



# Peer pressure and web-based peer learning: an exploratory case study

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## Abstract

This study explores whether and how peer pressure influenced students' participation in web-based peer learning (WPL). Fifteen students enrolled in a university reading course were followed over the course of one semester, and interviews with them along with the researcher's observational notes on their learning activities were qualitatively analyzed. Peer pressure slowly and steadily occurred during the students' WPL, with the students feeling differently about it at different levels. All of the students became somewhat used to it later in the semester. The peer pressure was mainly influenced by technological factors (e.g., the openness of the web platform) and non-technological factors (e.g., the academic gaps between students), along with other accompanying reasons (e.g., self-motivation for looking academically decent). The study concludes that students' experiences of peer pressure in relation to WPL involved a gradual process, had multiple causes, and ultimately positively impacted the students, although in the process, peer pressure exerted either negative or positive power on the students.

**Keywords** Web platform · Peer learning · Peer pressure · University students · Reading literacy

## 1 Introduction

Web-based peer learning (WPL) is a learning method that is realized through peer assistance on a web platform (Ko et al., 2022). On the web platform, diverse types of learning resources can be openly and conveniently shared among students (e.g.,

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audiovisual and textual resources as well as learning activities) (Al Abri, 2021; Wang & Reeves 2006). Also, the web platform is characterized by its flexibility in overcoming temporal and spatial constraints associated with traditional learning (Xie & Ke, 2011). More importantly, on the web platform, students are also encouraged to co-participate in learning by assisting each other or learning from each other through diverse means (e.g., by reading and responding to each other's questions and comments) (Al Abri, 2021; Lockyer et al., 1999; Osborne et al., 2018). Such learning methods resonate with theories that emphasize the power and effectiveness of peer learning or peer mediation (Alexander, 2020). Primarily due to these advantages, WPL has been extensively promoted as a stand-alone learning method or as a complement to in-class learning (Ko et al., 2022; Wang & Reeves, 2006). Empirical research has also widely reported its application in diverse educational settings in terms of its affordances (e.g., Zhang 2021).

Meanwhile, peer pressure is a phenomenon that is common in settings involving peer contact (Clasen & Brown, 1985). In this phenomenon, individuals' peers pressure them to do or not do something against their wishes in exchange for making them a member of, or affiliated with, the peer group (Clasen & Brown, 1985). Peer pressure may come from diverse sources and may produce positive, negative, or mixed effects on the pressured individual (Boruah, 2016; Ranjha et al., 2021). Relevant topics have been widely documented in educational settings, where students' behaviors with their peers are a key focus (e.g., Zhao 2021). For example, some students, triggered by what they observe to be their academic gap or by their self-esteem, are pressured to academically perform as well as their peers (Chang et al., 2014; Liu et al., 2001). On another note, students may feel frustrated when they cannot become a member of a peer group (Jiang & Dewaele, 2019; Ranjha et al., 2021). In the context of WPL, students are presumably pressured because peer learning is a key element of their learning plan but is an open learning method where their satisfactory or unsatisfactory performance is made known to their peers and may result in peer pressure (Vanderhoven et al., 2015).

However, the actual occurrence of peer pressure in WPL is only sporadically mentioned in research (e.g., Liu et al., 2001). Possibly, research attention is more focused on the overall value of WPL than on a thorough investigation of the challenge of peer pressure among students in WPL. This focus is understandable since researchers may want to give priority to the need of those seeking effective teaching methods. Yet, it is also worthwhile to help teachers and other educators remain alert for potential challenges when adopting the teaching method, such as by developing a systematic understanding of the students' experiences of peer pressure associated with WPL.

Taken together, given that peer pressure is a part of peer interaction (Clasen & Brown, 1985; Vanderhoven et al., 2015), WPL involves peer interactions and presumably produces peer pressure among learners. However, despite a plethora of research on the affordances of WPL, almost no research has been systematically conducted on it in relation to the peer pressure that students exert on each other. To fill this gap, students' experiences of peer pressure and its relationship to WPL are explored. In so doing, the sources or features and configurations of peer pressure

when students engage in WPL can be understood better and can help teachers and administrators buttress students' engagement in WPL.

