

# Theoretical Foundation for Developing Instructional Guide for China Pre-Service EFL Teachers to Teach Phonics

Min Jie Chen<sup>1</sup>, Guo Jie Yin<sup>1\*</sup>, Raja Nor Safinas Raja Harun<sup>2</sup>, Wei Lun Wong<sup>2</sup> & Charanjit Kaur Swaran Singh<sup>2</sup>

<sup>1</sup>Mianyang Teachers' College, China

<sup>2</sup>Sultan Idris Education University, Malaysia

\*Correspondence: Mianyang Teachers' College, China

Received: October 11, 2023

Accepted: February 11, 2024

Online Published: February 14, 2024

doi:10.5430/jct.v13n1p242

URL: <https://doi.org/10.5430/jct.v13n1p242>

## