Agency in Development through Mobile-Technology-Assisted Interaction: Agentic Learning Behaviours and Emerging Dimensions

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Abstract
Discussion on agency has been well documented in language research and recently gaining more ground in the ever-changing learning environment supported by mobile technologies. In such ubiquitous settings, online interaction, as a key catalyst to promote agency, has attracted an increasing attention of researchers and educators. However, a paucity of research has been focused on investigating the way learners exercise their agency in mobile-technology-assisted online interaction and factors that may affect their practice of agency. This research employs a case-study approach to examining how interaction helps enable learners' development of agency in a mobile social network application (WeChat) assisted informal learning environment. Data were collected through a questionnaire and recorded interaction via discussion activities on WeChat. The questionnaire data indicated that participants had overall positive attitudes towards WeChat-assisted learning and helped gauge the feasibility of implementing subsequent WeChat-assisted discussion activities in this study. Suárez et al.'s (2018) six dimensions of learner agency (goals; content; actions; strategies; reflection; monitoring) were adopted as an analytical framework to guide data analysis and discussion. It was found that towards the completion of discussion sessions on WeChat, except agency in 'monitoring' discussion progress, all the other five dimensions were observed and strengthened in terms of initiating discussion 'goals', leveraging 'content', implementing 'actions', employing discussion 'strategies', and 'reflecting' on the content and interaction. It is argued that even with practice effect, teacher intervention still seemed to be indispensable to help 'monitor' the discussion progress in a mobile-technology-assisted autonomous learning environment.
Keywords: Learner agency, Learner interaction, Mobile-technology-assisted learning, WeChat

1. Introduction
Language research and learning theories tend to prioritise learner interaction, which is often viewed as proceeding along a continuum from the monologic to the dialogic in language classrooms (Haneda & Wells, 2008; Kokoç & Altun, 2021). Dialogic learner-learner interaction has long been considered beneficial in cultivating learner autonomy (Gass & Mackey, 2007), enhancing willingness to communicate (Cao & Philp, 2006), and facilitating development of learning strategies (Kibler et al., 2017). However, factors that may hinder learner interaction have been constantly identified in research conducted in EFL (English as a Foreign Language) contexts, such as teacher-student power relations (Maulana et al., 2011) and curriculum 'topic affordances' (Yashima et al., 2016, p. 120). These culture-bound and context-specific factors in part have led to EFL learners' silence in teacher-centred classrooms (King, 2016), and further contributed to learners' receptive rather than productive learning modes (Shen et al., 2015).

Research to date, has witnessed a gradual change in the wide landscape of technology-assisted learning, particularly in ways learners learn and interact as compared to learning in traditional teacher-led classrooms (Golonka et al., 2014; Jedishkem et al., 2023; Xu & Peng, 2017). Renewed curricular initiatives in the global educational context have tended to place a priority on technology-assisted and self-regulated learning (Galikyan et al., 2021; Jiang et al., 2020). However, after a wide integration of cutting-edge technologies into EFL classrooms, the little changes observed seem to be of a superficial nature (e.g., paper-based materials are 'technologised' with no changes to pedagogies) (Kettle et al., 2012).

Researchers and practitioners in recent years have shifted more attention to teaching and learning beyond the formal classroom to seek alternatives to provide EFL learners with more opportunities for interaction and agency exercises (Andersen et al., 2022; Chuang et al., 2018; Leong, et al., 2018; Shadiev et al., 2017; Xing, 2022; Xu et al., 2017). A call for individualised learning experiences driven by mobile technologies (Kukulska-hulme & Shield, 2008) has led to the notion of agency becoming a priori to be adopted to theoretically guide research on mobile-technology-assisted learning (Suárez et al., 2018), hence a key analytical construct to support data analysis and discussion in the current study.

A search of different combination of keywords (e.g., mobile-technology-assisted learning and agency) was

conducted in Google Scholar and ERIC (Education Resources Information Centre). Theoretical discussion and recent empirical studies on agency exercise and interactive learning supported by mobile technologies, WeChat in particular, were reviewed and synthesised, to help identify the gaps this context-specific study aims to fill.

2. Literature review
2.1 Mobile-technology-assisted interaction
Studies on interactive learning in a mobile-technology-assisted online environment have been focused on a wide range of perspectives (e.g., Community of Practice, Qi & Wang, 2018; peer relationship, Lee & Bonk, 2016), with a large number touching upon the role of course requirements and teacher intervention (Mayfield et al., 2013; Shih et al., 2015; Zheng & Warschauer, 2015) in shaping learning behaviours online (Fattah, 2015; Hsu & Ching, 2012; Junco, 2012; Kizilcec et al., 2017; Pham et al., 2014). The nature of technology-assisted learning activities being compulsory or voluntary, and their task-technology fit appear to be major influential factors affecting learning behaviours and behavioural intentions (e.g., Lee & Lehto, 2013; Leong et al., 2018; Lin & Wang, 2012; Lu & Yang, 2014).

In a study based on compulsory Twitter-based microblogging tasks, Hsu and Ching (2012) investigated the feasibility and effectiveness of employing Twitter as a platform to facilitate informal leaning beyond the classroom to complement formal learning. Participants were observed to actively engage in microblogging practices (a total of 361 tweets were posted during nine weeks), but their active participation was argued to be largely ascribed to assignment requirements (91% of the posts were related to the assigned tasks). In another study without the constraints of course requirements (Pham et al., 2014), learners' participation was found to be far less satisfactory in an elective online course (0.1 messages on average were posted per learner per week). Although both instructor-initiated and learner-initiated conversation exchanges were observed, instructor initiations were largely one-way communication (e.g., announcing discussion topics) and learner-initiated interactions were limited to socialising.

