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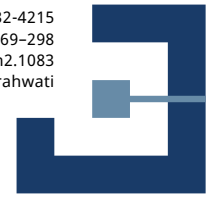

Castledown

The nexus between emotional intelligence, learning engagement, motivation, and achievement in team-based mobile language learning

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The extant literature on the integration of mobile instant messaging (MIM) into language pedagogy has documented its potential to leverage engagement and learning outcomes. Nevertheless, how individual differences in regard to emotional, sociocognitive, and motivational bearings contribute to language learning gains is hardly documented. This study is devoted to addressing this lacuna through an analysis of structural equation modeling (SEM) which explores the association between trait-emotional intelligence (TEI), online learning engagement (OLE), EFL learning motivation, and their grades in English for Academic Purposes (EAP) programs. Three-hundred-seventy-one freshmen in an Indonesian university were involved in EAP programs framed in team-based mobile language learning (TBML), mediated by Telegram as a complementary learning app. The students responded to an online survey eliciting their post-lesson perception of the abovementioned variables. Students' course grades complemented the data collection. The results of our SEM analysis acknowledged the linear correlation from TEI, OLE, to EFL motivation as the drives to students' learning achievement. This has also been supported by a robust

correlation between the variables. The findings of the present study implicate the pedagogical potentials of TBML to scaffold self-regulated learning and satisfactory language learning gains, provided that students' emotional intelligence, engagement, and motivation are intensively potentiated across different learning phases. Research limitations and recommendations are also explored.

Keywords: EFL learning motivation, MIM, online learning engagement, TBML, TEI

Introduction

Current discussions document the seamless integration of collaborative mobile learning into language pedagogy, and this integration has led to increased motivation, engagement, mutual support, and positive affectivity (Kukulska-Hulme & Viberg, 2018). However, for mobile learning not to be mired in past ways of pedagogical delivery, teachers need to guide students to gain the utmost of abundant resources in border-crossing contexts to regulate their learning endeavors toward their needs (Zou & Yan, 2014). It is also essential to avoid low motivation, negative attitude to mobile learning, and disrupted concentration (Elaish et al., 2019), which generally stem from the lack of control and values of mobile learning. Research has demonstrated that when students perceive no convenience or relevance between mobile technology and their learning, their motivation, self-management, and self-monitoring are likely to wane (García Botero et al., 2019; Peng et al., 2020; Terras & Ramsay, 2012).

Engaged in mobile learning, students experience diverse emotional, psychological, and behavioral dynamics, affecting their self-regulated language learning (Dixson, 2010). Teachers, therefore, need to understand these dynamics and develop more advanced skills to appropriate mobile technologies for empowering learning experiences (Diao & Hedberg, 2020). This pedagogical inquiry becomes even more crucial in consideration that positive links exist between emotional intelligence, learning motivation, and student engagement (Imamyartha et al., 2021; Zhoc et al., 2018). Given the driving factors of motivational, cognitive, and emotional facets of students' online learning performance, literature pertinent to how these factors contribute to their actual language learning performance remains scanty. By the same token, previous works on mobile learning have not sufficiently delved into the emotional drives to students' engagement due to the overemphasis on the students' technology acceptance and the resultant engagement along with their language learning gains.

Although the aforementioned lines of inquiry have been advocated in previous works (Imamyartha et al., 2022; Luan et al., 2020; Yılmaz, 2022), the existing discourse on mobile language learning has yet to scrutinize the nexus between students' emotional intelligence, cognitive engagement, and motivational bearings in mobile learning. Existing literature has profoundly addressed learners' perceived cognitive and metacognitive engagement in mobile language learning (Annamalai, 2015; Wang & Crosthwaite, 2021) and the resultant learning

performance (Andujar, 2016; Awada, 2016; Chang & Lin, 2019). We attest to the urgency in exploring the links between TEI, OLE, and EFL learning motivation, each of which corresponds to emotional, sociocognitive, and motivational bearings respectively. This exploration holds the potential to shed light on how teachers and course designers develop their online language learning in a way that maximizes the potency of MIM for language acquisition while addressing the challenges of online language learning. Furthermore, it aims to make theoretical contribution by extending the discussion on effective pedagogies that support collaborative mobile language learning by taking into account emotional, sociocognitive, and motivational facets of language pedagogy.

Language instruction through team-based mobile language learning

The collaborative mobile learning in our study follows the TBML framework developed by Zhu and Wang (2019). They propose four components pivotal to collaborative mobile learning: a) readiness empowerment b) permanent team formation, c) application activity, and d) peer assessment. The framework has robust alignment with a socio-constructivist approach to language learning embedded in project-based language learning. Although developed for non-linguistic pedagogy, this framework is conceptually conducive to language acquisition from the perspective of a sociocultural framework for mobile learning. This framework taps upon three fundamental factors to L2 acquisition, encompassing psychological factors (cognitive and linguistic activities as the precursor to language learning), physical factors (mobile devices and mobile apps to mediate language learning), and other agents (teachers and peers) (Ma, 2017). Hereunder is the model of Telegram-aided TBML adapted in the present study.

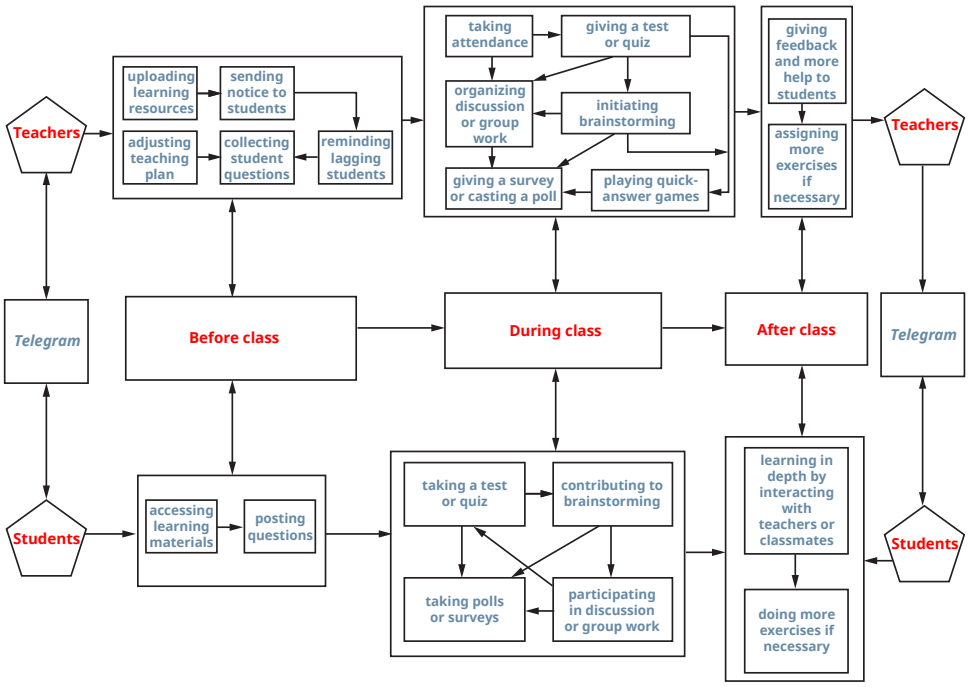

Figure 1. Learning activities in Telegram-aided TBML

In this instructional framework, students in this study were randomly assigned to small chat groups consisting of four to six students. This moderate team size aimed at encouraging intensive exchanges of ideas and ambient interaction between members (Lai, 2016). The teacher always used English when communicating in group chats, while students were allowed to opt for Indonesian, English, or mixed codes. Video conferencing powered by Zoom was employed briefly before setting TBML tasks during and after class hours. This virtual meeting aimed at ensuring that students understood the goals, procedure, and expectations of a given task while helping them to tackle any doubts or difficulties during task accomplishment. Another support in the form of a learning management system (LMS) through Moodle was operative to facilitate task submission and log students' attendance. During task accomplishment, the students used Telegram to share the tasks and manage group discussions, with the teacher being on the peripherality of the discussion. With the chat support and features for delivering multimedia, they shared their ideas, learning resources, and interim learning products with their peers in the chat room, followed by continuous reflection and revision on the learning artifacts. The teacher took a more active role in this phase to give constructive feedback and formative assessment.