## 2 Literature review

### 2.1 Web-based peer learning and peer pressure

Web-based peer learning (WPL) has been widely reported in the literature (e.g., Osborne et al., 2018). This line of literature focuses on the positive experiences that students have at different levels. For example, Al Abri (2021) conducted a quasi-experimental study on university students' engagement in peer feedback through WPL and concluded that WPL helped the students improve their writing quality through mutual peer assistance, both synchronously and asynchronously through the web platform. The research also observed that the web platform supported peer learning and emancipated the students from the temporal and spatial constraints of traditional classroom-based learning. Osborne et al. (2018), using a mixed-methods approach, discovered the effectiveness of peer learning activities on a discussion board for postgraduate students that were enrolled in a course on health leadership and management. Osborne et al. (2018) also found that a few students displayed different levels of motivation due to diverse factors, such as their technological preference for this mode of learning and their emotional alignment with it. The constraints on their effective WPL were also resonated and reported in other studies, such as studies on students' prior learning experiences (Zhang, 2021) and their personality's aptness for peer learning (Fatimah et al., 2021). These constraints were more external and individual than interactive between students. In all, research on WPL has demonstrated the effectiveness of this mode of learning, which represents the synergized power of technological affordances and peer learning while also emphasizing the socio-cognitive constraint factors at play (e.g., the students' emotions).

In contrast, at the socio-cognitive level, peer pressure was only sporadically and briefly reported in a few studies on WPL (e.g., Rimor et al., 2010; Vanderhoven et al., 2015), suggesting the need for more systematic exploration. The paucity of research in the field of WPL may be due to researchers' greater attention to the socio-cognitive factors at the intrapersonal rather than interpersonal level. Nevertheless, research beyond the field of WPL has illustrated well the features of peer pressure (e.g., Zhao 2021; see also Boruah 2016). One feature is the multiple triggers of peer pressure, which suggest an easy emergence. For example, Chang et al.'s (2004) quantitative analysis showed that, in the educational setting, the trigger was especially the students' awareness of academic gaps between them and their peers. Tanaka (2017) suggested that peer pressure among students associated with the mode of learning is caused by the students' tendencies to act like their peers. In other words, group norms have power over peers. Other studies have shown other socio-cognitive factors, such as personality and low self-esteem, dynamically emerging and further intervening in the process, thereby contributing to students' awareness of peer pressure (Bukowski et al., 2008; Fatimah et al., 2021).

Additionally, what merits attention is the complex pattern of interaction between peer pressure and their behavior. On the one hand, students may push for or distance themselves from a group affiliation in a peer interaction context, even though such behaviors are not socially valued, thereby demonstrating the power of peer pressure in dragging students into or excluding them from a mini-society constructed by peers (Clasen & Brown, 1985). For example, Zhao's (2021) quantitative analysis of American students enrolled in a course on building information modeling showed that peer pressure may motivate students in a socially valued way (e.g., to work hard), such that they align themselves with the overall ambiance of the mini-society in which they and their peers exist. In contrast, Ranjha et al.'s (2021) review study showed that peer pressure may de-motivate some students to learn. When peers found that they might not be accepted as members of a peer society, they gave up on trying to catch up with others. Meanwhile, when the students experienced peer pressure and rescinded their efforts to work hard as a result, they also experienced a loss of confidence and lower self-esteem (Bukowski et al., 2008).

Taken together, peer pressure is a common and important element of peer interaction, but little is known about it in the WPL context despite the wide adoption of this learning mode in the 21st century and during the coronavirus disease 2019 (COVID-19) pandemic. To contribute to a systematic understanding of this topic in the field of WPL, this study is guided by the following research questions: (1) Do students experience peer pressure during WPL? and (2) What does peer pressure among students look like in WPL, if it occurs there? This study unpacks the mystery of peer pressure in relation to WPL and calls on teachers and other educators to pay further attention to other learning modes beyond WPL that have been widely recognized in the current educational setting. As such, people who are concerned with WPL may be more considerate when using it to either replace or supplement in-class learning.

### 3 Methodology

This study did not ambitiously seek a generalized understanding of students' peer pressure in relation to WPL. Instead, it used the case study approach, focusing on students' experiences during a university reading course and relying on an interpretive paradigm to achieve a contextualized understanding of the phenomenon (Andrade, 2009).