Besides course requirements, Lin and Wang (2012) found that teachers played a crucial role in boosting learners' use of an e-learning system to self-manage and share knowledge. Through tracking blog-based online interaction of English learners in an immigrant community, Zheng and Warschauer (2015) also found that the teacher played an inevitable role in initiating interaction and monitoring learner participation, particularly at the initial stage of online tasks, contributing to a student self-initiated interaction pattern towards the completion of the study. Another recent study (Zheng et al., 2022) highlighted the significance of students "befriending" their teachers to promote interaction, affective and cognitive learning in a mobile social network application assisted online learning.

Research findings reviewed above may allude to the necessity of providing teacher scaffolding and intervention, as well as integrating course requirements in mobile-technology-assisted online learning activities, even though online learning is often conceived to be a space to exercise autonomy and self-regulation (Crompton, 2013; Kukulska-hulme & Shield, 2008).

2.2 Learner agency
The rapid advancement and frequent adoption of technologies in language research and education have been given high expectations to support agentic learning in high education contexts, leading to increased research interests in the notion of agency (e.g., Kohn & Hoffstaedter, 2017; Liu & Chao, 2017; Manyukhina & Wyse, 2019; Xiao, 2014). Agency refers to one's self-regulatory abilities, belief systems and distributed functions that work together to guide intentional actions (Bandura, 2001, p. 2). Learner agency is strongly linked to, but distinguished from learner autonomy (Benson, 2013). Learner autonomy, the capacity to independently take control of one's own learning, is believed to be socially produced from the perspective of agency (Gao, 2010). Effective autonomous learners view themselves as active agents and are able to consciously exercise agency through different strategies to construct their learning experiences (Bown, 2009).

Research tends to relate agency to learners' abilities to initiate self-regulated learning behaviours (e.g., Bown, 2009; Huang, 2011) and the learners who can generate their own goals with motivations are conceptualised as autonomous agents (Luck & d'Inverno, 1995). Guided by socio-constructive perspectives on learning, learners are viewed as agents who constantly engage in the co-construction of their own learning conditions (Lantolf & Pavlenko, 2001). More than being reactive and responsive, learners as agents are deemed to be able to also have an impact on their contexts (Sealey & Carter, 2004). A proliferation of opportunities for autonomous or self-regulated learning in a mobile-technology-assisted environment has highlighted the importance for learners to cultivate a sense of agency to make the most of learning opportunities and technological affordances (Mercer, 2011). However, in such an emerging ubiquitous and autonomous learning environment, the extent of teacher involvement seems to continue playing a part in affecting learners' perceptions towards technological affordances, as well as agency exercise orientation (e.g., individual-oriented or social-oriented) (Liu & Chao, 2017).

Technologisation has helped expand the educational repertoires and transform the status quo in higher education (Lillejord et al., 2018). However, the implementation of technology-assisted pedagogy, not viewed as

determinism, appears to be difficult to happen without human agency (Aagaard & Lund, 2020). This has made it necessary to empirically observe how learners develop and exercise agency in situated process of interaction and learning (Mäkitalo, 2016; Stenalt & Lassesen, 2021), particularly in an era where 'algorithms' in education are widely embraced (Harari, 2017). Agency has been argued to be "decisive in what form digitalisation takes and what educational objectives it serves" (Aagaard & Lund, 2020, p. 7), perhaps a prerequisite for conscious transformation from transmission to constructivist instructional models. Hence, this study adopts agency as the theoretical foundation to underpin discussion on the extent to which learners are able to break away from the traditional structured instructional settings and take initiatives to transform learning behaviours in a mobile-technology-assisted environment.

Building on Bandura's human agency features (Bandura, 2001), Suárez et al. (2018) developed a more specific framework to examine the degree of learner agency in mobile-technology-assisted learning (p. 41). The definitions for each dimension of learner agency have been adapted to better suit the context of the current study (discussion activities on a mobile social network application – WeChat):

Goals (opportunities to set up the directions of discussion);
Content (opportunities to decide which information can be used for discussion);
Actions (opportunities to decide what and how to respond in the discussion);
Strategies (responsibility for how to construct responses in the discussion);
Reflection (opportunities to reflect on the discussion content and teacher/peer posts);
Monitoring (opportunities to regulate discussion progress).

This framework of learner agency is employed in this study as an analytical tool to guide data analysis and discussion on how learner interaction was enhanced to support agency exercise in WeChat-assisted discussion activities.

2.3 WeChat-assisted learning

Mobile social network applications have been widely acknowledged as beneficial to provide access to authentic discourse (Andujar, 2016; Tong et al., 2022), promote socialisation and collaboration (Baek et al., 2017; Troussas et al., 2014), and boost learning performance (Sung et al., 2016). The application adopted in this context-specific study to facilitate interactive learning and agency exercise is WeChat, combining multi-lingual text entry, audio/video chatting, picture/document sharing, etc. into one platform. With more than one billion users in the globe (Statista, 2020), WeChat has recently gained an increasing attention across educational contexts as an educational tool to facilitate knowledge exchange (Qi & Wang, 2018; Wang et al., 2016; Zhou et al., 2022) and language learning (Wang & Jiang, 2022; Xu et al., 2017; Xu & Peng, 2017).

