

The Development of Early Literacy Skills Indicators (ELSI) for Children Aged 3+ to 4+ Years

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Abstract--- *This study aimed to develop an Early Literacy Skills Indicators (ELSI) to assess early literacy skills which includes five components, namely language and communication, concept of print and environmental print; phonemic and phonetic; reading and narrative comprehension, and early writing for children aged 3+ to 4+ years. The development of ELSI design was based on the ADDIE-ELSI Model which consists of five stages; Analysis, Design, Development, Implementation, and Evaluation. The researchers analyzed documents, and involved three experts, 43 educators and 40 children aged 3+ to 4+ years as respondents for data collection. This study succeeded in developing ELSI with emphasis on principles such as authentic, balanced and integrated, standardized, individual, and interactive. ELSI has good content validity, difficulty index and discrimination index in assessing children's early literacy skills. In conclusion, ELSI was developed systematically and empirically, and could accurately assess early literacy skills of children aged 3+ to 4+ years.*

Keywords--- *Early Literacy Skills, Early Childhood, Authentic Assessment, Addie Model.*

I. INTRODUCTION

An accurate assessment of early childhood development is a challenging task. Most researchers find it is difficult to make a valid decision when evaluating early childhood because the development is fast, episodic, and strongly influenced by experiences, emotional state, and assessment criteria [1-3]. Early childhood assessment differs from adult assessment because the children have not yet mastered reading and writing skills [4]. A different and unique early childhood development influences the selection of methods or tools for evaluating children. Assessment methods should be appropriate for the children's cognitive, social, and physical developmental level.

This practise applies in the assessment of children's early literacy skills as well. Early literacy skills refer to basic skills in reading, writing, and other literacy-related skills [5,6]. The stages of early literacy skills exist in children aged 3+ to 4+ years [7]. Early literacy skills include five major components that need to be mastered by children, namely; (i) language and communication; (ii) concept of print and environmental print; (iii) phonemic and phonetic; (iv) reading and narrative comprehension; and (v) early writing [8-11]. Therefore, accurate assessment of early literacy skills should consider all these five components.

Assessment of early childhood literacy skills is an important aspect of a comprehensive early childhood program [12-14], and has expanded to nursery or preschool [15]. Occassionally, information about early literacy skills

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acquisition is interpreted as a reflection of all aspects of teaching in an early childhood education (ECE) program [12]. However, assessing literacy skills at every age level is difficult, especially in early childhood [16]. This is because children's early literacy skills are very unstable, and influenced by other developmental aspects such as physical, cognitive, and emotional. This further complicates children's early literacy skills assessment with traditional standardized measurements. The assessment of early literacy skills requires evidence from a variety of methods that are consistent and relevant to children's development.

In general, assessment for children's early literacy skills is conducted informally through observation [17,18]. However, this observation method has no specification of early literacy skills mastery according to the learning standards [19]. Besides, there are several considerations when using informal assessments. Informal assessments do not use standardized procedures [20], which makes the criteria of early literacy skills assessment less consistent among children. In addition, the level of early literacy skills assessed is not significant, and there is a lack of information on validity and reliability of informal assessments [20]. Informal assessments also do not compare to normative expectations which cause the difficulty of determining children's early literacy skills accurately [21].

Moreover, comprehensive and standard early literacy skills assessment tools for early childhood in Malaysia are limited. Currently, the existing assessment tools only evaluate one component of early literacy skills such as The Integrated Scales of Development [22], Children's Writing Assessment Rubric [23], reading skills with Higher Order Thinking Skills under Malay Communication Strand [19], Planned Skills Assessment Inventory [24], and National Child Data Centre (NCDC) [25]. There are assessment tools that evaluate more than one component of early literacy skills, but are not comprehensive, such as Malay Preschool Language Assessment Tool [26], Malay Reading Readiness Inventory [27], Early Literacy Skills Screening Test [28], Children's Literacy Skills Assessment [29], and Literacy and Numeracy Screening (LINUS) [30]. Most of these early literacy skills assessment tools are only suitable for kindergarten or primary school children.

Hence, there is a need to develop a more efficient and comprehensive early literacy skills assessment tool for children. This study was conducted to develop Early Literacy Skills Indicators (ELSI) for children aged 3+ to 4+ years.