#### 3.1 Research context and participants

The current study was conducted in a first-semester university reading course offered to English majors. The site was chosen because the researcher was granted access to the learning activities there related to the course, which were also relevant to this study on WPL. Indeed, the academic texts on linguistics and language education that were used in the course to develop the students' understanding of content and their critical thinking were new to the first-semester undergraduates. As a result, the instructor supported their in-class learning by asking them to post their questions

during their pre-class or post-class studying on a web-based platform developed by a Chinese company in order to help answer each other's questions.

The students completed web-based platform activities throughout the semester. Each time a new text was about to be addressed in class, the students were asked to participate in the activities. The students completed the activities 10 times in relation to the 10 texts covered during the semester. Each activity followed the same pattern and consisted of the following: (1) for each of the 10 texts, students were asked to pose two questions; (2) students then answered any other classmate's questions. They were instructed to answer at least one question; (3) the same question could be answered by more than one more student. Those who answered the same question could also participate in a dialogue with each other by echoing or refuting an answer; and (4) the student who posed the question could also interact with their respondents, for example, by pointing out their confusion with the answers provided. The WPL was an obligatory part of the course, but was graded based on whether it was complete or incomplete so as not to give students any extra burden. In other words, if they completed a task on time, they received full credit.

The questions that the students posed were more about content-level questions, with some sporadic questions on sentence structure and language use. Thus, this site's choice was optimal for exploring the students' possible experiences of peer pressure during WPL and how such experience affected their learning on the platform, if ever.

The students have never been exposed to web-based learning in this way. They only had occasional experiences with web-based platforms, though not for learning; they had only used these platforms for signing up for extracurricular activities. Fifteen students from the course, all female, were enrolled in this study. They were chosen because they expressed willingness to share their experiences with peer pressure. They were named student 1 to student 15. They were all born and raised in China. They and all their classmates were used to a test-driven teaching style, in which they only superficially learned the meanings of the text they studied. As mentioned, they almost had no experience with content-based learning before their enrollment in the course. To facilitate data analysis and interpretation, students were categorized at the beginning of the study as being quick-paced, well-performing learners, or as being slow-paced, under-performing learners. These categorizations were based on their own self-perceptions. However, such categorizations were dynamic, which was further determined by the researcher's observation notes on students' learning performances across the semester.

### 3.2 Data collection and analysis

The current study followed the institutional code of ethics and was conducted in accordance with the 1964 Helsinki Declaration. Data collection occurred in a naturalistic setting, meaning that the researcher did not interfere with any of the WPL-related activities. The researcher's unobtrusive role also made the collection and analysis of, for example, observation notes maximally objective. Data were collected in two rounds of interviews with each of the 15 students. The interviews occurred around the middle and end of the semester, respectively. Each interview lasted around 35 min. In addition, the researcher observed the students' in-class learning

**Table 1** Sample Coding Scheme

Codes	Peer pressure	Web-based peer learning (WPL)
	Being latent	The perceived usefulness
	Students' motivation	A peer learning platform
	Self-esteem	Pace of learning
	Being dynamic	The difficulty of tasks
<b>Categories</b>	Feeling pressure	An informal form of learning
	Hindering students' motivation	A venue for knowing peers' progress
	Galvanizing students' motivation	Being dissimilar in the learning pace
	Changing sources	Being aware of own performance
<b>Themes</b>	Peer pressure initially being inactivated; students' realization of peer pressure in the context of their ongoing learning; the punctuation of students' peer pressure at various levels; the impact of peer pressure on the students' WPL	

and their activities on the web-based learning platform throughout the semester. The researcher's observation was unstructured in order to attempt to gain a contextual understanding of the participants' actual learning activities. The observation notes complemented the insights gained from the student interviews.

The collected data were primarily analyzed via inductive thematic analysis (Guest et al., 2011). With all of the data in written form, the researcher began the analysis. The preliminary codes emerged inductively, based on the intensive reading and comparison of data sources. The coded resources included sentences, phrases, and paragraphs of interview transcripts and observation notes. Using the preliminary codes as the starting points, the research continued with another three rounds of immersion in the data sources, recoding the data. In this process, studies on peer pressure and WPL as well as on peer learning were reviewed (Clasen & Brown, 1985; Lyons et al., 2021). A total of 75 codes were finalized. Next, the researcher organized the codes, forming 23 categories. The final step was to identify themes. In retrieving themes, the process was constantly reviewed, not only in relation to the research questions but also to previous literature. In doing so, the researcher hoped to have sufficiently comprehensive presentations of the themes, demonstrating the commonalities or differences in the findings yielded in both the current study and previous studies. Ultimately, to answer the current study's research question, five major themes were finalized. Table 1 provides a sample coding scheme.