Xu et al. (2017) investigated the usefulness of WeChat in facilitating video-based English-speaking tasks (e.g., recounting video clips via voice messaging on WeChat) and providing teacher feedback on a group of Chinese university students' oral production. Through a post-study questionnaire, a majority of the participants expressed their willingness to learn and interact with teachers on WeChat, and teacher corrective feedback provided on WeChat was reported to be helpful to compensate for the limited instructions and feedback received in physical classroom settings. Wang et al. (2016) paired a group of Chinese EFL students with a group of Australian students learning Chinese as a foreign language and examined the affordances of WeChat to facilitate semi-synchronous knowledge exchange for language development via topic-based discussion tasks. A range of features on WeChat (e.g., emoji; pictures), in particular an integration of voice and text chat into one interface, were adopted by the participants to support collaboration and meaning negotiation. The participants from two distinguished contexts were observed to be active in providing peer feedback and engaged in the tasks with a high level of interactivity. The involvement of instructors (teachers) in the chat groups was also found to be crucial to provide necessary scaffolding and guidance to well prepare the participants for tasks.

A larger percentage of studies employing WeChat for language development have tended to focus on teaching and learning Chinese as a foreign language and paid more attention to conversation exchanges between teachers and learners (e.g., Wang & Jiang, 2022; Zhou et al., 2022). The way learners exercise their agency through learner-learner interactions has been rarely examined, nor factors that may affect practices of learner agency in an online learning setting. Regarding research methodology, previous studies adopting mobile social network applications to facilitate learner interaction have shown a tendency to rely on a frequency analysis of learners' online posts to gauge the participation level, while there seems to be an overlook on the content of interaction (e.g., Hsu & Ching, 2012; Zheng & Warschauer, 2015).

Compared to the sample size in previous studies on learner perceptions towards WeChat-assisted learning (e.g., participant no. = 16, Xu & Peng, 2017), the current study recruited a relatively larger number of participants (no. = 105). It aims to: 1) corroborate previous findings regarding learner perceptions towards WeChat-assisted learning through collecting more empirical data extracted from this context-specific case study to inform about the feasibility of subsequent WeChat-assisted learning activities; and 2) investigate the extent to which WeChat-assisted discussion activities can help promote agentive learning behaviours. The two research questions that the

current study aims to address are as follows:

1. What are learners' perceptions towards WeChat-assisted learning in this context-specific case study?
2. How can the participants' agency exercise be enabled and supported through discussion activities on WeChat?

3. Research methodology

A case study approach was adopted for data collection (Baxter & Jack, 2008), aiming to gain in-depth understanding about this particular group of learners' perceptions towards WeChat-assisted learning and how they exercise agency in WeChat-assisted discussion activities. This study was conducted at a Chinese multidisciplinary university, where WeChat was not employed as a formal educational tool. A total of 105 third-year English major undergraduates voluntarily participated in this study at the beginning of their third academic year. All the participants had passed TEM4 (Test for English Major Four in China), which took place at the end of their second academic year. The passing score of this national test (60%) is approximately equivalent to IELTS band 6.0 – 6.5 (see Dunlea et al., 2019, for the results of mapping China's standards of English language ability to IELTS). This ensured that the participants were able to take part in this study under English instructions (e.g., completing questionnaire and discussing in English). Prior to research, it was confirmed that each participant possessed at least one smartphone with access to internet and had the mobile social network application – WeChat installed.

Data were collected from two instruments: a questionnaire and recorded interaction on WeChat. The questionnaire (see Appendix), which is useful to avoid researcher bias and facilitate efficient data collection from a large sample size (Gillham, 2007), was devised to gather information relating to participants' perceptions towards WeChat-assisted learning. It also helped gauge the feasibility of implementing subsequent WeChat-assisted discussion activities. Recorded interaction on WeChat helped provide data for discussion on how learner agency could be enabled and developed through teacher-mediated interaction, as well as factors that affected students' agency practice and online participation.

3.1 Questionnaire

A total of 112 paper-based questionnaires were sent out to six classes of third-year university English major students. All the questionnaires were returned, with seven excluded due to incompletion. The questionnaire (see Appendix) commenced with two general questions enquiring the participants' frequency of using WeChat to learn English and in what ways it had been used. These two questions were followed by 25 Likert-scale items collecting information regarding the participants' perceptions towards WeChat-assisted learning (a five-point scale and the choices range from 1 – Strongly Disagree to 5 – Strongly Agree). The design of the Likert-scale items was guided by the Technology Acceptance Model (Perceived usefulness; Perceived ease of use; Attitude toward usage) (Davis, 1989), and the items were adapted from previous studies surveying EFL (English as a foreign language) learners' perceptions towards learning facilitated by computers and mobile devices (Shen et al., 2015; Bogart & Wichadee, 2015; Jarvis & Achilleos, 2013).

A pilot study was conducted to test the Likert-scale questionnaire items. Questionnaire data acquired from the pilot study were computed and analysed through SPSS (Statistical Package for the Social Sciences, Version 22). The analysis results showed that the inter-correlations of variables in the questionnaire were adequate (Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.938) and the null hypothesis was rejected (p-value of Bartlett's Test of Sphericity = 0.000). In the current study, a total of 25 Likert-scale items were first examined by a reliability analysis and a test of bivariate correlations (i.e., a validity test) test through SPSS. Analysis results showed a high level of internal consistency (Cronbach's alpha = 0.936) and all items were valid (i.e., p-value < 0.05). They were followed by a t-test to help calculate the means of each item and map the participants' perceptions towards WeChat-assisted learning.