II. MATERIALS AND METHODS

This study used the ADDIE Model development design [31] as a basis or framework for developing ELSI. The researchers has also applied several criteria for the procedures of assessment development such as children's developmental assessment procedure [32], standardized test development procedure [4], and rubric development procedures [23] which fit into every level of the ADDIE Model. The researchers have modified the ADDIE Model design to develop a new model for ELSI development known as the ADDIE-ELSI Model. This was consistent with several previous studies that indicate the ADDIE Model design can be modified based on specific research needs [33-36].

The ADDIE-ELSI model begins with Analysis, Design, and Development stages in one way. Next, the ADDIE-ELSI Model is a cycle involving three stages, namely Development, Implementation, and Evaluation. It involves process of repeating and crossing each other to produce a perfect ELSI. Each level of the ADDIE-ELSI Model also

involves a review process, which known as a formative assessment [31]. It aims to obtain the validity features of each stage of ELSI development process. Figure 1 shows the ADDIE-ELSI Model developed by the researchers;

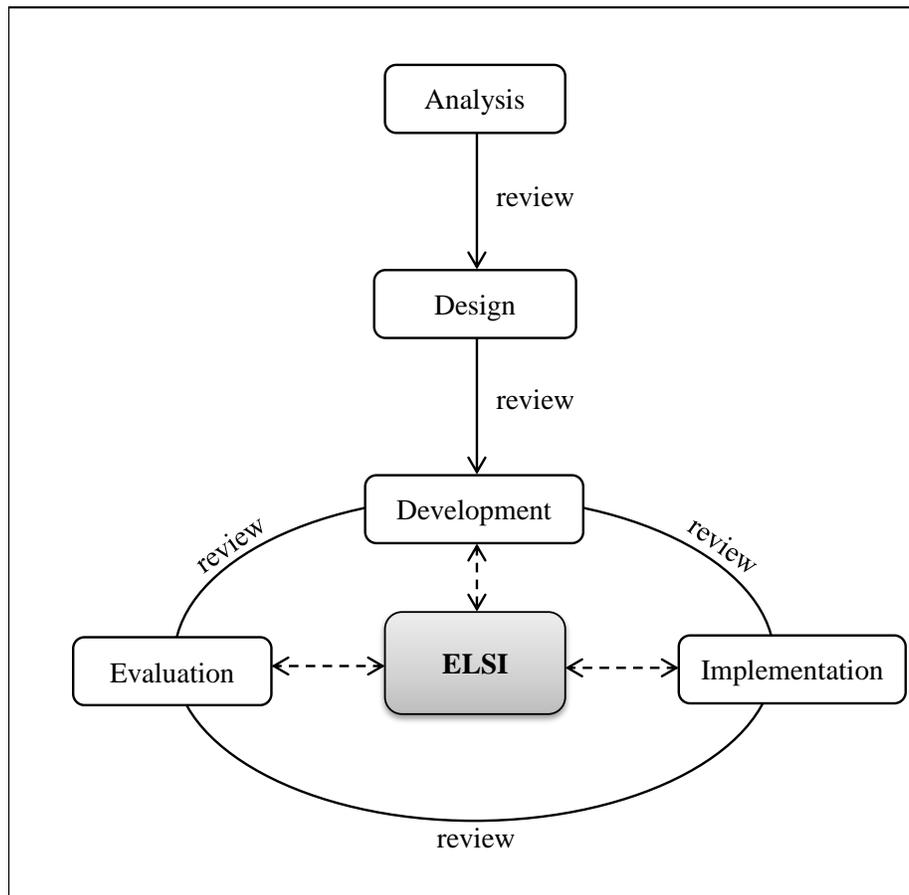


Figure 1: ADDIE-ELSI Model Development Design

The researchers analyzed documents, and involved three experts, 43 educators and 40 children aged 3+ to 4+ years as the respondent for data collection.

III. RESULTS

The researchers explained the findings of study based on five stages of ADDIE-ELSI Model, namely Analysis, Design, Development, Implementation, and Evaluation.

