



Needs Analysis of Metacognitive Strategies Training in English Language Instruction Using Digital Technology and to Improve the Autonomous-Learning Ability and English Language Achievement of Chinese EFL Undergraduate Students

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Abstract

Background and aims: Learner autonomy has become a focal point in language learning over the past 30 years. In China, fostering and improving college students' autonomous learning ability has become a crucial aspect of higher education English teaching reform in the 21st century. Thus, this paper aims to analyze the needs of Chinese EFL undergraduate students to improve their autonomous learning ability and English language achievement.

Materials and methods: A needs analysis questionnaire (N=183) was conducted to investigate students' necessities, lacks, and wants in English language learning.

Results: The findings showed that the students required being trained to use metacognitive strategies and apply digital technology in their English learning to improve their autonomous learning ability and English achievement.

Conclusions: Besides using metacognitive strategies to improve their autonomous learning and English language achievement, students also expressed their preferences for digital tools as effective means to augment their learning outcomes and motivation.

Keywords: English Language Instruction; Digital Technology; Metacognitive Strategies; Autonomous-learning Ability; English Language Achievement; Chinese EFL Students

Introduction

Learner autonomy has become a focal point in language learning over the past 30 years (Tsai, 2019). In China, fostering and improving college students' autonomous learning ability has become a crucial aspect of higher education English teaching reform in the 21st century (Du, 2020). The information age and advancements in educational technology necessitate the development of learner autonomy as a fundamental educational objective in higher education, particularly with the incorporation of digital technology in language learning (Melvina et al., 2021). The rapid evolution of technologies has led to a paradigm shift in knowledge acquisition methods. This increased emphasis on technology-driven educational approaches informs the demand for reevaluating the roles of both teachers and students in the teaching and learning process. Metacognitive strategies training is considered an essential component of second foreign language acquisition, as it fosters students' autonomous learning abilities and enhances learning efficiency (Ji, 2002; Sun & Chang, 2020).



However, studies show that EFL learners infrequently utilize metacognitive strategies to improve their learner autonomy (Boonma & Swatevacharkul, 2020; Pang, 2003; Zimmerman and Risemberg, 1997).

Objectives

Thus, this study aims to investigate the needs of Chinese EFL undergraduate students to improve their autonomous learning ability and English language achievement. A needs analysis questionnaire (N=183) was conducted to investigate students' necessities, lacks, and wants in English language learning. The findings showed that the students required being trained to use metacognitive strategies and apply digital technology in their English learning to improve their autonomous learning ability and English achievement.

Literature Review

Autonomous Learning

Autonomous learning was brought to attention by Holec (1981) in the 1980s. He emphasized the importance of learners taking charge of their learning, which requires a level of natural or systematic learning. Holec outlined five abilities that autonomous learners must possess, namely, setting learning objectives, choosing learning materials, selecting learning strategies, monitoring the learning process, and evaluating the acquired knowledge.

Later in the 1980s and 1990s, three main trends of autonomous learning modes which were represented by McCombs (1989), Butler and Winne (1995) and Zimmerman (1990) have been identified.

McCombs (1989) proposed autonomous learning as a product of self-systematic development, encompassing goal-setting, strategy selection and implementation, and behavior evaluation. The development of autonomous learning ability hinges upon both the structure and the process of the self-system. Butler and Winne (1995) contended that an autonomous learning process should include task definition, goal setting and planning, strategy implementation, and metacognitive adjustment. Zimmerman (1990) introduced a third mode of autonomous learning, which stressed the importance of self-regulation and self-motivation. The key to this approach was for learners to constantly monitor and adjust their cognitive state and emotional attitude, be capable of observing and using various strategies to adjust their learning behavior and take control of their learning process based on external feedback (Zimmerman, 2002).

Benson and Voller (2013) stated that providing learners with an environment and opportunities to promote varying degrees of independence in the learning process was a crucial factor in improving their autonomous learning ability. He also suggested that teachers and educational institutions should give learners the chance to get involved in classroom activities or take part in extracurricular projects. This student-centredness orientation could ensure the effect of autonomous learning.

Chinese scholar Pang (2003) viewed autonomous learning as the concept of learners' purposeful learning process without depending solely on external guidance or support. He emphasized the importance of individuals taking responsibility for their learning and actively seeking out the knowledge and skills they need to achieve their personal learning goals, as well as the important role of motivation, goal-setting, self-reflection, self-regulation, cooperation, and evaluation in the improvement of



autonomous learning.