3.2 Discussion activities on WeChat

Among 105 participants who completed the questionnaire, a class of 18 respondents volunteered to participate in the follow-up WeChat-assisted out-of-class discussion activities. Three virtual discussion groups were created on WeChat (six participants in each group). Small groups can help reduce the possibilities of learners' limited or non-participation commonly observed in big groups in an online learning environment (Shu & Gu, 2018). A teacher, who delivered a face-to-face intensive reading course to these participants, was involved in each of the three WeChat groups to provide instructions and guidance for discussion activities.

A total of four sessions of topic-based discussions were carried out on WeChat and completed over a time span of one month (each session lasted for one week). The discussion topics and schedule were intentionally planned to be in alignment with the participants' compulsory reading course to maximise their interests in taking part in the discussion activities. The discussion was graded by the teacher and factored into participants' final grade of the course. All discussion topics were initiated by the teacher and each topic was related to a unit in the participants' intensive reading coursebook (Contemporary College English 6, Yang, 2003), as shown in Table 1.

Session 1	Reading in coursebook	"Nettles" – Alice Munro
	Discussion topic on WeChat	Love and marriage
	Teacher initiation	Teacher shared a short video of an American young couple talking about their five-year relationship, and asked participants to discuss how different it is compared with Chinese couples.
Session 2	Reading in coursebook	"The one against the many" – Arthur M. Schlesinger, Jr.
	Discussion topic on WeChat	The greatest country in the world
	Teacher initiation	Teacher shared a short video clip from the TV show "The Newsroom", and asked participants to share opinions on "why America is the greatest country in the world".
Session 3	Reading in coursebook	"Inaugural address" – John F. Kennedy
	Discussion topic on WeChat	Comparisons between John F. Kennedy's and Donald Trump's inaugural speeches
	Teacher initiation	Teacher shared the video and written transcripts of Donald Trump's inaugural speech, and asked participants to discuss in what ways the two speeches are different and why.
Session 4	Reading in coursebook	"How to get the poor off our conscience" – John K. Galbraith
	Discussion topic on WeChat	Similarities and differences between the 50s, 70s and 90s
	Teacher initiation	Teacher asked participants to discuss the lives of the 50s, 70s and 90s in China from different aspects and compare with western counterparts.

Table 1: WeChat discussion topics and brief description

All recorded interaction during discussion sessions on WeChat were exported and organised by the same teacher; researchers were not involved in the discussion sessions to mitigate the observer effect, thus having no access to the original conversation history. Conversation exchanges were coded based on three interaction patterns, i.e., 1) teacher monologues (teacher instructions/questions/initiations); 2) teacher-student interactions; and 3) student-student interactions. Data analysis is focused on reporting on the dimensions of learner agency (i.e., goals; content; actions; strategies; reflection; monitoring) that emerged in teacher-student and student-student interactions on WeChat, as well as how participants' agency progressed throughout four sessions of discussion.

4. Results
4.1 Questionnaire
The questionnaire (see Appendix) includes two general questions respectively enquiring the participants' frequency of using WeChat to learn English and in what ways it had been used, followed by 25 Likert-scale items investigating the participants' perceptions towards WeChat-assisted English learning (a five-point scale and the choices range from 1 – Strongly Disagree to 5 – Strongly Agree). Participants' comments for the open-response question item 1.2 were summarized by keywords and categorised into two strands, one relating to the usefulness of WeChat and the other relating to the reasons why WeChat was not used for English learning.
Regarding the frequency of using WeChat to learn English, 34.3% (cumulative percentage) of the respondents used WeChat on most days, or more frequently, as shown in Table 2.

	Number of responses	Percentage
Every day	18	17.1%
Most days	18	17.2%
Two or three times a week	33	31.4%
Hardly ever	25	23.8%
Never	11	10.5%

Table 2: Frequency of using WeChat

Table 3 summarises the ways how WeChat was used by the participants to learn English and the reasons why WeChat was not used.

Usefulness	Multiple functionalities for learning (e.g., document sharing; knowledge exchange); Accessibility to English learning materials (e.g., public WeChat accounts).
Reasons why WeChat was not preferred	Preferences for other mods of learning (e.g., books and computer); Preferences for other mobile learning apps (e.g., Zhimi vocabulary; Fun dubbing); Learning not structured; Easy to be distracted.