3.1 Analysis

Analysis stage is a basis for other stages of developmental design that aimed to identify the objectives, content, relevance of the target group, and product reach [37,38]. In this study, researchers analyzed several aspects, namely; (i) the requirement of early literacy skills assessment tools development; (ii) goal of early literacy skills assessment; (iii) principles of early literacy skills assessment; (vi) methods and strategies of early literacy skills assessment; (v) appropriateness of timeframe for the implementation of early childhood literacy skills assessment; (vi) use of media for the early literacy skills assessment; (vii) components of early literacy skills; and (viii) characteristics of the target group.

To analyze these aspects, researchers conducted a document analysis by examining Emergent Literacy Theory [39], and early literacy skills models such as; (i) Four Components Model [40]; (ii) Outside-in, Inside-Out Model [41]; (iii) Balanced Literacy Model [42]; (iv) Early Communication, Language, and Literacy Development Model [7]; and (v) Comprehensive Emergent Literacy Model [43]. Researchers also referred to recommendations of the authorities in ECE and early literacy skills such as the International Reading Association (IRA), the National Association for the Education of Young Children (NAEYC), the National Reading Panel (NRP), and the National Early Literacy Panel (NELP). In addition, researchers conducted a literature review to identify views of other researchers or findings from previous studies that related to early literacy skills assessment both locally and overseas.

Next, researchers analyzed the ECE curriculum in Malaysia, which are the National PERMATA Curriculum (NPC) used in the nursery, and the National Preschool Standard Curriculum (NPSK) used in the kindergarten. It aimed to identify existing practices, goals, principles, and methods for assessing children early literacy skills. Analysis of this document also helped researchers to identify to what extent the early literacy skills have been focused on NPC and NPSK.

Furthermore, researchers conducted a preliminary survey by distributing the Requirements Analysis Questionnaire to 43 educators to obtain their views and feedback on the aspects highlighted in this stage. In a preliminary survey, the sample size is at least 30 people [44].

Researchers' combined stage information from document analysis, and preliminary survey to analyze each aspect emphasized in this stage. All of analyzed aspects assisted the researchers to proceed with the next stage of ELSI development, namely Design stage.

3.2 Design

In Design stage, researchers determined the requirement to be developed specifically based on the information obtained in Analysis stage. This gave researchers an initial and primary focus on developing ELSI. Among aspects determined by researchers in this stage were; (i) objectives; (ii) components and items of early literacy skills; (iii) principles of implementation; (iv) implementation managements; and (v) media. All of these aspects were determined by researchers based on appropriateness and needs of early childhood literacy skills assessment.

Firstly, researchers defined objectives of ELSI, which is to assess the children's early literacy skills acquisition level comprehensively, and specifically according to the components of early literacy skills.

Secondly, researchers determined components of early literacy skills for ELSI, which were; (i) language and communication; (ii) concept of print and environmental print; (iii) phonemic and phonetic; (iv) reading and narrative comprehension; and (v) early writing. Each component came with several items which also considered the NPC and NPSK. This to ensure that ELSI content meets the requirement of the ECE curriculum in Malaysia. All components and items were the main contents of ELSI.

Researchers also determined content validity for components and items of early literacy skills in ELSI from three external assessors with a Doctorate of Philosophy, and experts in ECE, literacy, and development of assessment tools. In determining validity, it requires at least two [45] or three [46] external assessors to produce acceptable

agreement. This is consistent with several previous studies which included three external assessors in determining content validity [23,47,48]. The content validity has a high level of validity when reaching 70 percent and above [49,50].

In this study, researchers have found that components and items of early literacy skills had a high content validity of 84.8 percent. The highest content validity was 94.6 percent for language and communication, while the lowest content validity was 72.5 percent for concept of print and environmental print. Overall, each component obtained content validit. The findings of the content validity are as shown in Table 1;

Table 1: Content Validation of Components and Items of Early Literacy Skills in ELSI

Components	Assessors			Average	Opinions of Assessor
	A	B	C		
Language and Communication	100 %	88.9 %	95 %	94.6 %	Accepted
Concept of Print and Environmental Print	66.7 %	77.8 %	73 %	72.5 %	Accepted
Phonemic and Phonetic	87.5 %	100 %	95 %	94.2 %	Accepted
Reading and Narrative Comprehension	71.4 %	85.7 %	80 %	79 %	Accepted
Early Writing	77.8 %	88.9	85 %	83.9 %	Accepted
Overall	80.7 %	88.3 %	85.6 %	84.8 %	

All three external assessors also provided written suggestions for improvement that were gathered and compared by researchers. Based on the proposed improvement, researchers refined the components and items of early literacy skills in ELSI to be more complete and accurate in assessing children's early literacy skills.

