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### **A mobile diary application as an instrument for collecting real-world and real-life contextualized language learning**

#### **Bio data**



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#### **Abstract**

This study is part of a long-term project dealing with the definitions, measurements, factors, and outcomes of outside-classroom real-world (RW) and real-life (RL) contextualized (mobile-assisted) language learning, that is, CLL and CMALL. A known research obstacle in the field is how to collect learners' RW/RL contextualized learning given 'noisy' data. There is an issue of memory for self-reported data, which weakens questionnaires' validity. The experience sampling method (ESM), however good in assisting learners' recall, is quite laborious. Diaries are introspective, and asking about recent events, such as a day before, as in the day reconstruction method (DRM), can reduce memory bias. Furthermore, digital tools facilitate data analysis for researchers. Therefore, in this study, we developed a diary application to collect data on learners' experiences in outside-classroom RW-RL CLL & CMALL. We developed the diary app based on the DRM guideline and eight principles that make it usable in future studies regardless of the target language with no need for coding. The main learner functionality (reporting events) is based on the RW/RL contextualized learning model adjusted to the diary. The diarists are guided unequivocally based on the model and using clear instructions and questions about aspects of language, context, materials, and feelings. The Admin Monitor facilitates data tracking and analysis. Thus, this pioneering language-learning diary application for outside-classroom RW-RL CLL and CMALL is more structurally consistent and comprehensive than traditional language-learning diaries. The

app is purposeful for researchers and practitioners interested in using language-learning diaries or learning about students' outside-class RW-RL CLL & CMALL.

## Conference paper

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### Background

#### *Outside-class RW-RL CLL & CMALL*

A thread of studies has developed over the years, dealing with contextualized language learning (CLL) that involves learning *outside of class* in one's daily real-world (RW) and real-life (RL) (e.g., Edge et al., 2011; Hyland, 2004; Litzler, 2014b). Studies exploring such out-of-class RW-RL-CLL have also been given attention in mobile-assisted language learning (MALL), given mobile devices' utility in contextualized language learning (Comas-Quinn et al., 2009; Kukulska-Hulme, 2012; Pegrum, 2014; Sharples et al., 2007). Thus in recent years, a vast collection of studies examining such real-world and real-life contextualized mobile-assisted language learning (RW-RL-CMALL) has appeared (e.g., C. M. Chen & Li, 2010; Ezra & Cohen, 2018; W. Y. Hwang et al., 2014; Ibrahim et al., 2017; Lee, 2019; Lee & Park, 2019; Rivers, 2009; Sandberg et al., 2011; Santos et al., 2016; Zhang, 2018).

#### *Data collection instruments of outside-class RW-RL CLL & CMALL*

Outside class, RW-RL CLL & CMALL can occur at any place or time during the day. Therefore, learners' reports on their daily language learning occurrences capture this type of learning. Studies have used various data collection instruments for learners' reports, including Time-Tracker web tools (Viberg et al., 2021), questionnaires, surveys, and interviews (Bradley et al., 2017; Cohen & Ezra, 2018; Lamb & Arisandy, 2020; Steel & Levy, 2013).

Studies adopting the experience sampling method (ESM) (Edge et al., 2011; Larson & Csikszentmihalyi, 2014) can overcome memory limitations and an inherent bias due to self-report methods (Bradburn et al., 1987). Diaries and journals are also considered valuable for recording occasions of language learning beyond the classroom while maintaining immediate recollection by recording them shortly after the event (Reinders & Benson, 2017). Moreover, introspective journal entries provide data that may reveal aspects of the language learning experience which are challenging to attain by other means (Curtis & Bailey, 2009). Several language learning diary studies in second or foreign language learning environments looked into learners' outside-classroom activities (Benson et al., 2018; Chanjavanakul, 2017; X.-B. Chen, 2013; García-Amaya, 2017; Hyland, 2004; Krishnan & Hoon, 2002; Litzler, 2014a, 2014b; Litzler & Bakieva, 2017b; Ranta & Meckelborg, 2013; Warden et al., 1995). These diary studies illustrate how learners recalled outside activities focusing on *language, context, materials, and feelings* and what purposes keeping a diary can serve.

However, the literature to this date, to the best of our knowledge, has provided no instrument to systematically collect learners' reports on their outside-classroom RW-RL CLL & CMALL. Thus, an instrument built on consistent guidelines and clear definitions of RW and RL learning, with aspects of language, context, materials, and feelings, is missing. Assessing and evaluating learning of this kind of activity is indeed a challenge (Comas-Quinn et al., 2009).