Table 3: Respondents' comments on WeChat-assisted English learning

The 25 Likert-scale items were examined by t-test through SPSS and the results showed that the means of 23 items out of 25 were above or close to 3.00 (see Figure 1). This implied that a majority of the participants held neutral or positive attitudes towards WeChat-assisted learning, although WeChat had not been frequently used by most of the participants to learn English (only 34.3% claiming their use on most days, as shown in Table 2). These initial questionnaire results helped provide validity of designing and implementing follow-up WeChat-assisted discussion activities with this group of English learners.
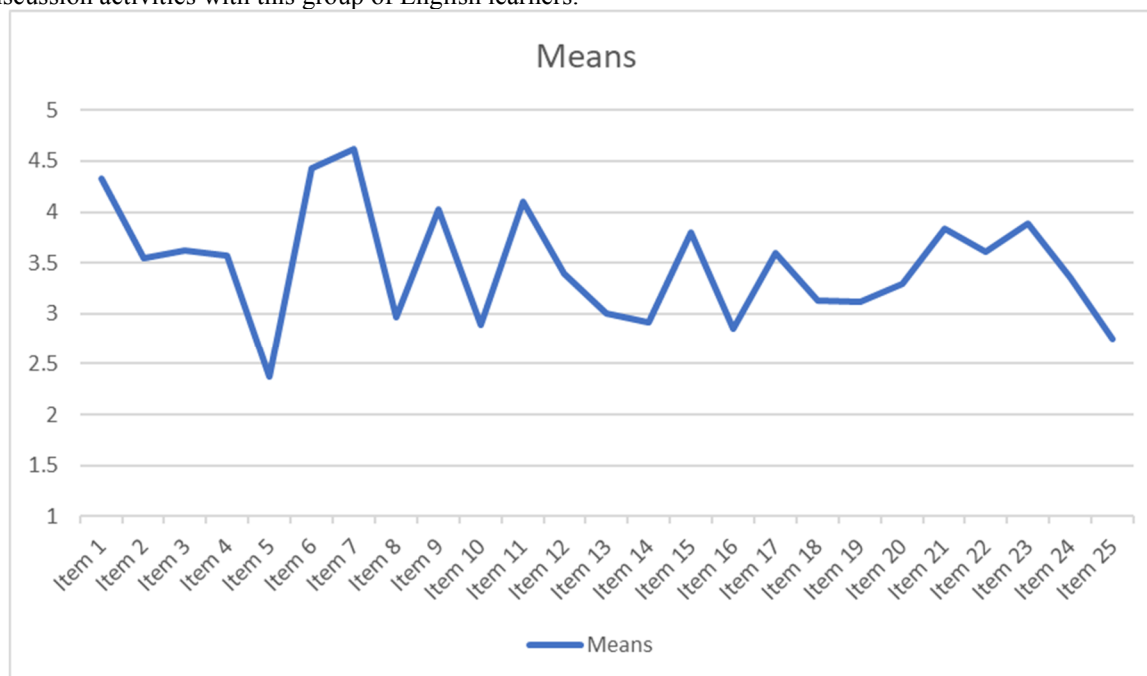

Figure 1: Means of 25 Likert-scale items

4.2 WeChat-assisted discussion
Sessions one and two
Both of the first two sessions commenced with teacher instructions informing participants of the discussion topics and what was involved as fixed content (i.e., materials provided by the teacher), as shown in Exchange 1 for an example.
Exchange 1:

Teacher:	Dear students, we are learning Unit 4 Nettles this week, which is about marriage and love. I will send you a video clip of an American young couple talking about their perspectives on marriage and love. Please have a look and post your opinions.

It should be noted that after the instruction was provided in the first session for a long period of time, there was no response observed in all three WeChat groups. The teacher, then, added a set of follow-up questions to try to prompt thinking and interaction, as shown in Exchange 2.
Exchange 2:

Hi students, please try to provide some responses to the following questions after watching the video clip:
1. Are there any changes to your perceptions towards love and marriage in Western culture?
2. What are your opinions now on love and marriage?
3. In what aspects do you think how love and marriage are perceived in China is different from that Western culture?

Responses from a small number of participants started appearing after the set of teacher questions were posted, as shown in Exchange 3 for an example.
Exchange 3:

Student A:	1. Yes, my opinion have changed after watching the video clip. I think there is something about love and marriage that different cultures share in common. 2. My opinion is that people in western countries tend to follow their feelings when it comes to love and marriage. Their love is more intense and passionate, but our culture is more reserved. I think Chinese younger generations' perspectives on love and marriage have been largely influenced by western movies. 3. I think the major difference is Chinese people's perspectives on marriage tend to be easily influenced by their parents and what people say around them.

In Exchange 3, the teacher questions helped guide Student A to reflect on the fixed content (the video clip) and

relate her prior knowledge and perceptions to the video content. Student A's detailed answers, though presented in a colloquial manner, demonstrated her reactive autonomy in taking part in the discussion, but her agency in initiating and constructing responses seemed to be largely constrained by placing too much attention to addressing teacher questions.

As the discussion proceeded, teacher initiation and intervention were observed to play an important role in eliciting participants' interactions and maintaining their engagement and teacher-student interactions constituted a greater portion of discussion in sessions one and two, as shown in Exchange 4.

Exchange 4:

Teacher:	What about others? @Student B @Student C?
Student B:	1.I had no opinion on marriage so it did not change anything.
	2.I feel they take marriage less seriously and regard it as an opportunity to better themselves and mature together rather than an end to their freedom.
Teacher:	If they take marriage less seriously, how can they be together for nine years?
Student B:	If they were more cautious it should have taken longer time for them to get married.
Teacher:	I think it took them 5 or 6 years to get married, because they met and started dating when they were in high school. Wasn't it long enough?
Student B:	I do not think it's long enough for young adults, as they haven't encountered enough people to make the right choice. And the reason why this footage stands out from crowd just is that it is unusual for young couple to maintain their relationship for this long from my perspective.

In Exchange 4, Student B responded to teacher questions after being tagged and asked individually. Although Student B claimed that she "had no opinion on marriage", she was encouraged through teacher intervention to provide clarification on her claim, which demonstrated her agency in reflecting on the validity of the fixed content ("the reason why this footage stands out … is that it is unusual …").

As the discussion continued, peer interactions started to be more frequently observable, although most of them were still presented in colloquial language, as shown in Exchange 5.

Exchange 5:

Student C:	I think to me, it's easier to say I love you in English than in Chinese.
Student D:	Agree. It's much easier to say if it's not mother tongue.
Student C:	Also, I have been watching Desperate Housewives. I feel Americans highly value passion, that kind of feel.
Teacher:	It has been exaggerated in TV. How the man dated his girlfriend in the clips is totally different from that.
Student C:	There was a scene. The man was set up to get married. He was found having an affair by his wife. Then he just said to his wife because the passion was gone.