The study's validity and reliability were also ensured throughout. First, the study involved multiple sources of data, such as two rounds of interviews and semester-long observation notes. Second, two other researchers skilled in qualitative analysis examined and agreed upon the data transcriptions and analyses. The study participants also endorsed the analysis of the findings presented in the current study. In doing so, the study excluded the possibility of the researcher's way of asking interview questions to nudge the participants to verbalize their learning experiences.

## 4 Findings

Overall, peer pressure was interwoven into the students' WPL, albeit slowly. Its occurrence was dynamically accompanied by changing sources that fell under technological factors and non-technological factors, with underperforming students apparently feeling the power of peer pressure more strongly than those who had been performing well. However, peer pressure positively motivated all of the students later in the semester, despite temporarily causing the underperforming students to dis-align with the learning. Through positive motivation, the students who were initially underperforming were later able to join the students who had been performing academically well.

### 4.1 Inactivated peer pressure: contained by the students' attitudes to and confidence in web-based learning

The peer pressure among the students was not obvious when they embarked on the web-based learning. It only seemed related to the students' attitudes toward this method of learning. "It is just an additional learning, and I do not feel pressure" (student 4). The students initially did not take web-based learning seriously. As such, the openness of the web platform to their peers (i.e., the visibility of their learning activities to their peers and vice versa) did not pressure them. As student 6 further pointed out, "I was not worried about losing face with my questions or answers on the web since it was an informal form of learning for me. I just did what I needed to do". Only a few students referred to the experience as "fun" at this very early stage. "I have never used web-based learning. I think it is new, and it's fun working with each other and seeing others' learning activities on the web" (student 7). Exposed to a new platform, the students, in this early phase of their interactive learning through the web, did not experience peer pressure, but instead welcomed a new experience of group learning.

Such an attitude toward web-based learning was understandable when it was synergized with the students' previous learning experiences. Student 6 noted, "Before entering university, we were learning based on textbooks or working on materials related to high-stakes exams, and we were basically only listening to what our teachers said and doing what they instructed". The students saw their teacher as dominating their pre-tertiary education. Due to their rooted learning experiences prior to university, they habitually valued in-class learning over web-based learning.

At this stage, the students also felt confident that their peers' learning competence was similar to theirs on the open web platform. Their confidence in themselves counteracted the potential sources of peer pressure (e.g., some students' outstanding performance) associated with web openness. "When I just started to share my questions or comments on the text, I noticed that the other students' questions or comments did not differ much from mine. I feel that our learning ability and pace are almost the same" (student 7). Student 8 also added, "I was somehow confident at that time and did not feel any pressure from my classmates". Indeed, the students' initial learning, as well as their questions, comments, and peer assistance were mostly focused on general ideas and were at the paragraph level, which was quite common

for the thinking activities in their prior reading classrooms (from the observation notes). Their almost homogeneous behavior seemed related to the time needed for adjustment. Student 9 further noted, “My thinking patterns at this time, gained from my previous learning, constrained me...and it took time for me to meet the instructor’s expectations”. At this time, some students’ talent for learning was not activated, but was even suppressed by their previous mode of learning and constrained by the new learning context. “New learning standards and expectations...focused on developing our critical thinking—I am not ready for these, although I am a fast learner” (student 12). Later in the semester, though, the students, such as student 9, became active on the web and could already pose questions and answer their teachers’ questions well from a critical thinking perspective (from the observation notes).

Despite the students’ confidence at this time and their report of not feeling pressure, some students also paradoxically acknowledged that peer pressure was already lurking. “I can feel that some students are really excellent. They have just not demonstrated their talent yet at the start of the semester” (student 8). “I knew peer pressure may occur soon, as I saw in class” (student 6). Indeed, in classes, some students, such as student 2, could occasionally join content-based discussions of text-related questions, especially with teacher mediation, but they were not well prepared yet to go that into depth on their own on the web platform (from the observation notes). The students’ self-confidence related to open learning on the web platform was not that strong yet given their observations in class. Either way, at the superficial level, the near-homogeneity of the students’ thinking patterns demonstrated on the web freed them from feeling peer pressure, although such pressure was already looming deep in some of their minds.