### The language diary app development

#### **Objectives**

Given diaries' merits, such as evoking recent memories, and in light of their potential superiority over ESM in terms of lower participant burden (Karapanos, 2020), we chose to implement our outside-class RW-RL CLL & CMALL instrument as a diary. Our diary only

accepts events that happened the same day, or one day before the learners record the data, as suggested in the day reconstruction method (DRM) (Kahneman et al., 2004). Furthermore, in light of the need for structured diaries (Brown et al., 2015) to overcome memory and definition difficulties (Vavoula, 2005), we drew on the RW/RL contextualized learning model (Cohen & Ezra, 2018; Ezra & Cohen, 2018). We thus guide the learners through questions, as is customary in both ESM and DRM. We collect all types of outside-learning events, with or without a mobile device. We elicit information about aspects of language, context, materials, and feelings to fortify recall and form a more holistic picture of one's contextualized learning. Finally, we are developing our diary as a mobile application for two main reasons. First, electronic, written journal entries significantly facilitate data analysis (Curtis & Bailey, 2009). Second, mobile devices' noticeable characteristics, including permanency, accessibility, immediacy, and interactivity (Viberg & Grönlund, 2012), facilitate an ideal ongoing basis for filling in diaries (Stockwell, 2022).

Thus, the aim of this study was to 1. develop a holistic, structurally consistent data-collection diary instrument, 2. develop a self-explanatory, handy diary application, and 3. develop a diary application that empowers researchers and practitioners to track, analyze, and easily maintain required changes and configurations. We thus designed and developed the "Langy" (**LanguageDiary**) mobile application.

#### *Design principles and adjusted RW/RL contextualized learning model*

Eight crucial *design principles* were recognized for the diary app in light of the study objectives. Namely, we strived to

1. Boost memory
2. Provide a structure-based diary
3. Offer a self-explanatory diary
4. Build a holistic diary
5. Use common LL diary-studies tips
6. Facilitate data tracking
7. Facilitate data analysis
8. Support system configuration

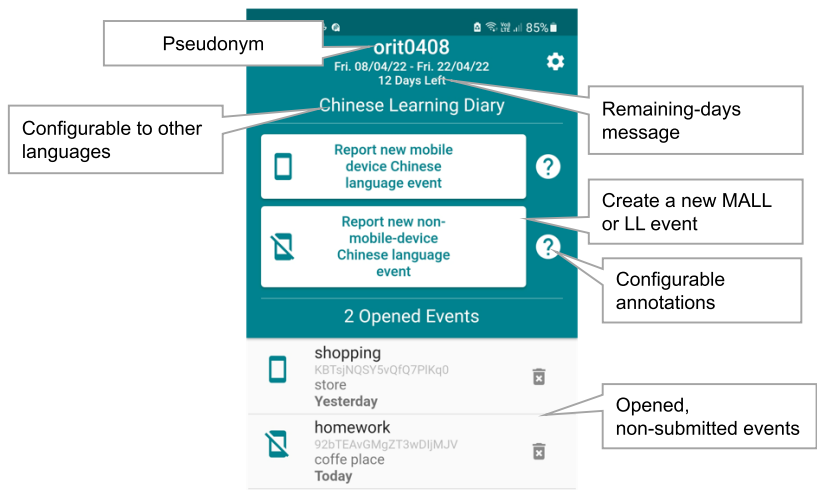
A detailed explanation of the eight design principles follows. We boost learners' memory by adapting the DRM method and using some other mnemonic tools (1). Structured input consistency is delivered using the RW/RL contextualized learning model (see below in detail), guiding questions, and annotations enriched with examples from our previous studies. These can also boost memory and help overcome definition discrepancies among learners. Furthermore, the RW/RL contextualized learning model (Cohen & Ezra, 2018; Ezra & Cohen, 2018) was adjusted to fit the structured LL diary. According to the adjusted model, the diary provides learners with a consistent platform for recording RW and RL information about their learning events (2). A handy diary app with unequivocal guidance is provided using guiding questions and annotations, including ample examples (3). All aspects – language, context, materials, and feelings – are included in the diary. A holistic picture might further fortify learners' memory (4). We comply with diary privacy important to learners' candidness, and provide language scaffolds such as explicit instructions to ignore grammar and spelling mistakes (Curtis & Bailey, 2009). We also strive to push learners toward ongoing filling in diary records rather than postponing and filling multiple records collectively (Stockwell, 2022) (5). The app admin user can monitor data recording of learners (6) and analyze their data (7). The diary can be modified and configured according to desired characteristics of the diary study.