The dialogic features in TBML represent a fertile ground for developing language proficiency as MIM serves as a social and cultural artifact for stimulating multitudes of cognitive and metacognitive processes within a communicative setting (Imamyartha et al., 2023). This is coherent with the development of students' L2 agency which drives common cognitive processes influential to language acquisition. These involve metacognition, cognition, entertainment, communication, and self-regulation. In addition, the presence of other agents resonates with the essence of the sociocultural nature of human activities devoted to language learning mediated by inexhaustible online resources (Kukulska-Hulme & Viberg, 2018). A recent study in the Indonesian EFL milieu demonstrates the value of MIM to increase learners' emotional intelligence, online learning engagement, and motivation, compared to the usual computer-mediated language learning (Imamyartha et al., 2021). Their study has acknowledged Kukulska-Hulme and Lee (2020) noting that MIM-aided mediation gives rise to an inviting environment and fosters active engagement, positive attitude, and stronger bonding with a learning community.

Research in this area has also underscored the potency of collaborative mobile language learning for language learning gains. First, involving a teacher-made learning system and familiarization strategies, Shadiev et al., (2020) have documented significant gains in terms of paraphrasing, translation, vocabulary, and writing skills. The mobile learning system is perceived as a vital medium for students to develop their background knowledge and an enjoyable learning tool to self-regulate their language learning. Moreover, Gutiérrez-Colón et al., (2020) review the literature on the use of mobile devices in reading instruction. They highlight the value of providing learners with flexibility and authenticity via mobile learning to develop readers' interest and motivation as the precursor to maintaining positive reading habits. Despite the screen limitation,

mobile devices remain an effective conduit for reading instruction through the appropriation of text display for mobile reading. Their research underlines teachers' roles in moderating text display type to reading context for improved attention, cognitive load, and reading comprehension. The limitation of mobile devices, as a corollary, opens the path for more technology-supported language instruction through the use of different devices for more engaging and effective learning. In the same vein, MIM also facilitates listening instruction. de la Fuente (2014) explores the differential outcomes of the delivery medium of aural input on learners' noticing and comprehension. She reports that learners in collaborative mobile settings demonstrate higher levels of noticing, top-down comprehension, and bottom-up comprehension than those in computer-mediated instruction. In the following section, we elaborate on our research model and hypotheses as informed by the abovementioned inquiries.

Research model and hypotheses

Trait emotional intelligence

TEI is proven to increase students' learning achievement via their academic engagement driven by cognitive, interpersonal, and motivational processes (Perera, 2016). This coheres with the other previous works underlining the roles of engagement, effort, and attention linking TEI and achievement (Perera & DiGiacomo, 2015). In this regard, TEI denotes a significant predictor of academic performance through the mediating role of engagement, perceived social support, engagement, and adjustment. In the context of language acquisition, emotional intelligence has been found to envisage improved language proficiency as mediated by affective and motivational drives (Shao et al., 2013). Equally important is that TEI can elevate students' academic performance even at the initial stage of instruction. In the university setting, stronger TEI leads to a better social rapport between teachers and students and among peers, leading to more productive collaboration (Maguire et al., 2017). Students with higher TEI tend to self-regulate their learning better by adopting a task-focused approach and behavior even during stressful periods. In our study, TEI is manifested in an individual's behavioral tendencies and self-assessed abilities. The construct encompasses interpersonal traits (e.g., "I like helping people"), intrapersonal traits (e.g., "Looking at both my good and bad points, I feel good about myself"), adaptability (e.g., "It's easy for me to adjust to new conditions"), stress management (e.g., "I can handle stress without getting too nervous"), and general mood (e.g., "I generally hope for the best") (Petrides & Furnham, 2001). Following the abovementioned lines of research, this study formulates the following hypotheses:

- H1: Students with higher TEI tend to demonstrate a higher rate of online learning engagement in TBML
  - H1a: Students with stronger interpersonal traits tend to demonstrate a higher rate of online learning engagement in TBML.

- H1b: Students with stronger intrapersonal traits tend to demonstrate a higher rate of online learning engagement in TBML.
- H1c: Students with better adaptability tend to demonstrate a higher rate of online learning engagement in TBML.
- H1d: Students with better stress management tend to demonstrate a higher rate of online learning engagement in TBML.
- H1e: Students with a more positive general mood tend to demonstrate a higher rate of online learning engagement in TBML.

Online learning engagement

The integration of technology offers the potential to elevate language proficiency and motivation (Cahyono et al., 2023; Kantisa & Sitthitikul, 2020). This is aligned with the correlation between learning engagement and EFL learning motivation in collaborative mobile learning (Imamyartha et al., 2021, 2022). According to Dixson (2010), online learning engagement in this study taps upon several areas: a) skills engagement (e.g., "I study through mobile discussion on a regular basis"); b) emotional engagement (e.g., "I really desire to learn the course material and exercise through mobile discussion"); c) interaction engagement (e.g., "I help fellow students in mobile discussion and exercises"); and d) performance engagement (e.g., "I get a good grade on the exercises in mobile discussion"). The socio-constructivist properties of collaborative mobile learning envision the impacts of peer support and the affordances of MIM in increasing learning motivation (Alshaibani & Qusti, 2021; Yang et al., 2019). The teacher and students' activities in TBML are mostly aligned with the motivational macro strategies reported to develop students' motivation (Lee et al., 2020). Involving collaborative learning, positive information feedback, promotion of learner autonomy and confidence, and personal relationship with students, these macro strategies are proven influential to foment L2 learning motivation. Given these empirics, we then formulate the following hypotheses.

- H2: Students with stronger online learning engagement in TBML tend to develop stronger EFL learning motivation.
  - H2a: Students with stronger emotional engagement in TBML tend to develop stronger EFL learning motivation.
  - H2b: Students with stronger skills engagement in TBML tend to develop stronger EFL learning motivation.
  - H2c: Students with stronger interaction engagement in TBML tend to develop stronger EFL learning motivation.
  - H2d: Students with stronger performance engagement in TBML tend to develop stronger EFL learning motivation.