In Exchange 5, instead of taking turns responding to teacher questions, Student D showed her agency in responding to peer posts by agreeing with Student C's personal experiences and providing reinforcement. Student C's mention of a TV show – Desperate Housewives, showed her agency in leveraging additional resources (dynamic content) to reinforce claims.

Sessions three and four

When the discussion proceeded to the third and fourth sessions, general teacher instructions were still provided (see Exchange 6 for an example), but follow-up teacher questions were intentionally not given to examine the extent to which participants were able to take more initiatives in discussion after practices in the first two sessions.

Exchange 6:

Teacher:	There are similarities and differences between the post-90s generation, their parents' generation, and their grandparents' generation and each generation has similarities and differences compared with their western counterparts. You may start discussion from aspects of education, attitudes towards marriage and cultural life.

Not long after the instructions were provided in both sessions three and four, a few participants started posting relevant ideas and even actively responding to each other's posts, as shown in Exchange 7.

Exchange 7:

Student E:	For nearly all the grandparents' generation is in retirement situation. They are also stressful. Many old people feel an empty feeling after retiring, for that they have no chance to provide own value.
Student F:	But after being tested by these difficulties, there are firmness, earnestness and reason in their personalities. They dare to think, to do, to love, to hate, to fight, and to win.
Student G:	Yes, I agree. Take Jackie Chan as an example. Jackie Chan, 62, as an action movie star, he was given an honorary Academy Award for his great accomplishments in film.

In Exchanges 6 and 7, given no fixed content involved, participants were allowed more freedom to unfold discussion and their language appeared more academic and sophisticated than those used in sessions one and two.

Student E showed his agency in initiating discussion directions (i.e., the mental well-being of the post-70s) and Student G was able to seek evidence to reinforce Student F's posts.

Teacher initiation and intervention became less observable in sessions three and four. Nevertheless, they still occasionally served to elicit more thinking and discussion, leading to more dynamic content to be added by participants, as shown in Exchange 8.

Exchange 8:

Teacher:	Any comments on the education of the three generations?
Student H:	As for education policy, during the 1950s to 1960s, political consciousness was overemphasized by the government in schools. What's worse, the schools were accessible to only few of post-50s generation who had a correct family composition.
Student I:	In the middle 1970s, after the Cultural Revolution, the Chinese government proposed the Four Modernization Program, which relied on vast technological talents. Undoubtedly, higher education was expected to play a crucial role. U.S. Library of Congress reported the Chinese government carried out the reforms on higher education system concerning opportunity, direction, and teaching content in 1986.

Throughout sessions three and four, all participants were observed to contribute to the discussion, although did not demonstrate the same level of engagement. Compared to limited peer interactions in sessions one and two, learner-learner interactions were considerably increased and appeared much more academic towards the completion of discussion activities.

5. Discussion

5.1 Perceptions towards WeChat-assisted English learning

Prior to WeChat-assisted discussion activities, only 34.3% (cumulative percentage) of the participants used WeChat for English learning purposes most days, but showed an overall positive perception towards WeChat-assisted learning (means of 23 out of 25 questionnaire items were above or close to 3.00 – Neutral). An increasing number of teacher-learner and learner-learner conversation exchanges observed in the four discussion sessions also implied that WeChat-assisted discussion activities were well embraced by the participants, indicating its usefulness in creating a space beyond the formal classroom to promote learner interaction and agency exercises (e.g., Qi & Wang, 2018; Xu & Peng, 2017). However, there were other mobile learning apps (e.g., Fun dubbing for speaking practice) reported by the participants as advantageous over WeChat. This might be ascribed to the fact that a range of mobile English learning apps provide tailored learning programs and can be customised to suit differentiated learning preferences for drilling practices of particular discrete language items (Burston, 2014).

Being able to show preferences for different mobile learning apps alluded that these participants were agentic to reflect on their learning needs and make choices. However, they may have failed to realise that the role that most of the mobile apps have played in learning (e.g., Zhimi vocabulary facilitating mechanical vocabulary exercises) is hardly distinguished from the arguable teacher's role as a custodian of knowledge in a teacher-centred and examination-oriented classroom (Wei et al., 2015). Overloaded information and repeated language exercises in these mobile apps, similar to teacher-dominated classroom teaching (Yashima et al., 2016), may jeopardise the dynamics in learning, resulting in learners' increasing dependence on the accessible instructions and exercises.

Compared to mobile apps or web-based knowledge management systems initially designed for teaching and learning purposes (e.g., Lee & Bonk, 2016), learning with WeChat undoubtedly requires more effort and agency to initiate plans, search materials and employ various learning strategies to help implement intentions. Although, as indicated by some participants in the questionnaire, there had been public accounts established on WeChat to facilitate English learning (e.g., subscribing to gain access to learning resources or online mock language tests), WeChat was still primarily perceived and used as a tool for communication by participants. This has been commonly observed in studies adopting mobile social network apps to facilitate language learning and teaching (e.g., Fattah, 2015). However, such apps with affordances to facilitate (a)synchronous communication provides possibilities and convenience to organise interaction-oriented learning beyond the classroom (Khaddage et al., 2016), which helps nurture agentic behaviours barely observable in large English as a foreign language classes.