## 4.2 Students’ awareness of peer pressure as contextually responsive

The students gradually felt peer pressure regarding using the web platform for learning. The immediate external trigger was the academic performance demonstrated by a few of their peers on the web platform, which was aggravated by the platform’s openness and the students’ self-esteem. Peer performance started to create an ambiance of peer pressure on students from different groups in their respective ways.

On the one hand, the peer pressure was obviously felt by those who considered themselves lagging behind others on the web platform, based on their observation of their peers’ open activities on that forum. “According to what I see on the platform, some students really have innovative perspectives on posing text-related questions and answering relevant questions related to textbook reading” (student 7). Student 6 also echoed this finding and noted, “The questions that some students were asking and answering were no longer merely about sentence comprehension. I feel I am not good enough to do that”. “I feel tense...and pressured” (student 3). Indeed, some students were progressing at a quicker pace than others, demonstrating their critical perspective; for example, they posed questions on the design of the methodology of the research listed in a text or the potential design of the logic of paragraphs (from the observation notes). Such a good performance may be due to their quick grasp of the learning style in class or their self-directed efforts (recall student 12’s early remarks as stated in the preceding section). In contrast, for other students, such as students 6



and 7, their questions and answers on the web at this time were still more about the comprehension of individual sentences and were related to their previous learning style (from the observation notes). Such a learning gap was further made obvious during in-class discussions or their peers' comments on the web. As the observation notes also show, those critical questions, such as from student 12, caused heated student discussions on the web platform, unlike the merely sentence-based questions. In all, for this group of students, their awareness of peer pressure was primarily externally triggered by their observations of their peers' better academic activities that were openly shared on the web.

For underperforming students, their peers' performances seemed to have had a chain reaction of activating their self-esteem, thereby aggravating their awareness of peer pressure. "I felt bad when I found I could not meet the standards our instructor announced.... I am a person of self-esteem. Lagging behind is humiliating for me" (student 8). "I do not want to be the worst student in the class.... I feel I am being dragged behind...and having bad feelings" (student 9). When the students' self-esteem was activated in this context, their awareness of peer pressure increased. In particular, student 7 noted, "In class, if you asked a 'superficial' comment/question, it was gone after that; but on the web, it is permanently recorded, seen by peers over and over again". Such peer pressure related to self-esteem was also made unignorable by the openness of the web platform.

On the other hand, some students who could pose really good questions and comments started to feel pressure later. "I saw some students doing good on the web.... I really admire them...and I also feel a slight pressure" (student 2). Even those who did a good job felt pressure when they compared themselves with those who did well and demonstrated their performance publicly on the web. The peer pressure that some students felt stemmed from the performance of a few of their peers whom they admired. In contrast with these students who were already performing well but who still felt peer pressure from seeing their peers' good performances, some students in the same context were not similarly affected. For example, while student 2 said, "I need to keep working hard and keep pace with my peers and our instructor", student 3 noted, "I think I have been doing a good job. As long as I do it my way and maintain my pace, I can deal with peer pressure". The latter acknowledged her peers' excellence, but maintained a good attitude toward the pressure that arose from it. Such difference in attitude from that of the underperforming students was possible due to the former's adequate performance compared with that of the other students.

### 4.3 The dynamics of peer pressure at a multi-dimensional level

However, over time, the sources of the students' peer pressure seemed to fluctuate, with old ones fading and new ones emerging. For the students who considered themselves lagging behind, the original factors at the academic and technological levels (i.e., their weak academic performance in comparison with others and the openness of the web platform) were replaced by others. As student 4 noted, "These factors are gone, as I am doing well on the web and in class" (student 4). Student 4's self-evaluation was representative of this subgroup. Indeed, by this time, she could already post questions from the critical thinking perspective, such as the soundness

of the support and claim in the text (from the observation notes). Meanwhile, the openness and permanence of the web platform was also no longer a factor of the students' peer pressure. "Following a serious reflection on who I am and what I need to do, as well as what I am doing, I think I am ok with this...I just need to be patient with myself" (student 7). Students' active connections with their identity, progress, and the meaning of learning during their reflection made them open to peer judgment on the web. In other words, students experienced a mature phase where they cleared the factors associated with their early peer pressure experiences.