EFL learning motivation

EFL milieu poses acute motivational dynamics as learners may not see the direct relevance of learning the language in their context. Our research follows Xuejun (2020) who classifies EFL learning motivation into a) intrinsic motivation (e.g., "I am studying English because I think it is good for my personal development"), and b) extrinsic motivation (e.g., "I am studying English because I have to meet the requirements/expectations of my teachers and/or parents"). Both extrinsic and intrinsic motivation are deemed pivotal drives for developing English proficiency or achievement in English language learning through triggering stronger persistence, a positive attitude to language learning, and strategy use (Peng & Patterson, 2022). Lee et al., (2020) report students' gains in cognitive, metacognitive, social, and affective dimensions after the deployment of motivational strategies. These outcomes include more meticulous task accomplishment, stronger group engagement, stronger self-regulation, and self-reflection, and more learning perseverance. These outcomes are widely acknowledged to positively correlate with achievement (Xu et al., 2021). This coheres with the report on Chinese EFL learners' motivation which positively correlates with the use of language learning strategies, as the mediator to their proficiency scores in English examination (Zhang & Xiao, 2006). In consideration of these reports, we formulate the hypotheses below.

- H3: Students with higher EFL learning motivation will achieve better learning achievement in TBML.
  Based on the abovementioned hypotheses, we propose the following structural model.
  - H3a: Students with higher intrinsic motivation will achieve better learning achievement in TBML.
  - H3b: Students with higher extrinsic motivation will achieve better learning achievement in TBML.

Based on the abovementioned hypotheses, we propose the following structural model in Figure 2. We extrapolate the linear positive association between the variables, predicting that students with strong TEI will tend to engage more in collaborative mobile learning and acknowledge the values of such learning experiences as the precursor to escalated EFL learning motivation. Taken together, these variables are presumed to result in better achievement in language classes. Reminiscent of the dynamics of emotional, cognitive, and motivational drives to students' learning outcomes in a mobile or online learning context, our hypothesized model presumes continual drives of TEI, OLE, and EFL learning motivation to the student's engagement in different phases of TBML, i.e., before, during, and after each unit of instruction, instead of being anchored in one particular period of instruction.

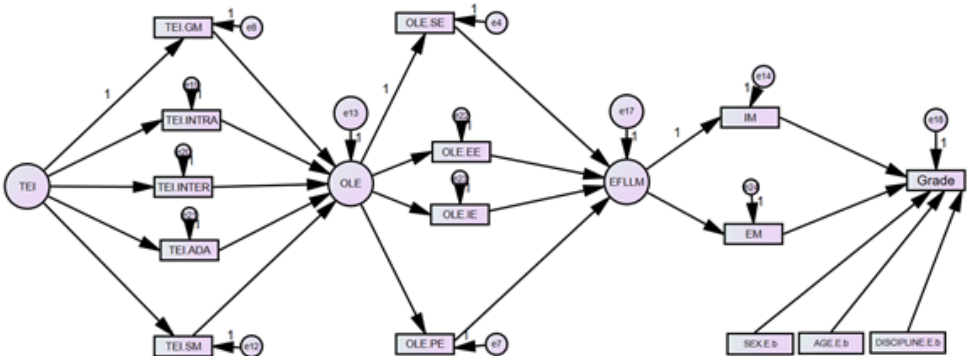

Figure 2. Hypothesized structural model in the study

Note: INTER, interpersonal trait; INTRA, intrapersonal trait, ADA, adaptability; SM, stress management; GM, general mood; EE, emotional engagement; SE skill engagement; IE, interaction engagement; PE, performance engagement; IM, intrinsic motivation; EM, extrinsic motivation; Grade, students' final grade in EAP course. We also involve students' age, sex, and discipline (i.e., major) as the control variables for their grades.

Method

Research design

This study employed SEM analysis to reveal the underlying linkages between TEI, OLE, EFL learning motivation, and academic achievement in the context of collaborative mobile learning. This analysis aids in estimating standardized effect size, evaluating error variance of outcome variables, and accounting for the correlation between predicting variables.

Setting and participants. The present study was carried out online in an English for Academic Purpose (EAP) program at an Indonesian university for sixteen meetings. The first author worked with four EAP instructors at the university in this research. This team of instructors co-designed the course outline for the EAP program, involving the instructional goals, resources, and activities framed in TBML. As each of the instructors was responsible for a different class, a monthly discussion was carried out to report on how TBML was operative throughout the program, ensuring congruent instructional activities across classes while addressing possible issues therefrom. The program focused on academic genres specific to each major and was grounded within collaborative language learning on integrated language skills.

The following figures exemplify a few of the learning activities in TBML. The two figures below capture group discussion and learning a product on a reading-writing assignment. The students initially collaborated to identify the main ideas of a three-paragraph explanatory text and then composed a

summary for the same text. Informed consent has been obtained to use the chat archives below, including the student's name.

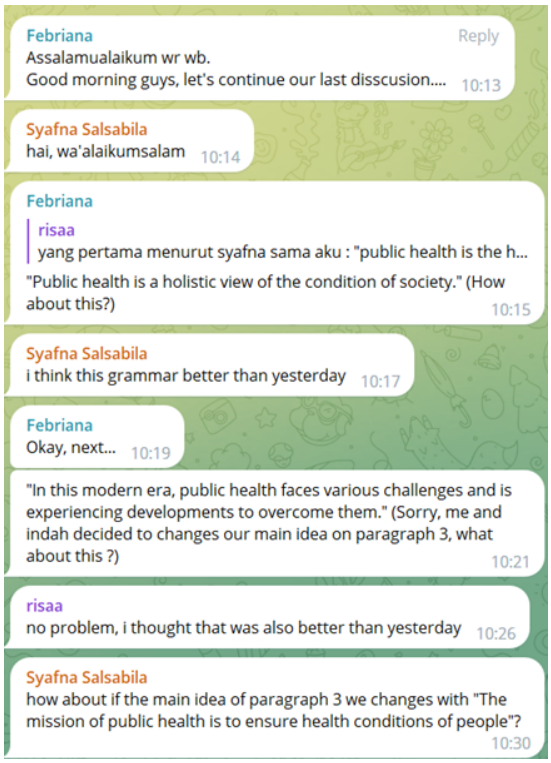

Figure 3. Discussion on identifying main ideas and writing a summary

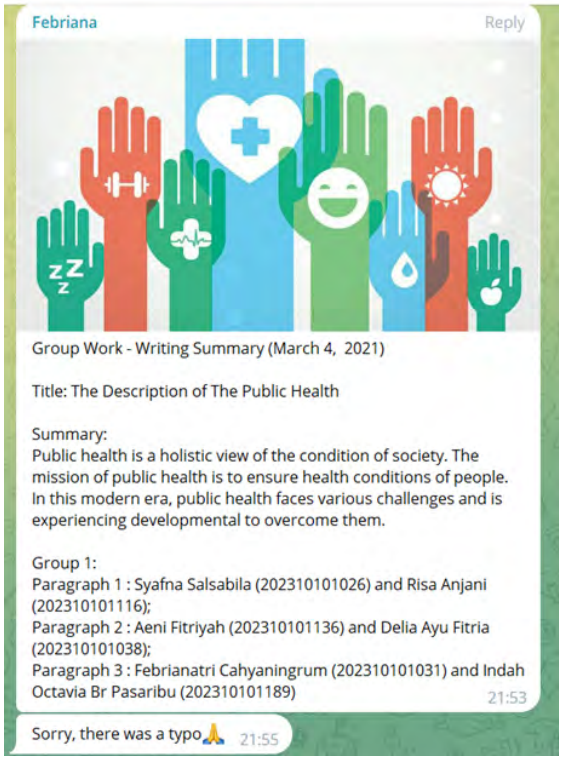

Figure 4. Final Summary

As appreciated in Figure 5, a listening exercise was also involved in TBML through which the students discussed a short video from YouTube and identified true-false information therefrom. Finally, they also engaged in an imitative speaking practice where they read brief news while recording their whole talk. This was coupled with a peer assessment of their speaking performance, as portrayed in Figure 6.