5.2 Learner agency

Agentic learning behaviours were hardly observed at the beginning of the first two discussion sessions on WeChat. Although direct teacher instructions helped inform the 'content' and shape the discussion 'goals', most of the participants remained silent and reserved, which appears typical of Asian educational contexts (e.g., Yashima et al., 2016). A small number of participants started sharing opinions after a set of follow-up teacher questions were posted to provide cues and help narrow down discussion directions. This has been a mirror image of a physical classroom setting widely observed in research conducted in Asian English as a foreign language contexts, where power relations and Confucian heritage culture continue playing a part in affecting learning behaviours in class (Shen et al., 2015; King, 2016).

Although teacher authority in this study (e.g., tagging individual students to respond) did help secure the initial online participation in the first two sessions, frequent teacher intervention seemed to have deprived the participants' opportunities of developing agency in initiating discussion (including 'goals' and 'actions') as well as 'monitoring' progress. This resulted in a common practice observed in the first two sessions where participants took turns responding to teacher questions and initiation individually, similar to a physical classroom environment where a manipulative way of monitoring interaction progression is commonly employed (Cancino, 2015). Nonetheless, moving from silence to reactive learning (i.e., responding to teacher questions and initiation) during the first two sessions, participants were observed to be agentic to bring dynamic 'content' into discussion, employ limited 'strategies' for discussion (e.g., spotting details from the fixed content; relating prior experiences to content) and 'reflect' on the authenticity of the content (e.g., Student B argued, "the reason why this footage stands out … is that it is unusual …").

As discussion proceeded, participants became more active posting ideas and even responsive to peers' posts in the third and fourth sessions with less detailed teacher instructions. The ways how participants responded to initial teacher instructions changed, pinpointing their enhanced agency in setting up discussion 'goals' and initiating 'actions', although a distributed practice effect inevitably played a part in familiarising participants with activity procedures (Wiseheart, et al., 2019). That being said, teacher intervention continuously helped steer discussion directions and maintain participants' engagement in the third and fourth sessions. This highlights the indispensable role of the teacher in 'monitoring' both the breadth and depth of discussion in mobile-technology-assisted online environments (Mayfield et al., 2013; Shih et al., 2015; Zheng & Warschauer, 2015).

The pattern of discussion was largely transformed from teacher-learner to learner-learner interactions towards the completion of this study. Since participants became more active to respond to both teacher initiation and peers' posts, more 'strategies' were observed to be employed in discussion (e.g., showing agreement on peers' opinions; referencing information to reinforce). A variety of dynamic content (e.g., web information from the U.S. Library of Congress) was also brought into discussion to help elaborate on opinions. The process of searching, filtering and interpreting dynamic content additionally facilitated the participants' exercise of agency in initiating 'actions' and 'reflecting' on the 'content'.

The dimensions of agency that emerged during the four discussion sessions on WeChat are summarised in Table 4.

Learner agency dimensions	Discussion sessions one and two	Discussion sessions three and four
Goals	Not observed; Framed by detailed teacher instruction, fixed content and frequent teacher initiation/intervention.	Observed but still scaffolded by general teacher instruction; Initiated relevant discussion from different perspectives.
Content	Discussion primarily based on fixed content (video clips); Limited dynamic content involved, including online news and TV shows.	Limited fixed content involved (written texts); More varieties of dynamic content added, including online information, TV shows and academic sources (e.g., the U.S. Library of Congress).
Actions	Focused on responding to teacher questions; Limited comments on peers' posts; Largely constrained by detailed teacher instruction and frequent teacher initiation/intervention.	More actions (besides responding to teacher initiation) observed, including actively commenting on peers' posts and initiating discussion strands; Moderated by teacher intervention when discussion went off topics.
Strategies	Limited strategies observed, including relating prior knowledge/experiences to content, leveraging dynamic content.	More strategies spotted, including showing agreement or disagreement, reinforcing opinions by reflecting on prior knowledge/experiences and referencing to support statements.
Reflection	Mainly reflected on fixed content in consideration of cues provided by the teacher.	Reflected on both fixed content and dynamic content, as well as peers' opinions.
Monitoring	Not observed; Primarily monitored by the teacher through intervention.	Not observed; Still primarily monitored through teacher intervention.

Table 4: Emerged dimensions of learner agency in discussion activities on WeChat

Being repeatedly involved in one discussion session after another, participants were observed to become more agentic in initiating directions for discussion based on topics, reflecting on both fixed and dynamic content and

employing a variety of strategies to negotiate for meaning. Although practice effect has been widely believed to play a key role in ensuring learners' progress in 'e-tivities' (online activities/tasks) (Salmon, 2013), it seems that participants' lack of agency in 'monitoring' discussion observed in this study (e.g., when to start a new topic for discussion; whether discussion is off topic) could only be compensated by the teacher's conscious intervention, suggesting the indispensable role of the teacher in participants' agency exercises in such an informal and interactive learning environment.

6. Conclusion and limitation

In this study, interactive discussion activities supported by a mobile social network application – WeChat offered learning experiences beyond the classroom that well nurtured meaning negotiation and learner interaction. They were found to be helpful to promote agentic learning behaviours, including initiating discussion 'goals', leveraging 'content', implementing 'actions', employing discussion 'strategies', and 'reflecting' on the content and interaction. In alignment with research on mobile inquiry-based learning (e.g., Sung et al., 2016), teacher initiation and intervention, observed to be reduced in frequency with time and practice effect, were still identified to be useful to help 'monitor' and further bolster agency exercises. The teacher's role in general, expected to be on the decrease in a ubiquitous and autonomous learning setting, was found to be crucial, particularly at a preliminary stage, to scaffold and guide discussion.