Needs Analysis

Nation and Macalister (2020) put forward a series of approaches for identifying learners' needs which was structured around necessities, lacks, and wants to design an instruction. These perspectives on needs analysis would alter due to the specific teaching and learning contexts. There were different stages when needs analysis could be conducted, including at the beginning of a course, in the preliminary stages of a course, and periodically throughout the course to ensure that instruction remains relevant and effective. Additionally, needs analysis at the end of a course, particularly when feedback is positive, could help make changes for future learners (Nation & Macalister, 2020).

The importance of conducting a thorough needs analysis in English language teaching cannot be overstated. By investigating learners' needs, instructors can better understand their students' goals, motivations, and areas of difficulty, allowing them to tailor their instruction accordingly and help their learners reach their full potential.

Table 1 Methods and Examples of Needs Analysis

<i>Type of need</i>	<i>Focus</i>	<i>Method</i>	<i>Example</i>
Necessities	Proficiency	Self-report Proficiency testing	Level of vocabulary knowledge (Nation and Beglar, 2007) Level of fluency e.g. reading speed
	Situations of use	Self-report Observation and analysis Review of previous research Corpus analysis	Analysis of texts (Nation, 2006) Analysis of exams and assignments (Friederichs and Pierson, 1981; Horowitz, 1986) Analysis of tasks (Brown <i>et al.</i> , 1984) MICASE (http://quod.lib.umich.edu/m/micase/)
Lacks	Proficiency	Self-report Testing	Vocabulary tests
	Situations of use	Self-report Observation and analysis	Examiners' reports Analysis of tasks (Ellis, 1986)
Wants	Wishes	Self-report	
	Use	Observation	Records of choices of activities Teachers' observation

(Adopted from Macalister & Nation, 2020: 32)

Metacognitive Strategy

O'Malley and Chamot (1990) explained metacognitive strategies as the tools that language learners could use to rationally adjust their learning behaviors, including planning, attention selection, monitoring, and evaluation. These strategies are particularly important because they allow learners to regulate their whole learning process at a high cognitive level (O'Malley & Chamot, 2001).

Oxford (2017) had a similar perspective with O'Malley & Chamot. He defined metacognitive strategies as the methods that help learners harmonize their learning process from four aspects: paying attention to the learning objectives; planning the learning process; organizing the learning process and



obtaining learning resources; monitoring the learning process and evaluating the learning outcomes.

Chinese scholars (Dong et al., 1996; Ji, 2005; Pang, 2003; Shu, 2004; Wen, 2001; Zhu, 2021) held the ground that metacognition was the individuals' self-awareness and self-regulation of the cognitive learning process. Metacognitive learning through planning, monitoring, reflecting, and evaluating could improve learners' language achievement and their ability to learn autonomously. In that way, improving students' autonomous learning ability by using metacognitive strategies was crucial to language learners, and cultivating their metacognition was the primary means to foster learners' autonomous learning ability.

Methodology

The research employed a quantitative approach to collect and analyze data through a needs analysis questionnaire.

Research Participants: The participants of the present research included 201 freshmen majoring in Business English and taking General English courses during Semester 1/2019.

Research Instruments

Needs Analysis Questionnaire

In language teaching, needs analyses were frequently conducted through the administration of questionnaires (Long & Doughty, 2009; Macalister & Nation, 2020). In this study, to examine the English learning needs of the participants, a Likert rating scale questionnaire was utilized. The questionnaire consisted of 29 questions, which enabled the assessment of participants' necessities, lacks, and wants about their English learning.

The needs analysis questionnaire was conducted at the beginning of the semester before the experiment and was initially written in Chinese to ensure the participants' full comprehension before being translated into English.

For the validity of the needs analysis questionnaire, three experts experienced in the TEFL context for no less than 40 years were invited to make the validation. Based on their feedback, some questions were amended or removed, and new questions were added. According to the results of the IOC, the Needs Analysis Questionnaire reached a satisfactory level of validity. For its reliability, a pilot study was conducted with a group of target participants before the actual data collection. After the revision of some parts, the final version of the questionnaire was developed. The Cronbach's Alpha coefficient was 0.816, indicating that the Needs Analysis Questionnaire had satisfactory reliability.