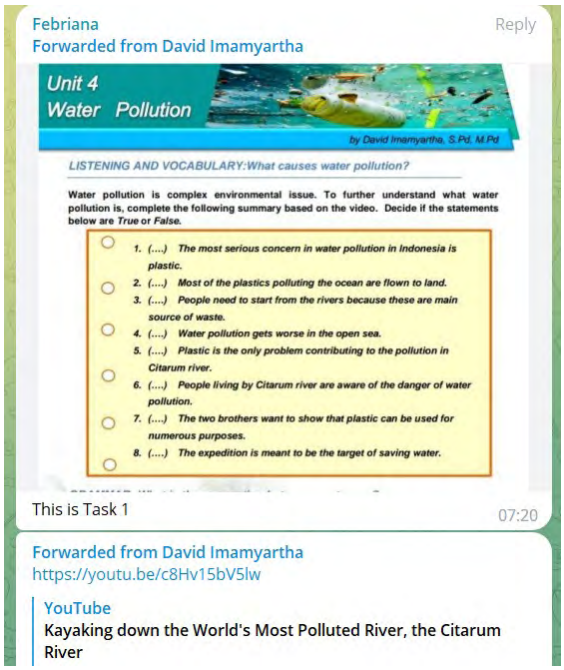

Figure 5. Discussion on identifying main ideas and writing a summary

Figure 6. Peer assessment on recorded speaking practice

A total of 371 students were recruited for the study. These students were enrolled in seven classes from five different majors: Biology Education, Physics Education, Community Education, Management, and Nursing. Their ages ranged from 18 to 21 years old. The students were assumed at B1 on the CEFR scale, which was the prerequisite to the course enrollment. The instructor team introduced the research objectives and learning benefits to the students at the first meeting. They were ensured that the research was profoundly driven by the goal to develop TBML supportive of their learning needs and curricular goals and that their involvement in data collection was voluntary, with their course grade kept independent of their research participation. Furthermore, the team acknowledged that their learning engagement in TBML and performance throughout the course were kept confidential and only used for research purposes.

Data collection and analysis. The original questionnaires with 5-point Likert scales measuring TEI, OLE, and EFL learning motivation were first translated into Bahasa Indonesia for accurate understanding. To maintain consistency, the first author was responsible for the initial translation of all research items, and then the other EAP instructors checked the items to evaluate the clarity and helped revise unclear or ambiguous items accordingly. The final instrument was pilot-tested on 82 freshmen from a non-English study program to check its clarity, internal consistency, and validity.

The 15 items measuring TEI demonstrated α 0.890 and satisfactory internal

validity (p <0.05). Likewise, the measure of EFL learning motivation included 18 translated items with exemplary internal validity (p <0.05) and α 0.854. The battery for online learning engagement demonstrated α 0.927, with all 20 translated items having satisfactory internal validity (p <0.05). All of the adapted survey items are available in the appendix. The student's academic achievement was measured using the course final grade which was the aggregate of their assignment, mid-term exam, and final exam scores. The items in both mid-term and final exams emulated TOEFL test items as the course was designed to develop students' proficiency in English for academic purposes. The examination was administered through the university's LMS. One sample item in the final exam for the students majoring in Management is observable below.

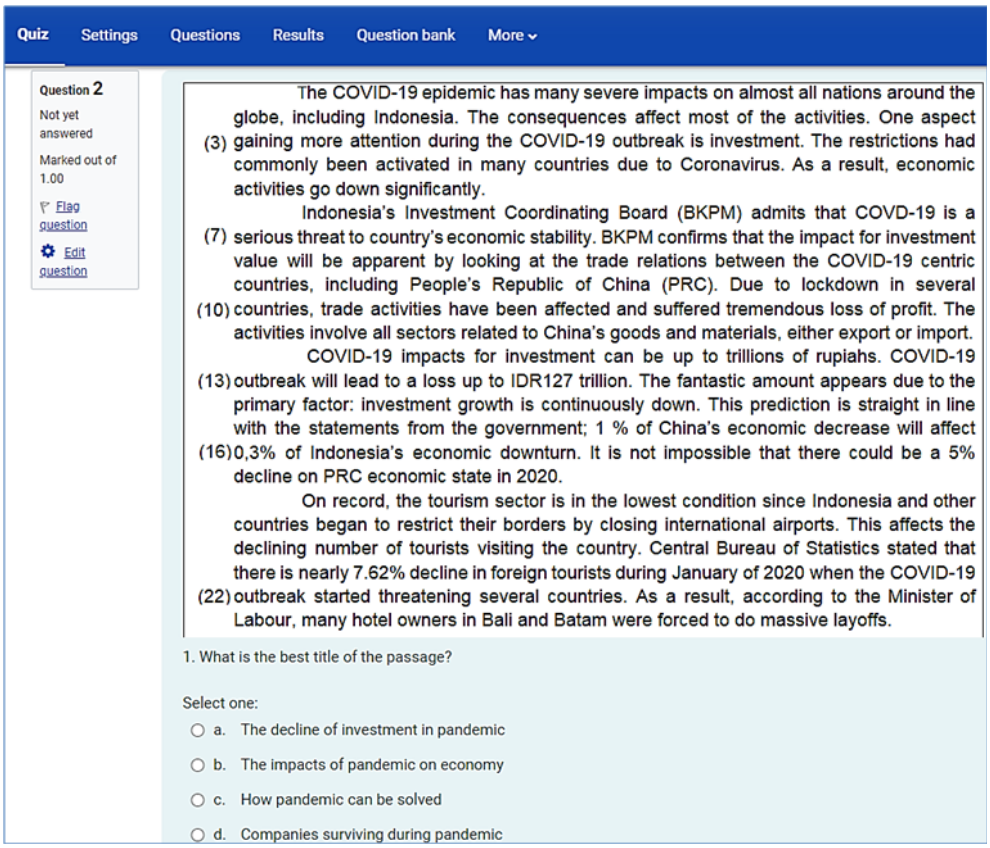

Figure 7. Sample item in the final exam for management major

No missing values were identified in the assessed variables, and no imputation was made. Preliminary analysis was performed to identify descriptive statistics, reliability coefficients, and correlation between the variables. Multivariate normality tests were then administered to examine the SEM estimation with the aid of SPSS AMOS 24. This analysis approach not only puts minimal demands on sample size and residual distribution but also supports studies oriented to theory prediction. These properties also suit the non-normality data and the extrapolating nature of our research. A confidence interval of 95% in the path coefficient was estimated to validate the final model, and we referred to

Hair et al's., (2010) criteria of good model indices. In addition to examining the predictive power of TEI, OLE, and EFL learning motivation, we assessed three control variables, comprising age, sex, and discipline, in relation to their grade.