Thirdly, researchers defined the principles of ELSI implementation that refer to the criteria or conditions of ELSI implementation on the target group. Among the principles of of ELSI implementation determined by researchers was authentic, balanced and integrated, standardized, individual, and interactive as shown in Table 2;

Table 2: The Principles of ELSI Implementation

Principles	Descriptions
Authentic	Conducted in an actual and meaningful to children through reading books.
Balanced and Integrated	Assessing early literacy skills of children in a balanced and integrated which includes five components, namely language and communication, concept of print and environmental print, phonemic and phonetic, reading and narrative comprehension; and early writing.
Standardized	Implementation procedures are similar for every child.
Individual	Conducted individually between assessor and children.
Interactive	Active involvement of children either verbally or physically.

Fourthly, researchers determined the management of ELSI implementation that refers to actual implementation procedure on the target group. Among aspects identified were target groups, implementation methods, scoring strategies, implementation setting, and implementation time as shown in Table 3;

Table 3: Management of ELSI Implementation

Aspect	Descriptions
Target Groups	Children aged 3+ to 4+ years.
Implementation Methods	Structured Interviews through before, during, and after reading storybook activities.
Scoring Strategies	Scores in form of items based on response (0, 1, 2, and 3) with specific rubric for each item. The total scores were divided into three levels, namely Weak, Moderate, and Good.
Implementation Setting	A separated room in a class.
Implementation Time	10 to 15 minutes.

Finally, researchers determined the media that was appropriate for the objectives, components and items of early literacy skills, and principles and management of ELSI implementation as shown in Table 4;

Table 4: Media of ELSI

Media	Functions
Storybook	Medium or mediator to conduct an authentic assessment of early literacy skills through before, during, and after of reading storybook activities.
Toilet Symbol	Medium or mediator to evaluate children's environmental print.
Stationery	Medium or mediator to assess children's early writing.
Worksheet	Medium or mediator to assess children's early writing.
ELSI Score Form	Record children's scores based on their responses or answers to each item.
ELSI Summary Form	Determine the mastery level of children's early literacy skills by component and overall performance.
ELSI Guidebook	Explain the content, usage procedures, and media of ELSI.

3.3 Development

In Development stage, researchers developed ELSI based on each of media set in Design stage. Among media of ELSI developed by researchers were storybook, toilet symbol, stationery, worksheet, ELSI Score Form, ELSI Summary Form, and ELSI Guidebook.

Next, researchers obtained content validity for each ELSI media from the same external assessors in Design stage. Overall, ELSI had a high content validity of 87.9 percent. Each ELSI media had a high content validity of 80 percent and above. Researchers have found that the highest content validity was 94 percent for ELSI Summary Form, while the lowest content validity was 80.7 percent for ELSI Score Form. The content validity of each ELSI media are shown in Table 5;

Table 5: Content Validity of Each ELSI Media

Media	Assessors			Average	Opinions of Assessor
	A	B	C		
Storybook "Ta Ta Rumah"	83 %	97 %	90 %	90 %	Accepted
ELSI Score Form	79 %	83 %	80 %	80.7 %	Accepted
ELSI Summary Form	90 %	98 %	95 %	94.3 %	Accepted
ELSI Guidebook	91 %	82 %	87 %	86.7 %	Accepted
Overall	85.8 %	90 %	88 %	87.9 %	

All three external assessors again provided written suggestions for improvement that were gathered and compared by researchers. Based on the proposed improvement, researchers refined the ELSI media.

3.4 Implementation

In Implementation stage, researchers conducted a pilot study to implement ELSI on 40 children aged 3+ to 4+ years at a private nursery and kindergarten in Puncak Alam, Selangor. This aimed to identify the suitability, practicality and reasonableness of ELSI in assessing early literacy skills of children in real situations.

Before using ELSI, researchers familiarized themselves with the instructions or test items in ELSI Score Form and storyline of "Ta Ta Rumah" storybook. Researchers also build the rapport with the children by participating in learning activities, helping children to complete the tasks, and playing with them.