Data Collection and Data Analysis: After the sample students completed the needs analysis questionnaire, the researcher collected the responses and analyzed these data to design the instruction. Before the questionnaire was officially administered, the researcher gave a thorough explanation of the questionnaire to make sure every participant understood the meanings of the technical terms and intricacies of the questionnaire. Once the students had a clear understanding of each part of the questionnaire, they proceeded to answer the questions, which were presented in Chinese. Completed questionnaires were returned to the researcher upon completion. One hundred and eighty-three questionnaires were collected and analyzed using descriptive statistics including Means (M) and Standard Deviation (S.D.).



Results

The designed needs analysis questionnaire revealed the students' needs in English learning, which included their current situation and experiences of English learning in necessities, perceived difficulties in lack, and preferred learning approaches of learning English in their wants. The questionnaire was conducted to gather relevant data for designing the instruction for the current research.

The needs analysis questionnaire was composed of four sections. Part I was the participants' Demographic Information. Part II was the five-point Likert scale questions, Part III was the Multiple-Choice questions, and Part IV was an open question. The five-point Likert scale questions were designed with answers ranging from "5 – Strongly Agree" to "1 – Strongly Disagree". The mean range interpretation (see Table 2) included 4.50 – 5.00 meant "Strongly Agree", "Always", and "Excellent"; 3.50 – 4.49 meant "Agree", "Often", and "Above Average"; 2.50 – 3.49 meant "Undecided", "Sometimes", and "Average"; 1.50 – 2.49 meant "Disagree", "Rarely", and "Below Average"; and 1.00 – 1.49 meant "Strongly Disagree", "Never", and "Very Poor", as the mean range specification employed in several previous studies (Allen & Seaman, 2007; Moohammad et al., 2014; Sullivan & Artino, 2013).

The findings revealed the learners' current situation and experiences of English learning, learners' perceived difficulties, and learners' preferred approaches to learning English as follows.

Learners' current situation and experiences of English learning

Based on the needs analysis questionnaire, it was revealed that the students were facing challenges in developing their autonomous learning ability despite extended experience with English learning from seven to nine years, and a majority report having from 30 minutes to one hour per day of autonomous learning duration, as indicated by the "Undecided" mean range in item 15 - *I set goals and plans in learning English* ($M = 2.72$, $SD = 0.92$), item 18 - *I revise my English study plans if they don't work well* ($M = 2.48$, $SD = 0.83$), and item 19 - *I summarize and reflect by myself what I've learned after I finish learning English* ($M = 2.14$, $SD = 0.83$).

Regarding English language skills, the results reflected their experiences of English learning from the aspects of reading, listening, speaking, and writing. It showed that the students relied on their teachers' instruction to guide their reading and listening was indicated by the "Always" mean range reflected by "I don't read if my teacher doesn't ask me to" ($M = 4.62$, $SD = 0.68$), and "I listen to my teacher in class" ($M = 4.52$, $SD = 0.69$). Students reported an "Often" level in vocabulary acquisition, reflected by "I learn new words from my teachers' explanation" ($M = 4.31$, $SD = 1.00$), and speaking skills, reflected by "I speak to foreign teachers" ($M = 3.90$, $SD = 1.11$), and "I take every possible opportunity to speak in class" ($M = 3.86$, $SD = 0.76$). The results also indicated the least learning methods students would like to utilize in improving their language skills, as indicated by the "Rarely" mean range was consulting their peers while learning vocabulary ($M = 1.55$, $SD = 0.91$), taking speaking contests ($M = 1.62$, $SD = 1.05$), using digital reading materials ($M = 1.79$, $SD = 0.86$), attending English lectures and seminars to improve their listening skills ($M = 1.86$, $SD = 1.09$), or writing book reviews to improve their writing abilities ($M = 1.90$, $SD = 1.55$). Overall, the results demonstrated that students need to urgently improve their autonomous learning abilities and English language skills.