In this mature phase, however, the students had to face new factors that were related to peer pressure. On the one hand, this group of students pointed out that one's way of thinking cannot be completely changed in a short time to the same way of thinking of those who behaved well at the beginning of the semester. This made them still pale in comparison with those others, although they had already gained the skills taught in class. "Some of my classmates were trained with a science background or a prior repertoire of knowledge. Their view could integrate their training with what they are now learning" (student 7). Some students could do well in arguments, such as by suggesting including a quantitative analysis, which was completely new to those who had not had such training (from the observation notes). In other words, some students picked up what was covered in class and used it to re-engage on the web platform. This somehow alleviated their pressure. However, their realization of their peers' accumulated knowledge during their early training, which is not easy to gain over a short time, resulted in pressure in a new dimension. It was not that they could not do well; it was that some standards were not reachable in a short time.

For those who had been doing well, they were immune to feeling pressure at the start of the semester, but they became sensitive to those who did equally well. "Some topics of texts really take time, and I took time to search for online materials to read, to be critical, as I did with other texts on the web" (student 2). "I guess some students may easily do independent learning in different ways.... It is a piece of cake for them all the time...although I did not ask around about them. Thinking of this made me feel a bit pressured" (student 3). Over time, the pressure that they felt was related more to their perceptions of other students' easy excellence compared with their difficult attempts to remain excellent during their learning process.

#### **4.4 The power of peer pressure in relation to the students' WPL**

Students in the two aforementioned groups displayed different patterns in response to peer pressure. The immediate representation associated with the early phase of peer pressure was the abrupt decrease in confidence and motivation in the students who did not do well. "I initially thought I was good...but now, I see the gap with my own eyes.... I was losing confidence while using that mode of learning" (student 7). Such loss of confidence was aggravated by the students' connections with their old schoolmates. "I realized why they told me there were lots of hidden tigers in university.... It just took time to see this" (student 3). Apparently, these students experienced a phase of seeming disillusionment in the face of peer pressure during the learning.

This is not the whole story, though. “I started to tell myself how to face peer pressure...by reminding myself of my past experiences in dealing with peer pressure” (student 4). “I know that what I need to do is to create an appropriate mindset as regards peer pressure, and to practice such mindset” (student 8). The students started to deal with peer pressure at the level of conceptualizing the learning and practice. The quick change they were able to make was related to another dimension of peer pressure: its effect on motivating them to work hard. “Seeing my hardworking and excellent peers, I had to catch up with them” (student 7). The positive side seemed to triumph over the de-motivating side of peer pressure, especially in the context where the overall trend was to demonstrate academic excellence. The students’ experiences illustrated well the power of a learning context where students were in a battle between their original self and their expected self. At the level of practice, for example, student 5 actively participated in in-class learning. In comparison with her early shyness, she was boldly expressing herself (from the observation notes). Out of class, before she posted comments on the web, she read the texts carefully and also tried to learn from her peers by adopting their approaches. “Through in-class and out-of-class learning, I feel I am grasping critical thinking in text comprehension... and I am feeling better” (student 5). At the level of conceptualizing WPL, echoing student 5, student 8 also noted, “I think I can now accept the exposure of my learning weaknesses on the web...I should get rid of this shyness in exposing myself and of my worries about peer judgment on the web...they are part of learning” (student 8). Such conceptualization was also bolstered by their academic position of themselves. “We are university students, so our demonstration of professionalism is of the utmost importance, and we should put aside our shyness” (student 7). Apparently, in tandem with concurrently occurring factors, the students were displaying their self-initiated efforts at knowledge construction and WPL implementation, and were squarely facing the sources of their peer pressure and trying to behave in a socially valued way despite such challenge.

The students who did well in class, but still experienced peer pressure from those who did similarly well, started reminding themselves to keep up their momentum by being self-motivated to participate in WPL. “I just keep going; I never tried to give up albeit peer pressure” (student 3). “But I do not want to overperform on the web. Then I feel I am too eye-catching. I moderately mitigate my performance, although I am motivated” (student 2). Peer pressure motivated such students rather than demotivated them. The slight difference among them, in terms of student 3 keeping up her momentum and student 2 slightly mitigating her pace, was understandable, as student 2 could have wanted to keep her affiliation to the well-performing group, which was also the dominant group in the setting.