Compared to previous studies on WeChat-assisted learning (e.g., Xu et al., 2017; Xu & Peng, 2017), this case study involved a larger participant sample in the questionnaire (n. = 105). This could help provide additional empirical data to inform about Chinese EFL learners' positive perceptions towards WeChat-assisted learning, and reinforce the feasibility of designing and organising learning activities on WeChat which is primarily used as an instant messaging mobile application. However, the participants recruited in this study were merely English major undergraduate students. A wider scope of participants across varied disciplines may be needed to gather a larger set of data for finding generalisation. Since this study is focused on investigating how learner agency can be enabled and enhanced through WeChat-assisted discussion activities, the Likert-scale questionnaire was only used to generally map the participants' perceptions and the feasibility to carry out the subsequent discussion activities on WeChat. A further factor analysis could be helpful to zoom in on specific variables that have played more significant roles in affecting learner perception.

Traditional teacher-led and school curriculum-based teaching (e.g., teacher lecturing and computer-based content delivery) may continue to serve as a preferred delivery mode for a wide range of EFL learners, most of whom are profoundly influenced by the long-standing ideology underlining the authority of the teacher in language learning. This may allude to a necessity of putting in place more context-sensitive learning design, acknowledging contextual and cultural factors instead of endeavouring to seek one-size-fits-all educational technologies or pedagogies to immediately transform long-established learning behaviours. Further longitudinal research seems to be in need to investigate the extent to which mobile-technology-assisted discussion activities could continue to help support agency development as the novelty effect (i.e., a positive effect due to a change) fades away and such practices become part of learners' routines. Other variables (e.g., selection of discussion topics; design of teacher initiation and intervention) may also be taken into consideration when designing research on the development of learner agency in mobile-technology-assisted online interaction.

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Appendix
Questionnaire
Instructions: Mobile technology has received an increasing popularity in English education around the globe. This questionnaire is designed to learn how and to what extent Chinese undergraduate students use WeChat in English learning. This questionnaire contains two sections collecting information regarding your use of WeChat for English learning purposes and your perceptions towards WeChat-assisted learning. The information you provide will remain confidential and the results of the questionnaire will be used for research purposes only. Please

provide as accurate an answer as possible to each question or item.

Section I. Instructions: Please complete the following questions to generally reflect your use of WeChat in English learning. Please tick √ the answer that suits you and provide a written response in the space provided.

1.1 How often do you use *WeChat* to learn English? (Choose only one answer)
A. Everyday   B. Most days   C. Two or three times a week   D. Hardly ever   E. Never

1.2 In what ways have you used WeChat to learn English? Or why do you not use WeChat to learn English? Please give your answer briefly:
_____

Section II. Instructions: Twenty-five statements are given below, which people may use to describe the perceptions they have towards WeChat-assisted English learning. Please read each statement and indicate the extent to which the statement suits you by circling the corresponding number.

No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2.1	It is easy and convenient to subscribe *WeChat* public accounts to help me learn English.	1	2	3	4	5
2.2	*WeChat* provides a user-friendly interface.	1	2	3	4	5
2.3	*WeChat* is useful to communicate with friends and classmates in online discussion groups.	1	2	3	4	5
2.4	I can understand the learning materials shared on *WeChat*.	1	2	3	4	5
2.5	It is easy to use *WeChat* to send pictures and texts to friends or classmates.	1	2	3	4	5
2.6	It is easy to use *WeChat* to establish online discussion groups.	1	2	3	4	5
2.7	It is easy to edit pictures or texts on *WeChat*.	1	2	3	4	5
2.8	*WeChat* facilitates searching for information that I need.	1	2	3	4	5
2.9	It is easy to use *WeChat* dictionaries to look up the vocabulary that I do not understand.	1	2	3	4	5
2.10	*WeChat* allows me to learn English at any time and any place.	1	2	3	4	5
2.11	Using *WeChat* helps me to develop my English grammar and vocabulary.	1	2	3	4	5
2.12	*WeChat* helps me search for additional learning materials to increases my comprehension of English textbooks used in class.	1	2	3	4	5
2.13	It is easy to use *WeChat* to communicate with my friends, classmates and my teacher.	1	2	3	4	5
2.14	I agree that *WeChat* is helpful to share information, learn instructions and materials.	1	2	3	4	5
2.15	It is convenient to use *WeChat* to organise personal learning agenda and remind me of events.	1	2	3	4	5
2.16	*WeChat* can be an effective educational tool for English learning.	1	2	3	4	5
2.17	There are plenty of interesting learning materials shared on *WeChat*.	1	2	3	4	5
2.18	My learning time is extended as *WeChat*-assisted learning promotes my interest.	1	2	3	4	5
2.19	Using *WeChat* to assist English language learning can enhance my language skills.	1	2	3	4	5
2.20	I think learning English on *WeChat* is easy and helpful.	1	2	3	4	5

No	Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
2.21	It is a good idea to integrate *WeChat* into English teaching and learning.	1	2	3	4	5
2.22	I think learning English on *WeChat* is interesting.	1	2	3	4	5
2.23	I agree that learning materials on *WeChat* are plentiful and informative.	1	2	3	4	5
2.24	Using *WeChat* enables me to accomplish learning tasks more quickly and effectively.	1	2	3	4	5
2.25	*WeChat* is useful to create online discussion groups to assist learning.	1	2	3	4	5

Thanks for completing this questionnaire. We would like to invite you to participate in some follow-up discussion activities on WeChat. If you would like to participate, please provide us with your email below for further information. Thank you.

Email: _____