tseng & Tsai, 2010), and cultural background (e.g. language, nationality, and religion) (Tsemach & Zohar, 2021). In addition, since peer feedback is an internal and social process (Huisman et al., 2018), interpersonal factors including perceptions of feedback, trust, psychological safety, and social interdependence can also affect students' argumentation performance. For future studies, we suggest considering these elements in studying the receiving and/or uptake of peer feedback among unsuccessful, less successful, and successful students.

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## Statements on open data, ethics, and conflict of interest

The data presented in this study is available upon request to the first author. Furthermore, upon request, the link to the various modules of the Brightspace environment can be provided by the first author with a username and password. Ethical approvals of this study were guaranteed by the hosting institution. All the information collected from this study has been kept confidential. Students were informed in advance that the data from this experiment will be used for research purposes. In addition, the authors declare that they have no conflict of interest to disclose.

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