The difference between this group and the group that had not initially performed well was also both obvious and understandable. That is, while the former group faced pressure, this was from peers who were almost equally dominant within the group. It was thus unlikely for them to become demotivated (recall the remarks of students 2 and 3 in the preceding paragraph). This may also be because they were very reflective and well aware of the keys to their academic success in the new context. “Reading is not a once-and-for-all process. When topics change, you may need to make additional efforts to digest them” (student 2). “It is not like doing math; once you know the

formula, you know what to do for a couple of similar questions” (student 3). Indeed, the textbook included diverse topics on language and linguistics, which were new to the students (from the observation notes). As such, students of the well-performing group, in order to avoid lagging behind, were constantly devoted to searching for materials, doing multiple rounds of reading before they posted comments or questions, and revisiting their textbook when helping others. Such efforts were augmented by the students’ experiences with temporary deviation from their normal track of learning. “There was a time I was busy with other courses and did not invest in learning. I then found my comments and questions on the web to be so lame” (student 3). “I did not know how to help others...and I was lost. I saw others helping widely... Peer pressure obviously rose then” (student 2). Against the backdrop of peer pressure and keeping pace with their idols or group, these students realized that, while they had grasped the ways of thinking required in the course, they also had to combine the knowledge of the learning strategy with a constant investment of efforts. This further explains that, in contrast with the other students who experienced a temporary lapse of confidence amidst peer pressure, these students nearly maintained a positive attitude. Peer pressure drove them to work hard as a result of the interaction between historical factors (e.g., their matured understanding of peer pressure) and emergent factors (e.g., their reflective understanding of their ongoing experiences with WPL).

## 5 Discussion and implications

This qualitative study of students’ experiences of peer pressure during WPL yields the following results. First, we saw the complexity of WPL and how students experience peer pressure in relation to this learning method. We further saw that peer pressure existed throughout the students’ learning, but the psychological states involved were not elaborately captured in previous research on WPL (e.g., Liu et al., 2001; Lyons et al., 2021). Indeed, previous research was more focused on the synergized affordances between the technological function and peer collaboration (e.g., Ko et al., 2022; Xie & Ke, 2011). The predominance of research on this topic is understandable since such affordances are obvious in this mode of learning. In other words, the results of this study enable us to understand WPL from a psychological perspective, a challenging dimension of WPL that must not be ignored.

Second, the results of this study show that the peer pressure the students felt during WPL was erratically connected with both technological factors (e.g., the openness of the web platform) and non-technological factors (e.g., the students’ previous repertoire of knowledge and individual differences). These factors dynamically changed in the course of the process. For example, some of the students once considered the openness of the web platform to be risky for their self-esteem, and thus, it was a factor in peer pressure during peer learning. However, they gradually embraced it with their reconceptualization of themselves and with their academic progress. Thus, the myth regarding the sources of students’ peer pressure was qualitatively deconstructed to reveal its multiple dimensions and dynamic features. Complementing previous research on peer pressure where sources of peer pressure were statically unearthed in and out of the field of web-based learning (e.g., Chang et al., 2014; Vanderhoven et

al., 2015), this study also contributes to a detailed and dynamic understanding of the features of peer pressure triggers, especially in the WPL setting.

Third, this study shows the close interaction between peer pressure and students' learning activities demonstrated on the web. As shown in this study, there was a predominant positive relationship where students were motivated by peer pressure, but for a time, some showed demotivation in response to peer pressure. The relationship between the two was not linear but was mediated by diverse factors (e.g., the students' self-esteem, self-agentive efforts, identity, or confidence, depending on their individual differences) against the learning setting where the overall ambiance was concerned with academic improvement and excellence. In the end, the students seemed used to peer pressure, were acting upon it, and invested in learning in the WPL context. On the one hand, the power that peer pressure had to motivate or demotivate the students toward peer group membership, affiliation, or disaffiliation was similar to other educational settings (e.g., Jiang & Dewaele 2019; Ranjha et al., 2021). In this sense, the power of peer pressure in the context of web-based learning is nothing special, as it is present in other social settings. However, this study showed that the students ultimately seemed to have become used to and motivated by peer pressure while engaging in WPL, thus projecting a positive journey. This result differs from that of previous research on web-based learning and fields beyond, which showed dichotomous (i.e., positive and negative) effects of peer pressure on student learning (e.g., Liu et al., 2001). The finding in the current study shows that students' web-based peer pressure converged in the direction of being unidirectionally and positively motivating students. The positive result of this study was likely made possible by the synergy of this semester-long qualitative research and the students' adjustments to web-based learning. In this sense, this study contributes to the literature on the relationship between student learning (not limited to web-based platforms) and peer pressure (e.g., Jiang & Dewaele 2019; Liu et al., 2001). As a result, it shows the emergence of the unidirectional power of peer pressure to motivate underperforming students, especially when the external learning ambiance or the group is, on the whole, positively oriented toward academic success and when the students' agency is activated (see also Zhao 2021).