Findings

Model fit analysis

Prior to the SEM analysis, we investigated the correlation between the variables, and the results demonstrated a significant correlation, which is generally marked by a moderate correlation coefficient, $p<0.01$. Only performance engagement, emotional engagement, interaction engagement, stress management, and interpersonal trait are positively correlated with the grade.

Table 1. Correlation coefficients between the research variables

	Mean	Grade	SE	EE	IE	PE	IM	EM	SM	ADA	INTER	INTRA	GM
Grade	79.08	1	0.091	0.103*	0.115*	0.121*	0.098	0.074	0.131*	0.088	0.117*	0.072	0.044
SE	4.2156	0.091	1	0.708**	0.716**	0.622**	0.400**	0.334**	0.322**	0.480**	0.428**	0.386**	0.407**
EE	4.0766	0.103*	0.708**	1	0.723**	0.677**	0.476**	0.346**	0.332**	0.500**	0.442**	0.403**	0.453**
IE	4.2120	0.115*	0.716**	0.723**	1	0.715**	0.507**	0.359**	0.375**	.538**	0.495**	0.405**	0.442**
PE	4.1482	0.121*	0.622**	0.677**	0.715**	1	0.473**	0.390**	0.357**	0.528**	0.522**	0.444**	0.486**
IM	4.1472	0.098	0.400**	0.476**	0.507**	0.473**	1	0.516**	0.262**	0.490**	0.399**	.363**	0.390**
EM	3.9790	0.074	0.334**	0.346**	0.359**	0.390**	0.516**	1	0.307**	0.400**	0.369**	0.350**	0.328**
SM	4.0631	0.131*	0.322**	0.332**	0.375**	0.357**	0.262**	0.307**	1	0.659**	0.520**	0.590**	0.577**
ADA	3.6442	0.088	0.480**	0.500**	0.538**	0.528**	0.490**	0.400**	0.659**	1	0.610**	0.617**	0.672**
INTER	4.0144	0.117*	0.428**	0.442**	0.495**	0.522**	0.399**	0.369**	0.520**	0.610**	1	0.519**	0.577**
INTRA	4.1222	0.072	0.386**	0.403**	0.405**	0.444**	0.363**	0.350**	0.590**	0.617**	0.519**	1	0.620**
GM	3.8388	0.044	0.407**	0.453**	0.442**	0.486**	0.390**	0.328**	0.577**	0.672**	0.577**	0.620**	1

Note: ***p <0.001; **p <0.01; *p <0.05

Afterward, we checked the fit indices of our structural model against the recommended values by Hair et al., (2010). As reported in Table 2, the model has satisfied all of the fit indices. The reported values of fit indices thus corroborate decent structural model fit to the data in our study.

Table 2. Model fit summary for the research model

Fit index	Recommended value	Reported values
$\chi 2$	> 0.05	0.056
$\chi 2/df$	< 3	1.3366
Comparative fit index (CFI)	> 0.90	0.993
Goodness-of-fit index (GFI)	> 0.90	0.974
Adjusted Goodness-of-fit index (AGFI)	> 0.80	0.954
Root mean square residuals (RMSR)	< 0.10	0.029
Root mean square error of approximation (RMSEA)	< 0.08	0.031
Normed fit index (NFI)	> 0.90	0.975
Parsimony normed fit index (PNFI)	> 0.60	0.635

Initially, our structural model failed to meet the required $\chi 2$ of > 0.05. We checked the modification indices to see if the model could be improved and then applied a proposed modification by drawing a correlation between EFL learning motivation and online learning engagement, as displayed in Figure 8. The interlink between these variables mirrors the correlation analysis result in this study and that in a previous work by Imamyartha et al., (2021).

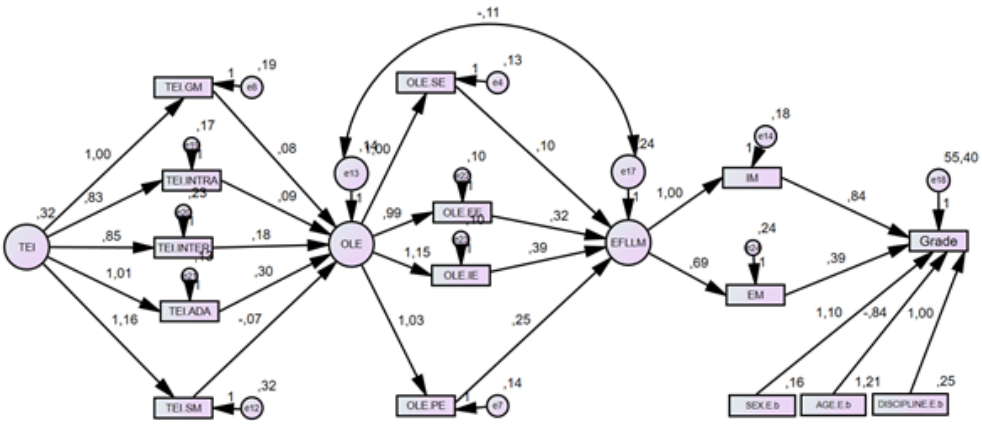

Figure 8. The results of path analysis with a regression coefficient

The final structural model demonstrates the noteworthy explanatory power of the exogenous variables, i.e., antecedents, to each of the three endogenous variables, i.e., TEI, OLE, and EFL LM (learning motivation).

Path analysis

The results of our SEM analysis have corroborated that most of our hypotheses are approved. We can see the regression estimate and the magnitude of the path coefficient corresponding to each hypothesis in Table 3.

Table 3. Summary of hypothesized direct effect

Hypothesis	Path	Estimate	Results
H1a	INTER → OLE	0.183***	Supported
H1b	INTRA → OLE	0.093*	Supported
H1c	ADA → OLE	0.301***	Supported
H1d	SM → OLE	−0.072*	Not Supported
H1e	GM → OLE	0.075	Not supported
H2a	EE → EFL.LM	0.323***	Supported
H2b	SE → EFL.LM	0.101	Not supported
H2c	IE → EFL.LM	0.386***	Supported
H2d	PE → EFL.LM	0.252***	Supported
H3a	IM → Grade	0.85	Not supported
H3b	EM → Grade	0.387	Not supported

Note: ***p <0.001; **p <0.01; *p <0.05

Concerning TEI-OLE estimates, the interpersonal traits are found to predict online learning engagement at 0.001 level. This is also evident in the case of intrapersonal traits as the significant predictor of online learning engagement. Adaptability has been proven significant predictor of online learning engagement. The general mood was not proven significant predictor of learning engagement. Although the regression path on stress management and online learning management is significant, the regression is found negative, thus rejecting our hypothesis. In the case of OLE-EFL LM, three out of four hypotheses are approved. Firstly, emotional engagement is proven a significant predictor of EFL learning motivation at 0.001 level. This magnitude of the path coefficient also affirms the other two hypotheses on the explanatory power of interaction engagement and performance engagement toward EFL learning motivation. Skill engagement is the only insignificant predictor of EFL learning motivation. None of the motivational drives are found to predict students' grades. The controlled effects of age, gender, and discipline were all proven insignificant in relation to the student's grades.