ELSI implementation emphasized on children's involvement in meaningful activities, and real experiences. This is because ELSI was conducted for children individually in before, during, and after reading storybook activities with the researchers. This created a natural way of assessment as the children assumed that they were reading a story book without realizing that they were being evaluated by the researchers.

3.5 Evaluation

Although researchers explained Evaluation stage in the final section, this does not mean that evaluation of ELSI occurred at the end of development process. Based on the descriptions from Analysis to Implementation stage, ELSI evaluation was actually carried out by researchers through a formative evaluation or review as described previously. Formative evaluations of ELSI by stages were done as follows; (i) Analysis stage through requirement analysis; (ii) Design and Development stage through content validity from external assessors; and (iii) Implementation stage through the pilot study.

Next, researchers conducted a summative evaluation in the Evaluation stage to evaluate ELSI overall performance. This was done through item analysis based on the pilot study data to identify difficulty index, and discrimination index of ELSI. The item analysis only considered children's achievement for each item of early literacy skills components in ELSI.

The difficulty index, and discrimination index of ELSI were obtained using Microsoft Excel software using formulas for response-based items [51,52]. Researchers used specific formulas to interpret the difficulty index value [51], and the discrimination index value [53,54].

The results showed that the overall difficulty index value of ELSI was medium at 0.49. Researchers also found that the highest difficulty index value was 0.77 (medium) for item "5.1: Know and use stationery.". Meanwhile, the lowest difficulty index value was 0.30 (medium) for item "4.3: Understanding stories (predicting / relating experiences or knowledge / retelling)". This indicated that all ELSI items had a medium difficulty index, and the results were acceptable.

In determining the discrimination index value of ELSI, researchers involved only 30 percent of the 40 children from the pilot study, which equates to 12 children for each high-achieving and low-achieving group of children. The total number of children involved in the analysis of discriminant index of ELSI was 24.

The findings showed that the overall discriminant index value of ELSI was very good at 0.49 (highly acceptable). In addition, most items had a discriminatory index value of 0.31 to 0.83, which was at a good and excellent level. This indicated that most items of early literacy skills components were acceptable and highly acceptable.

However, there were three items of ELSI that had a discriminatory index value of 0.19 to 0.25 which was medium. These items were; "2.2: Function of book (showing some sections and features of book such as front / page / back / title / author)"; "4.5: Response to reading materials (advanced activities such as making a book / acting / composing a song after reading or storytelling)"; and "5.8: Writing for various purposes (poetry / story / experience)". This meant that all these three items need to be modified by researchers.

Finally, researchers have made final improvements of ELSI based on the pilot study and summative evaluation findings through difficulty index and discrimination index. Researchers have improved several media of ELSI, such as "Ta Ta Rumah" storybook, ELSI Score Form, ELSI Summary Form, and ELSI Guidebook. This study had successfully developed ELSI to comprehensively evaluate children's early literacy skills as shown in Table 6;

Table 6: Components and Items of Early Literacy Skills Assessed in ELSI

Components	Items	Item No.
1.0: Language and Communication	1.1: Active listening skills in a variety of situations (questions).	1
	1.2: Focus on conversation / activity.	1
	1.3: Respond through facial / body gesture.	1
	1.4: Participates in conversation (expressing opinions / questions).	6
	1.5 Basic vocabulary acquisition (vocabulary acquired by age).	14
	1.6: Language acquisition (speaking using correct and fluent spoken language).	1
	1.7: Speak according to situations / cultures / manners.	1
2.0: Concept of Print and Environmental Print	2.1: Functions of book (showing parts of book as front / back / title).	4
	2.2: Picture comprehension (distinguish between print and picture).	5
	2.3: Print rules (knowing reading directions).	5
	2.4: Environmental print (symbol).	3
	2.5: Knowledge of text prints (letter).	9
	2.6: Knowledge of text prints (word).	10
3.0: Phonemic and Phonetic	3.1: Identify and manipulate sounds from the environment.	7
	3.2: Knowledge of rhythmic languages.	13
	3.3: Identify relationship between sound and letter.	12
4.0: Reading and Narrative Comprehension	4.1: Read / listen to stories.	2
	4.2: Introducing local literature or culture (song).	11
	4.3: Predicting story.	8
	4.4: Associate stories with experiences or existing knowledge.	15
	4.5: Retelling stories.	16
	4.6: Do reading activities (shared reading).	2
5.0: Early Writing	5.1: Scribbles / sketches / meaningful drawings.	19
	5.2: Imitate lines / shapes.	18
	5.3: Writing techniques (knowing starting point, directions, and position of writing).	17
	5.4: Write own name.	17
	5.5: Write patterned letters / strings.	17
	5.6: Write letters / syllables / words.	17
	5.7: Writing for various purposes (story / experience).	19