**The diary app modules**

The following section describes how the principles, the RW/RL model and the DRM one-day-backward guideline, were introduced into the two modules of the diary, namely the *Learner Diary* and the *Admin Monitor*. The UI components presented in the screenshots below were configured for our first diary study on learning Chinese as a second language.

*The Learner Diary module – The Opening screen*

Figure 1 shows the Opening screen in the Learner Diary module. The user pseudonym is presented in line with the privacy considerations of the instrument. Researchers and practitioners can modify the title 'Chinese learning diary' to fit other language diaries. In the following screens, any place indicating Chinese is modifiable to meet the studied language. A message informing the diarist how many days remain before the allotted time ends boosts the app's self-explanatory nature. The calculation is based on a pre-configured number of days in which researchers or practitioners want to hold their program. Diarists are guided to create a mobile event (MALL event) or non-mobile event (LL event). Configurable annotations, placed on both buttons (with or without mobile), highlight the definition of a language learning event, the differences between these two event types, and provide some typical examples. They serve as a consistent structure to follow and a mnemonic device to trigger learners' recall of relevant events. Configurable annotations are also helpful in increasing the app's self-explanatory capability and are attached to many fields in the app. The app instructs learners from diverse countries in simple English and asks learners to ignore their spelling and grammar mistakes while writing, adhering to the language scaffolds principle. The learner can open a maximum of four events in parallel (a configurable number). It serves the principle of ongoing filling in records by encouraging learners to create an event shortly after it happened. On the other hand, learners are pushed to fill in until completion by limiting the number of opened events and shutting records at the end of the day.

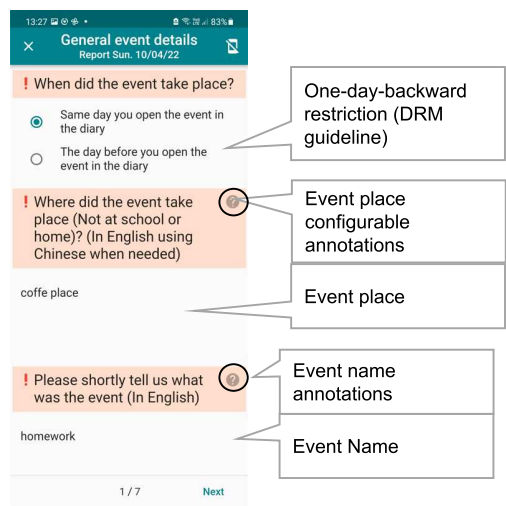


**Figure 1.** Learner Diary module - Opening screen

*The "Create MALL/LL Event" flows*

According to our initial configuration, the questions' MALL and LL event flows are similar. The questions concerning mobile device information and mobile learning materials are not included in the LL event flow. Researchers and practitioners can design and configure their own desired flows and respective questions and immediately deploy the app's changes without requiring any app update. Figure 2 shows the first screen in both event types – General Event Details, in which the learner selects the event date as the date of the report or one day earlier and records the place where the event took place and a short event name.

In addition to its memory-aid functionality, the DRM's one-day-backward restriction is also helpful in promoting the app's self-explanatory nature by focusing students on the relevant dates. A configurable annotation, adjacent to the place text field, explains to the learner the places relevant to the study with examples of excluded places (such as in school or at home as in our first case study). It also instructs the learner to mainly record English and use the target language (Chinese in our first study) to elaborate. To bolster the learners' memory, they are instructed to record more precisely by specifying location type and name, and some examples are provided. This instruction facilitates the data analysis as researchers and practitioners can differentiate between events that happened on the same day in similar places. The short event name can trigger learners' memory. The configured event name annotations instruct the diarist to enter a short name in English; in the other text fields, diarists are instructed to enter information mainly in English with the target language (e.g., Chinese) to elaborate when required, to avoid diary-caused CMALL or CLL. Learners are instructed to record more precisely by specifying the language activity (e.g., shopping for groceries or eating in a restaurant), and typical examples are provided. Thus, the app's self-explanatory and memory requirements are bolstered. The next button instructing learners to proceed likewise supports the app's self-explanatory principle.