Regarding learning strategies, the results indicated that the students had limited knowledge and awareness of how effective learning strategies could improve their English learning practices, as



indicated by the “Disagree” mean range in item 19 - *I summarize and reflect by myself what I’ve learned after I finish learning English* (M = 2.14, SD = 0.83), item 14 - *I use learning strategies in English learning* (M = 2.17, SD = 0.97), and item 17 - *I choose different learning strategies according to the characteristics of different English learning tasks* (M = 2.28, SD = 0.80). The results also revealed that the frequency of students using digital tools to study was low, as indicated by the “Rarely” mean range in using digital writing software (M = 1.90, SD = 0.86), or online learning resources, such as China University MOOC (M = 1.93, SD = 0.96) to support their learning efforts (see Table 2).

Table 2 Students’ Current Situation and Experiences of English Learning

Items (N=183)	Mean	SD	Interpretation
1. What materials do you use for reading?			
Textbook and/or paper books	2.55	1.02	Sometimes
Digital Newspaper APPs such as <i>China Daily</i> , Articles or Novels in Digital Dictionary	1.79	0.86	Rarely
I don’t read if my teacher doesn’t ask me to.	4.62	0.66	Always
2. How do you usually learn vocabulary?			
I learn new words from my teachers’ explanations.	4.31	1.00	Often
I learned new words by using a paper dictionary.	3.76	0.95	Often
I learned new words by using a digital dictionary.	2.17	0.66	Rarely
I look up the new words in the dictionary.	2.48	0.79	Rarely
I consult my classmates when I meet new words.	1.55	0.91	Rarely
I do nothing when I meet new words.	2.65	1.00	Sometimes
3. How do you often improve your listening ability?			
I listen to my teachers in class.	4.52	0.69	Always
I listen to my classmates in class.	2.07	0.75	Rarely
I listen to the listening materials given by my teachers.	4.48	0.74	Often
I listen to the listening materials required for specific exams.	3.17	0.76	Sometimes
I listen to English songs.	2.45	0.95	Rarely
I watch English films.	4.46	0.76	Often
I attend English lectures and seminars.	1.86	1.09	Rarely
4. How do you often improve your speaking ability?			
I take every possible opportunity to speak in class.	3.86	1.30	Often
I am taking a speaking contest.	1.62	1.05	Rarely
I join speaking clubs.	1.90	1.11	Rarely
I speak English to my friends after class.	1.93	1.03	Rarely
I like to speak English in group activities.	2.79	1.08	Sometimes
I speak to foreign teachers.	3.90	1.11	Often
5. How do you often improve your writing ability?			
I write what my teacher asks me to write.	3.66	1.17	Often
I keep English diaries.	2.41	1.15	Rarely



Items (N=183)	Mean	SD	Interpretation
I write book reviews.	1.90	1.15	Rarely
I write English academic papers.	1.28	0.59	Never
I practice my writing according to the requirements of specific exams.	2.72	0.80	Sometimes
I practice my writing with digital tools, such as <i>Pigai</i> .	1.90	1.01	Rarely
6. What digital tools do you often use in your English learning?			
Digital Dictionary App	3.38	1.05	Sometimes
Cellphone/Ipad/Laptop	4.59	0.83	Always
TED Talks	2.14	0.95	Rarely
WeChat Official Accounts	2.10	0.98	Rarely
www.pigai.org	1.90	0.86	Rarely
Online Teaching Platform	4.31	0.97	Often
China University MOOC	1.93	0.96	Rarely
Social media sites such as Douyin, Bilibili, Facebook, Twitter	3.97	1.09	Often
I think English is important for my future job.	4.66	0.67	Strongly Agree
I use learning strategies in English learning.	2.17	0.97	Disagree
I set goals and plans for learning English.	2.72	0.92	Undecided
I know what I need to do to improve my English.	2.66	0.94	Undecided
I choose different learning strategies according to the characteristics of different English learning tasks.	2.28	0.80	Disagree
I revise my English study plans if they don't work well.	2.48	0.83	Disagree
I summarize and reflect on what I've learned after I finish learning English.	2.14	0.83	Disagree

Learners' perceived difficulties

The questionnaire also disclosed several difficulties students perceived during their English learning (see Table 3).

One of the major challenges identified was the lack of autonomy. Students heavily depended on their teachers and could not take charge of their learning, as indicated by the mean range of "Always" in item 1 - *I don't read if my teacher doesn't ask me to* (M = 4.62, SD = 0.68), or "Often" in item 2 - *I learn new words from my teachers' explanation* (M = 4.31, SD = 1.00).