Overall, the development of ELSI was based on a systematic and empirical procedure through the ADDIE-ELSI Model developmental design as shown in Table 7;

Table 7: The Development of ELSI based on the ADDIE-ELSI Model

Stages	Descriptions
Analysis	<ul style="list-style-type: none"> • Requirement of early literacy skills assessment tool development. • Goals of early literacy skills assessment. • Principles of early literacy skills assessment. • Methods and strategies of early literacy skills assessment. • Appropriateness of timeframe for the implementation of early childhood literacy skills assessment. • Use of media for the early literacy skills assessment. • Components of early literacy skills. • Characteristics of the target group.
Design	<ul style="list-style-type: none"> • Determine objectives of ELSI. • Determine components and items of early literacy skills of ELSI. • Determine implementation principles of ELSI. • Determine implementation managements of ELSI. • Determine media of ELSI.
Development	<ul style="list-style-type: none"> • Develop media of ELSI. • Identify content validity of ELSI media.
Implementantion	<ul style="list-style-type: none"> • Conduct a pilot study of ELSI.
Evaluation	<ul style="list-style-type: none"> • Identify difficulty index of ELSI. • Identify discrimination index of ELSI. • Final improvements of ELSI.

IV. DISSCUSSIONS

The development of a new product should be based on a systematic development design in order to produce quality and appropriate products for target group. Although there are many development design models used to develop products such as ASSURE Model [55], Dick & Carey Model [56], Dick & Reiser Model [57], and Sidek Model [50]; most of these modules focus on the development of teaching and learning (T&L) modules. Therefore, researchers use the ADDIE Model as the basis for the ADDIE-ELSI Model to develop ELSI. The ADDIE Model covers a broader scope in developing products, namely modules, courses, curriculum, T&L materials [58-60]; and other research materials or sources [31].

This study is consistent with previous study that has developed an assessment tool, which is a performance evaluation rubric for an architectural design project based on the ADDIE Model [33]. In addition, the ADDIE Model has been used to develop products related to children's literacy skills in Malaysia [34,35,36,61,62]. Therefore, this study is in line with previous studies that used the ADDIE Model as a guide in developing assessment tools or other products related to literacy skills.

In this study, researchers have modified ADDIE Model design to the ADDIE-ELSI Model to develop ELSI. The ADDIE-ELSI Model is actually a combination of the ADDIE Model and several criteria for the procedures of assessment tool development [4,23,32]. It means that development of ELSI is more complete and comprehensive because it complies with the ADDIE Model standards, and the criteria for the development of assessment tools. The ADDIE-ELSI model is one of the major contributions of this study that other researchers could utilize to develop a new assessment tool.

This study also shows that ELSI has good content validity, difficulty index, and discriminant index in assessing children's early literacy skills. The good content validity proves that ELSI emphasizes on components and items of early literacy skills, and the use of media based on facts or evidence and justifiable [49,50]. The good difficulty index explains that ELSI has a medium level of item difficulty that is neither too easy nor too difficult for children [51]. Whereas, a good discrimination index explains that ELSI could distinguish between high and low achievement of children's early literacy skills [63-65]. Therefore, ELSI is suitable to assess early literacy skills among children aged 3+ to 4+ years accurately.

V. CONCLUSIONS

In a conclusion, this study has successfully developed a new early literacy skills assessment tool, known as ELSI. The main strengths of ELSI are it is systematically and empirically developed under the ADDIE-ELSI Model, and emphasizes on the principles of implementation such as authentic, balanced and integrated, standardized, individual, and interactive. This has triggered a new phenomenon in assessment method of ECE in Malaysia which typically conducted through observation. Through ELSI, early literacy skills of children aged 3+ to 4+ years can be evaluated in a more comprehensive and accurate manner.

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