Discussion

The research findings have portrayed the correlation between the four research variables and the complete correlation between the antecedents of TEI, OLE, EFL learning motivation, and students' grades. This is coherent, to a large extent, with the results of SEM analysis where a significant regression coefficient or effect size is confirmed between the variables. After a second modification to our model, our SEM analysis has documented linear positive regression from TEI, OLE, to EFL learning motivation, and students' grades, as well as a negative covariance between OLE and the motivation.

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The observed regression from TEI to OLE envisages that the former denotes a significant predictor of students' emotional, affective, and cognitive engagement in TBML. This is in harmony with Maguire et al., (2017) who report that emotional intelligence determines how individuals regulate their affective relationships and accompanying interactions. These have a strong correlation with collaborative learning in TBML. Students who score high in TEI tend to demonstrate stronger bonding between peers as members of an online learning community. This is evident in the fact that interpersonal traits can significantly determine students' affective engagement in collaborative mobile learning. Both variables in fact center on individuals' willingness and capacity to collaborate on task accomplishment. The positive association between intrapersonal traits, interpersonal traits, and online learning engagement postulates that students with higher TEI are more likely to engage in collectivistic learning presumably because they feel better equipped to initiate and maintain their interaction with others in the first place. In the same vein, TEI has been found to support interaction, which is crucial for collaborative mobile learning. Our study has proven that TEI, through intrapersonal and interpersonal traits, can escalate collective bonding, affective engagement, and by implication, successful engagement in collaborative mobile learning. This has accounted for the positive association with active learning in a collaborative setting.

Our findings also cohere with the positive association between TEI and the cognitive dimension of learning engagement. The success of online language learning represents a complex endeavor comprising cognitive, metacognitive, affective, and sociocultural bearings (Khotimah et al., 2022; Kukulska-Hulme & Viberg, 2018). The ability to self-regulate one's intrapersonal emotion holds a key role in maintaining meaningful engagement and contribution to group performance. Such ability is valuable in addressing the technical challenges of online learning engagement, such as the absence of a decent internet connection and the hassle of working on a small screen size (Imamyartha et al., 2022). As a corollary, the ability to adapt to these technical challenges and, more importantly, the task-related challenges in excelling in both individual and collective performance becomes crucial. This is confirmed by the hypothesized effect of adaptability on online learning engagement. Initially reported to disrupt student learning engagement, the upheaval of online language learning imposed by the pandemic has given rise to new learning practices and resources, along with a new mode of assessment. In this regard, adaptability plays a crucial role in maintaining students' learning and thus teacher needs to help them develop their adaptability by providing continuous support, feedback, and monitoring as new learning practices and resources start to take effect. Our findings are in line with Maguire et al., (2017) who argue that higher TEI promotes self-regulation of learning as the precursor to cognitive engagement and investment in learning. Self-regulation, which is embedded in intrapersonal and interpersonal traits as well as adaptability, potentiates the deployment of an effective learning approach.

By contrast, stress management and general mood cannot predict students'

online learning engagement. One possible rationale for this is that mobile learning has afforded a multitude of instructional- and social-oriented supports, implying a low-stress and enjoyable learning environment (Kukulska-Hulme & Viberg, 2018). This property helps students to maintain their emotions by shifting between the instructional and social orientation to the use of MIM throughout their online learning. In fact, as a social media *per se*, MIM can develop an inviting environment that allows the convergence of students with different learning performances and helps to grow relatedness and group support. In addition, the playfulness of MIM has been reported to drive its seamless integration into online learning (Zhonggen et al., 2019), therefore leading to increased enjoyment while lowering the affective and cognitive barriers as potential drives for stress.

OLE and EFL learning motivation

With the socio-constructivist and technological affordances of MIM, online learning engagement in TBML can exert a significant effect size on EFL learning motivation. MIM can converge the academic and social aspects of learning, which allows students to regulate and amplify their learning (Kukulska-Hulme & Viberg, 2018). This unique property is conducive to fostering students' EFL learning motivation, particularly during the hard times in the EAP context where they need to grapple with the linguistic and disciplinary content of their learning. Fundamentally psychological in nature, emotional engagement and EFL learning motivation are strongly intertwined in that the former is proven a significant predictor of the latter at 0.001 level. Emotional engagement deals with the extent to which students perceive and experience the enjoyment of mobile collaborative learning where they can easily work with their peers and seek the teacher's support. This perceived enjoyment and ease of use of MIM can determine the magnitude of their language learning motivation. In large part, this is also due to the infrastructure of MIM that allows learners to access multimodal resources (Kukulska-Hulme & Viberg, 2018). This affordance becomes increasingly conducive to EFL learning motivation by enabling opportunistic learning consolidation and knowledge co-construction (Annamalai, 2015).

Our findings also confirm the positive association between interaction engagement and EFL learning motivation. TBML offers a new window to language learning with plenty of interaction opportunities. Alamer and Al Khateeb (2021) report that relatedness in mobile learning poses a significant effect size on motivation. The possibility to communicate multimodally through MIM leads to increased enjoyment and the discovery of meaningful values of collaborative language learning. Multimodal communication has been acknowledged to compensate for the gap among learners' linguistic repertoires and therefore increase the likelihood of sustained meaningful communication (Lai, 2016; Mafulah et al., 2023), which is a key aspect in driving their language learning motivation. The use of MIM to foster students' collaboration in accomplishing language tasks relevant to their major denotes the core rationale for

increasing their motivation, rather than the technology *per se*. In addition, the collaborative dimension of mobile language learning is known to escalate students' learning motivation through the social obligations of individuals (Luan et al., 2020). Peer support through MIM is also essential in lowering language learning anxiety, which thus improves learners' motivation (Golonka et al., 2014). This is in coherence with previous works noting that collaboration and support from peers and teachers can nurture positive attitude toward language learning and language learning motivation (Afrilyasanti et al., 2023; Alamer & Al Khateeb, 2021; Imamyartha et al., 2021; Kukulska-Hulme & Viberg, 2018).

Performance engagement is another significant determinant of EFL learning motivation. Our study involves construct in performance engagement relevant to perceived value, i.e., using MIM can improve language proficiency. As students discover their efficacy in accomplishing language learning tasks within their group, they perceive increased self-efficacy and learning motivation. This supports previous work on mobile learning as the crucial conduit for increasing performance and both extrinsic and intrinsic learning motivation (Li et al., 2018). The perceived control of engaging in collaborative mobile learning also plays a key role in raising students' language learning motivation. Research has acknowledged the pedagogical potential of MIM for raising students' collaboration and autonomy (Annamalai, 2015; Imamyartha et al., 2022). This aligns with the possible serendipitous learning and extended learning beyond the class mediated by MIM. Furthermore, this allows the students to perceive the increment in their language learning performance which helps develop their confidence and identity as a language learner (Kukulska-Hulme & Viberg, 2018). These studies have therefore demonstrated how collaborative mobile learning provides an unrestricted and low-anxiety zone for students to express themselves through the foreign language and sustain longer engagement, particularly for reluctant learners.