Another difficulty the students met was their English skills. It was revealed from the questionnaire that students considered their English skills as "Average" or "Below Average". Specifically, the "Below Average" level was shown in students' listening (M = 2.38, SD = 0.78), and speaking (M = 2.48, SD = 0.63), and the "Average" level was shown in students' reading (M = 2.59, SD = 0.78) and writing (M = 2.83, SD = 0.76). Additionally, students also expressed dissatisfaction with their mastery of vocabulary and grammar, which was reported as an "Average" level (M = 2.83, SD = 0.88).

The questionnaire also revealed that students had limited experience and understanding of



metacognitive strategies for learning. Many only used these strategies to a limited extent and were not proficient in using them to optimize their learning outcomes, as indicated by the “Disagree” mean range in item 19 - *I summarize and reflect by myself what I’ve learned after I finish learning English* (M = 2.14, SD = 0.83), item 14 - *I use learning strategies in English learning* (M = 2.17, SD = 0.97) and item 17 - *I choose different learning strategies according to the characteristics of different English learning tasks* (M = 2.28, SD = 0.80).

Table 3 Learners’ Perceived Difficulties in English Learning

Items	Mean	SD	Interpretation
1. What materials do you use for reading?			
Digital Newspaper APPs such as China Daily, Articles or Novels in Digital Dictionary	1.79	0.86	Rarely
I don’t read if my teacher doesn’t ask me to.	4.62	0.68	Always
2. How do you usually learn vocabulary?			
I learned new words by using a digital dictionary.	2.17	0.66	Rarely
I do nothing when I meet new words.	3.65	1.00	Often
3. How do you often improve your listening ability?			
I listen to the listening materials given by my teachers.	4.48	0.74	Often
I listen to the listening materials required for specific exams.	3.17	0.76	Sometimes
5. How do you often improve your writing ability?			
I write what my teacher asks me to write.	3.66	1.17	Often
I practice my writing according to the requirements of specific exams.	2.72	0.80	Sometimes
I practice my writing with digital tools, such as Pigai.	1.90	1.01	Rarely
6. Please rate your English skills.			
Vocabulary and grammar	2.82	0.89	Average
Listening	2.38	0.78	Below Average
Speaking	2.48	0.63	Below Average
Reading	2.59	0.78	Average
Writing	2.83	0.76	Average
9. I can understand my teacher when she speaks English.	3.19	0.91	Undecided
10. I can ask and answer questions in English.	2.31	1.04	Disagree
14. I use learning strategies in English learning.	2.17	0.97	Disagree
15. I set goals and plans for learning English.	2.72	0.92	Undecided



Items	Mean	SD	Interpretation
16. I know what I need to do to improve my English.	2.66	0.94	Undecided
17. I choose different learning strategies according to the characteristics of different English learning tasks.	2.28	0.80	Disagree
18. I revise my English study plans if they don't work well.	2.48	0.83	Disagree
19. I summarize and reflect on myself what I've learned after I finish learning English.	2.14	0.83	Disagree

Learners' preferred approaches to learning English

In addition to highlighting the current learning circumstances and difficulties faced in their English learning, the questionnaire also unveiled students' specific preferences for learning English (see Table 4).

When regarding the abilities students would like to improve, it was found that students showed high demand to improve a series of abilities, as indicated by the "Strongly Agree" mean range in item 20 - *What other abilities would you like to improve*, the abilities they most wanted to improve was "Autonomous-learning ability" ($M = 4.72$, $SD = 0.53$), followed by "The ability to use modern digital technology" ($M = 4.51$, $SD = 0.78$), and "The ability of using appropriate learning strategies" ($M = 4.50$, $SD = 0.83$).

When concerning the English language skills students wanted to improve, the results revealed that students expressed their high demand, as indicated by the "Agree" mean range, in improving their English language skills in the following aspects, Listening and Speaking ($M = 4.31$, $SD = 0.97$), Reading ($M = 3.86$, $SD = 0.83$), and Writing ($M = 3.72$, $SD = 1.13$).

Another result from the findings revealed students' preference for learning English with the employment of digital technology, as indicated by the "Agree" mean range in item 12 - *I prefer learning with digital tools to traditional learning methods*. Despite the limited exposure to digital tools in their learning, students favored digital learning tools over traditional modes of instruction ($M = 4.10$, $SD = 1.01$).