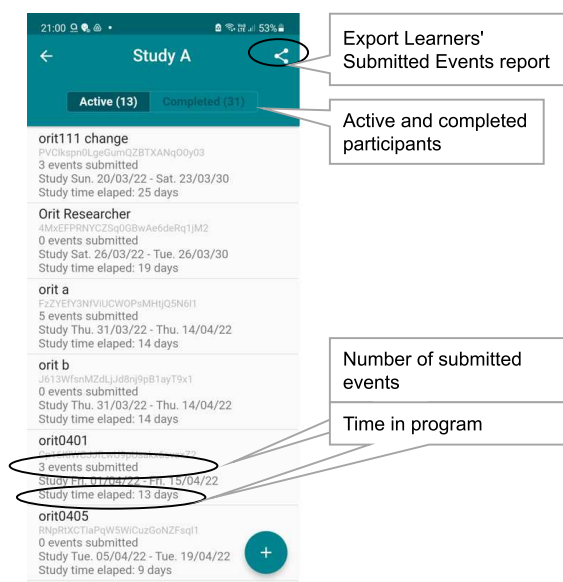
**Figure 2.** Learner Diary module - General Eevent Details screen (first screen of the MALL/LL event flows)

The rest of the screens ask about the following event information: digital and non-digital materials, Chinese skills and content, relation to RW and RL (according to our model),

and feelings. When learners finish filling up the questions, they click on the submit button. They can neither view nor edit the submitted event to avoid any diary-inflicted effect, thus keeping its primary function as a data collection instrument.

### *The Admin Monitor module*

Researchers and practitioners can track learners' events and evaluate them through the Track Learners' Activity screen in the Admin Monitor module (Figure 3). This screen presents the number of active and completed participants (diarists whose study has not ended yet or has already ended), the number of their submitted events, and their overall time in the program. These figures are helpful to monitor the number of participants and how engaged they are. The "Learners' Submitted Events" report, exported from this screen, presents the complete event information, including automatically calculated information such as the total number of events and each event type. Researchers and practitioners should use it during tracking and in the data analysis phase. Thus, the diary adheres to the principles of facilitating data tracking and analysis and ongoing filling in of diaries.



**Figure 3.** Admin Monitor module - track Learners' Activity screen

### **Discussion and conclusions**

We developed the language diary app based on the DRM guideline (one-day-backward recollections) (Kahneman et al., 2004), eight design principles, and the RW/RL contextualized learning model developed in our past studies (Cohen & Ezra, 2018; Ezra & Cohen, 2018). These foundations make the diary usable in future studies and language programs regardless of the target language and with little need for coding. As best as we know, this app is a forerunner pioneering dedicated diary application for language learning, specifically designed for the purposes of collecting data about outside-classroom RW-RL CLL & CMALL, that extends beyond previous language-learning electronic diaries (Benson et al., 2018; García-Amaya, 2017; Ranta & Meckelborg, 2013). The Learner Diary module's reporting events functionality is based on the RW/RL

contextualized learning model adjusted to the diary. Diarists are guided unequivocally, based on this model, using clear instructions and questions about aspects of language, context, materials, and feelings. Thus, this diary is more structurally consistent and comprehensive than traditional language-learning diaries, both open-ended ones (e.g., Benson et al., 2018; Litzler, 2014b; Litzler & Bakieva, 2017a; Warden et al., 1995) and more structured diaries (X.-B. Chen, 2013; García-Amaya, 2017; Hyland, 2004; Krishnan & Hoon, 2002; Ranta & Meckelborg, 2013). The diary questions are easily configurable and require no coding, allowing for a swift transition from one program to the next. The Admin Monitor module enables the user to track learners' progress and analyze the data efficiently and comprehensively. We plan in the next stage to perform comprehensive QA tests followed by several data-collection rounds. These rounds will be held in Taiwan among students of Chinese as a second language.

Language-learning diary studies and learning programs can draw on the eight design principles suggested in this paper as a reference checklist. Studies and learning programs interested in learning about outside-classroom RW-RL CLL & CMALL can draw assistance from data reported in the diary app. Furthermore, as developing materials in advance for contextualized learning requires knowledge of the entire domain's participants, situations, and language (Reinders & White, 2010), we suggest a data collection app such as Langy is also purposeful for material development. It informs about where, when, and what is learned outside class in RW-RL CLL & CMALL, supporting material adaptation to these outside-class learning contexts. In the future, technology-assisted reconstruction methods of moment assessment (Karapanos, 2020), using wireless communication, and sensing technologies (G. J. Hwang & Wu, 2014) can be used as well to provide a complementary picture of the phenomena. In MALL, tracking, including app records and server logs (Stockwell, 2022), can be integrated as well. Finally, we believe the diary-based instrument can be used in the future as a language-learning tool, although this will require additional development.

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