The study's implications are as follows. First, in the WPL process, peer pressure is common and continuous, especially due to the openness of the web platform and the permanency of its recording of learning activities. During the students' transition to WPL, it is important to prepare them for both its affordances and its potential to create peer pressure. One way to do this is by helping them, at the very beginning, appreciate how the advantages of WPL transcend the peer pressure they might feel during their learning. This is especially important during a pandemic, when web-based learning is used more widely than in normal times. As Devlin and Samarawickrema (2022) noted, "Educators are now more aware that they have the responsibility to continue to facilitate student learning with compassion" (p. 27). Another way is to encourage students to activate their agency in adjusting to the mode of learning. Since the factors associated with their experience of peer pressure change dynamically, especially at the student level, their timely self-manuevering may be helpful. Second, teachers also need to care for students' emotions when they experience peer pressure while using web-based learning. Teachers may provide encouragement or other forms of help

(e.g., by giving them the option of group-based participation, where they join groups comprised of academically advantageous students) when they feel peer pressure while doing activities on their own. On the spectrum's other end, teachers also need not be so worried about peer pressure, as it may also be a means of academically motivating students (Liu et al., 2001; Zhao, 2021). What teachers need to address is peer pressure that cannot be mitigated and may negatively impact some students over a long time. In this case, supplementary measures may be adopted in a timely manner; for example, teachers may allow their students to withdraw from WPL and communicate with them in the way they prefer until they feel ready to re-engage in the learning method. Third, at a time when technology use seems a must, especially during a pandemic, administrators still need to be cautious with the unpleasant effects that technology may have on students, bearing in mind students' interests regarding technology use. Timely communication with teachers and understanding of students' learning experiences may be necessary to provide campus-based remedies, to maximize the learning effect, and to achieve the highest quality inclusive education in web-based learning contexts.

## 6 Limitations of the study

Due to the methodology and sample method used in this study, its findings may be constrained. For example, in this study, the students were from a top-notch university and were all females. They ultimately reported that they became used to peer pressure and that it propelled them to work hard under such pressure. In addition, studying in a top-notch Chinese university tends to be competitive and a factor for students' peer pressure, which is different from, for example, those in Nordic countries, where competition between students is purposefully restrained—the aim is to learn, not to compete. However, in the current study, with a focus on peer pressure and WPL, the university itself did not emerge as a factor in students' peer pressure, as revealed from the data collection and analysis. The finding was no surprise, given that the current study is a case study and is limited to a specific setting and group of students in a class. Future research could involve a comparison with those studies in other universities, and see whether universities could be a factor that is aggravating students' peer pressure. For example, future research could involve participants with diverse backgrounds (e.g., students from different years) and from different tiers of universities in different countries in order to expand the understanding of students' experiences of peer pressure over a longer time or in relation to more factors. Future research could also adopt a quantitative approach, investigate the dynamics of peer pressure on a larger scale, and generate generalized findings. In addition, the current research is conducted as a stand-alone case study. Under counterfactual circumstances, peer pressure may also emerge. Future research could conduct a comparison with another group that was not exposed to WPL in order to strengthen the findings revealed in the current study.

**Data availability** The datasets used for the current study are not publicly available due to the need of protecting the participant's personal privacy, but are available on reasonable request.

## Declarations

**Competing interests** There is no conflict of interest.

**Ethics approval** The study was conducted in accordance with the ethical principles approved by the university the researcher is affiliated to.

**Informed consent** All the participants have given their consent.

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