Moreover, the results also showed students' motivations to learn English, as indicated by the "Strongly Agree" mean range, among them, "To get a good job" ranked the highest ($M = 4.86$, $SD = 0.44$), followed by "To pass exams" ($M = 4.72$, $SD = 0.59$). Also, students showed an "Agree" level on other reasons to stimulate them to learn English, which included "To get a good grade" ($M = 4.45$, $SD = 0.83$), "To prepare for future classes in English" ($M = 4.03$, $SD = 0.98$) and "To be able to read English materials on my own" ($M = 3.79$, $SD = 1.08$).

Table 4 Learners' Preferred Ways of Learning English

Items	Mean	SD	Interpretation
<i>7. Which of the following do you need help with ?</i>			
Vocabulary and Grammar	3.41	0.95	Undecided
Listening and speaking	4.31	0.97	Agree
Reading and Thinking Critically	3.86	0.83	Agree



Items	Mean	SD	Interpretation
Writing	3.72	1.13	Agree
11. I enjoy hearing what other students think about issues raised in class.	3.35	0.86	Undecided
12. I prefer learning with digital tools to traditional learning methods.	4.10	1.01	Agree
16. I know what I need to do to improve my English.	2.66	0.94	Undecided
20. What other abilities would you like to improve?			
Autonomous-learning ability	4.72	0.53	Strongly Agree
Creative and critical thinking ability	3.45	0.99	Undecided
The ability to use modern digital technology	4.51	0.78	Strongly Agree
The ability to use appropriate learning strategies	4.50	0.83	Strongly Agree
21. Why do you learn English?			
To get a good grade.	4.45	0.84	Agree
To pass exams. (e.g., on CET, TEM, BTEM, IELTS)	4.72	0.59	Strongly Agree
To get a good job.	4.86	0.44	Strongly Agree
To prepare for future classes in English.	4.03	0.98	Agree
To be able to read English materials on my own.	3.79	1.08	Agree
To study abroad.	2.14	0.83	Disagree

Conclusion

This study investigated the needs of Chinese EFL undergraduate students to improve their autonomous learning ability and English language achievement. A needs analysis questionnaire (N=183) was conducted to investigate students' necessities, lacks, and wants in English language learning. The results from the needs analysis questionnaire revealed that students would like to use metacognitive strategies to improve their English learning and autonomous learning ability. Besides using metacognitive strategies to improve their autonomous learning and English language achievement, students also expressed their preferences for digital tools as effective means to augment their learning outcomes and motivation. Further research can be delivered with a case analysis approach to enrich the existing findings

Recommendations

Metacognitive strategies training in English language instruction using digital technology can be a valuable tool for improving the autonomous learning ability and English language achievement of Chinese EFL undergraduate students. Here are some recommendations for implementing such a program effectively

1. Needs Assessment, before implementing any training program, conduct a needs assessment to understand the specific needs and preferences of your students. This will help you tailor the program to their requirements.
2. Select Appropriate Digital Tools, and choose digital tools and platforms that are user-friendly,



engaging, and suitable for metacognitive training. Tools like online learning platforms, interactive apps, and educational websites can facilitate self-directed learning.

3. Set Clear Learning Objectives, Define clear and achievable learning objectives for your metacognitive training program. Ensure that these objectives align with language proficiency goals and autonomous learning outcomes.

4. Teach Metacognitive Skills Explicitly, Introduce metacognitive skills such as goal-setting, self-monitoring, self-regulation, and reflection explicitly. Help students understand the importance of these skills in language learning.

5. Model Metacognitive Thinking, Demonstrate metacognitive thinking processes through examples and discussions. Show students how to apply these strategies to their own learning experiences.

6. Provide Scaffolded Support, and offer scaffolding support as students develop their metacognitive abilities. Gradually reduce guidance as they become more proficient in using these strategies independently.

7. Encourage Goal Setting and guide students in setting specific, measurable, achievable, relevant, and time-bound (SMART) goals for their language learning. Regularly review and adjust these goals as needed.

8. Promote Self-Assessment and teach students how to self-assess their language skills and progress. Encourage them to reflect on their strengths and weaknesses and make informed decisions about their learning strategies.

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