Despite the significant effect size of the abovementioned variables, skill engagement does not hold any positive association with EFL learning motivation. One rationale for this finding is the fact that MIM in our study serves as the channel for disseminating learning resources and teacher-made materials and as the medium for learning collaboration. Screen limitation would trigger unpleasant learning experiences and fatigue during repeated work on a mobile device. Students, therefore, tend to spend more extended learning periods on their computer or laptop which is more convenient for the consolidation of learning and higher-order thinking processes, as in the case of advanced language learners. This finding confirms previous research reporting that advanced language learners are more reluctant to use social media for learning than those with lower proficiency (Aloraini & Cardoso, 2020). (Golonka et al., 2014) also acknowledged that smartphones may be a viable medium for learning, yet this cannot cater to all language skills. In addition, the screen limitation along with slower performance contributes to a lower rate of accuracy and speed of smartphones compared to a computer. One final explanation for this finding is that students need to focus on both linguistic and disciplinary content in EAP program, which implies the need to compose and comprehend

abstract, complex information typical to academic genres (Yeh, 2015). This implies the need for the teacher to combine smartphones and computers to potentiate personalized language learning and diverse rates of EFL learning motivation among students.

By the same token, the absence of a positive association between skills engagement and EFL learning motivation also accounts for the negative covariance between OLE and motivation. Using MIM has been a proven effective approach to spark interest and curiosity in collaborative mobile learning (Kukulska-Hulme & Viberg, 2018), yet resultant engagement tends to decline over time. To some extent, this might be because students' interest wears off after they get familiar with the technology (Botero et al., 2019). Furthermore, the more students engage in mobile learning, the more they are exposed to the adverse effects of learning via MIM, including reduced focus, distracting environment, and time wastage (Şad et al., 2020). They also highlight that the easy access to language learning via MIM prevents students from reaching deeper cognitive depth which is essential for long-term learning. This is particularly due to the absence of reflection throughout their opportunistic learning. Overall, the adverse effects are counteractive to the high rate of self-regulation and extensive learning associated with strong language learning motivation. Simply put, collaborative mobile learning is indeed a decent approach to get students engaged at the outset of an online course, yet as they gain a higher rate of language learning motivation, they will switch to the different technology that can better suit their learning strategies.

EFL learning motivation and students' achievement

Partially, none of the intrinsic and extrinsic motivations holds a positive association with the student's grade in the EAP course. In the language learning context, it has been proven that motivation can predict language learning achievement, through the mediating effect of language learning strategies (Schaffner & Schiefele, 2016). The finding is in harmony with the extensive review and empirics in a study on Chinese EFL learners conducted by Jun Zhang and Xiao (2006). Their review highlights the notion of motivation as multifaceted with antecedents overarching beyond the common dichotomy of intrinsic and extrinsic motivation, some of which include teacher-specific, group-specific motivational components, cognitive components, and self-confidence. They explain that when one of these dimensions is absent, the aggregate of motivational drives is likely to wane. In this direction, they further corroborate the intricate association between motivation and learning strategies as the antecedents of language learning achievement. Given the fact that language learning motivation is culture- and context-specific (Gardner & Yung, 2017; Gozali & Cahyono, 2022), teachers need to pay heed to the multidimensional components of motivation to pave effective learning trajectories that are both attainable and rewarding. The findings of our research are aligned with this line of inquiry, noting that different rates of success can be accounted for by the sophisticated and dynamic interlink of individual cognition and emotion,

external rewards or incentives, and social setting. Put simply, addressing both intrinsic motivation and extrinsic motivation increases the likelihood to improve overall motivation and performance (Hendijani et al., 2016).

Following the abovementioned line of thoughts, we commenced another path analysis to see if we can improve the model. In this new model, we drew a direct association between EFL learning motivation and students' grades, which led to a better model as evinced by the fit indices ($\chi 2=0.085$,$\chi 2/df=1.302$, CFI=0.994, GFI=0.975, AGFI=0.956, RMSR=0.0257, RMSEA=0.029, NFI=0.976, PNFI=0.657). All of the hypothesis test results were similar to those shown in Table 2. However, as theorized, the EFL learning motivation as a complete edifice of intrinsic and extrinsic motivation has been found to significantly predict the students' grades ($\beta=0.174$, $p<0.05$). In consideration of these good model indices, we hereby propose the model in Figure 9 to demonstrate the linear association between the research variables along with their accompanying antecedents.

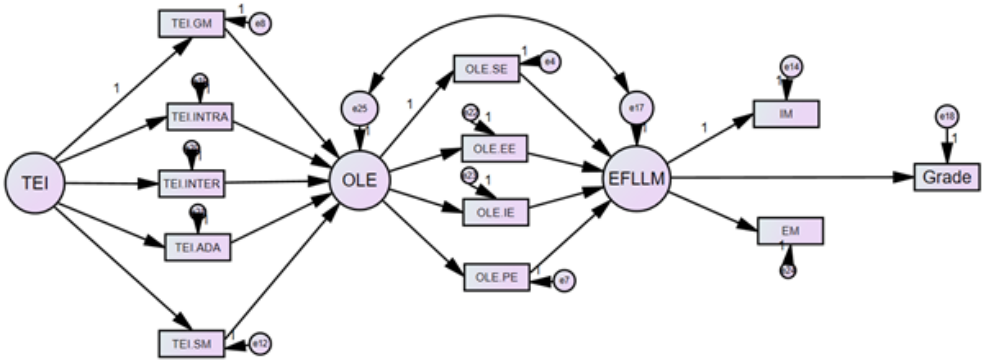

Figure 9. The final structural model

The implication for collaborative mobile language learning is clear. Teachers need to design in-class learning activities that harness the multimodality of MIM to cater to students' unique language learning needs and goals in linkage to curriculum objectives. In addition, they should consider affording more challenging out-of-class language learning tasks through the mediation of a computer or laptop where students can engage in more in-depth cognitive and linguistic processing on par with their interest and proficiency level. Guiding students to apply motivational macro strategies to excel in language learning will gainfully take advantage of the complex motivational drives to improve learning outcomes. Lee et al., (2020) report several motivational macro strategies with different loci of effects involving in- and out-of-class effects. These strategies include searching for additional self-learning resources, minimizing mistakes, developing more positive L2 learning attitudes, taking part in active roles in class, accomplishing assignments more carefully, using newly learned skills in practice, using and revising learning materials more thoroughly, and making more contributions to group work.

Conclusion

This research has addressed the gaping void in the literature concerning the underlying mechanism of emotional, sociocognitive, and motivational bearings as the parallel drives to students' language learning achievement in the tertiary EAP context. The findings are largely coherent with the previous discussions predicting the linear positive association between TEI, OLE, EFL learning motivation, and academic achievement along with their antecedents. However, our results provide more trait-specific elaboration as to how each antecedent operates in the structural model, which helps crystalize their roles in the attempt to elevate students' engagement, overall EFL learning motivation, and learning outcomes, particularly in collaborative mobile learning.

Several conceptual and practical implications are worth pondering. First, as students' online learning engagement is vital to promote learning outcomes through the mediation of EFL learning motivation, online learning engagement deserves more recognition from instructors and researchers. The overarching roles of different dimensions of engagement can help teachers identify essential skills, models of collaboration, and values of mobile learning as the springboard to design effective collaborative mobile language learning that appreciates students' personalized strategies to co-construct their learning. In addition, for optimal online learning engagement to thrive, teachers need to develop an empowering environment where students can learn from and support one another through, for instance, problem-solving, knowledge-building, or game-playing approaches through mobile learning. This can be a fertile ground for students to accrue their positive emotions and exercise their agency as both individuals and members of a learning community. Combined with academically rewarding learning goals and materials, collaborative mobile language learning can amplify students' intrinsic and extrinsic motivation with which they can witness the target language both as an end and medium bridging their interaction in a resource-rich mobile learning environment. Nevertheless, it is always less about technology than about pedagogy. As the conduit to spark interest and curiosity at the outset of learning, mobile devices can help teachers to create an inviting environment for students to build their confidence and self-efficacy in using the language. To further amplify their learning engagement and overall motivation, teachers can also integrate computers or laptops to enable more personalized and challenging learning experiences, from cognitive and linguistic perspectives.

Program designers are also encouraged to consider integrating TBML as a complement to regular face-to-face instruction. For our findings have underscored the sociocognitive, emotional, and motivational drives of mobile learning to help students co-construct disciplinary knowledge and academic language use, TBML can be made operative in pre-lesson and/or post-lesson activities. The former helps to prepare students for more complex tasks in the class, while the latter aims at extending students' content understanding and language performance through reflection and evaluation. Program designers and teachers need to collaborate to identify effective strategies to infuse TBML as vital elements to students' day-to-day learning praxis in a way that

seamlessly connects curricular goals and students' lives. This enables the curriculum to be developed in alignment with students' intrinsic and extrinsic motivations. It is about time that perspectives on language learning begin to shift and seemingly continue shifting in the constant surge of mobile devices as social media and academic platforms.

The abundance of learning resources accessible at students' disposal further extends and acknowledges their roles as learning creators. Students need to learn to navigate their roles as knowledge co-constructors and evaluators of their learning products. Despite the temptation of ample autonomy, there remains the urgency for students to develop the initiatives, knowledge, skills, and communication with the aid of mobile devices as they need to know how to navigate unlimited learning resources and validate quality resources. Strategies for knowledge consolidation from the ever-evolving growth of digital learning artifacts are deemed valuable to help students gain the utmost benefit from their serendipitous learning. Most importantly, teachers also need to appraise the uprising Third Space wherein learning pertains to but is not delimited by classroom, set curricula, and school authorities (Schuck et al., 2017). Teachers need to work with students as teachers are learners themselves, discovering new learning possibilities and continuously refining their views of and approach to how students should learn with, through, and around mobile devices. Equally important is that teachers shoulder more tasks in providing a multitude of feedback on students' collaborative mobile learning, which may not be previously possible.

Notwithstanding the research contributions, this research holds several limitations to acknowledge. First, although the size of participants is sufficiently large, the data collection did not take into account students' actual engagement via MIM since this would require extensive thread analysis. Grounding future studies on students' actual use of MIM, i.e., user analytics, retrieved from the app will afford a more authentic portrayal of their activity. Furthermore, considering the different types of interaction prevalent in collaborative mobile learning (Nor et al., 2012), the analysis of interaction patterns would shed light on which interaction patterns play the most crucial roles in escalating overall motivation and learning outcomes. Future researchers can also engage in the analysis of discursive moves (see Zhao & Chan, 2014) to scrutinize the depth of students' learning and identify the structural linkages between their discursive moves, learning engagement, and language learning gains. These lines of inquiry will aid in informing teachers' intervention and approach to encouraging students to reach pre-determined cognitive discourse functions essential in content-and-language integrated courses. Finally, our study is conducted in an Indonesian EFL setting where collaboration is highly endorsed by the curriculum, and this collectivistic learning is also widely socially respected. The different underlying mechanisms may arise in a community where individualistic learning is appreciated or learning collaboration is optional in nature.

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Appendix A

Part 1. The English version of adapted survey items on TEI (Petrides & Furnham, 2001)

Intrapersonal trait

1. I'm in touch with my emotions. (Emotional self-awareness)
2. When I'm angry with others, I can tell them about it. (Assertiveness)
3. Looking at both my good and bad points, I feel good about myself. (Self-regard)
4. I try to make my life as meaningful as I can. (Self-actualization)
5. I tend to cling to others. (Independence)

Interpersonal trait

6. I'm able to show affection. (Internal relationship)
7. I'm good at understanding the way other people feel. (Empathy)
8. I like helping people. (Social responsibility)

Adaptability

9. In handling situations that arise, I try to think of as many approaches as I can. (Problem solving)
10. I can easily pull out of daydreams and tune into the reality of the immediate situation. (Reality testing)
11. It's easy for me to adjust to new conditions. (Flexibility)

Stress management

12. I can handle stress without getting too nervous. (Stress tolerance)
13. It is easy to control my anger. (Impulse control)

General mood

14. It's easy for me to enjoy life. (Happiness)
15. I generally hope for the best. (Optimism)

Part 2. The English version of adapted survey items on OLE (Dixson, 2010)

Learning skills

1. I study through Telegram discussion on a regular basis.
2. I look over the responses and feedbacks in Telegram discussion to make sure I understand the material.

3. I organize my learning by taking part in Telegram discussion.
4. I make notes on the discussion, Power Points, and materials in Telegram group.

Emotional engagement

5. I find ways to make the course material and discussion relevant to my life.
6. I find ways to make the Telegram discussion and exercises interesting to me.
7. I feel it easy and comfortable to communicate with peers on Telegram group in English.
8. I feel it easy and comfortable to communicate with my teacher on Telegram group in English.
9. I find peers' feedback in my Class Telegram group useful for my study.
10. I find the teacher's feedback in my Class Telegram group useful.
11. I really desire to learn the course material and exercise through Telegram discussion.

Participation

12. I have fun in Telegram chats and discussions with the teacher or other students.
13. I participate actively in small-group Telegram discussion forums.
14. I help fellow students in Telegram discussion and exercises.
15. I engage in conversations online (chat, discussions, email).
16. I post responses in the Telegram discussion forum regularly.
17. I give feedbacks and comments to my friends in my class Telegram group.

Performance

18. I get a good grade on the exercises in Telegram discussion.
19. I do well on the on the exercises in Telegram discussion.
20. I feel my language skills can be improved by through various tasks in Telegram group.

Part 3. The English version of adapted survey items on EFL learning motivation (Xuejun, 2020)

Extrinsic motivation

1. I am studying English because I have to meet the requirements/expectations of my teachers and/or parents.
2. I am studying English because I would feel guilty if I don't know English.
3. I am studying English in order to get a good job in the future.
4. I am studying English to show myself that I am a good student because I can speak English.
5. I am studying English in order to go to get a good job.
6. I am studying English for the enjoyment I experience when I grasp a difficult construct in English.
7. I am studying English for the satisfaction I feel when I am in the process of accomplishing difficult exercises in English.
8. I am studying English because I would feel ashamed if I could not speak English when I communicate with my friends from English speaking countries.

Intrinsic motivation

9. I am studying English because I think it is good for my personal development.
10. I am studying English because I choose to be the kind of person who can speak more than one language.
11. I am studying English for the pleasure that I experience in knowing more about the culture of the English-speaking countries.
12. I am studying English because I choose to be the kind of person who can speak English.
13. I am studying English for the satisfied feeling I get in learning new things.
14. I am studying English for the pleasure I get from hearing English spoken by English native speakers.
15. I am studying English for the pleasure I experience when surpassing myself in English studies.
16. I am studying English because I enjoy the feeling of acquiring knowledge about the English-speaking countries and their people's way of life.
17. I am studying English for the good feeling that I experience while speaking English.
18. I am studying English for the good feeling when hearing English spoken.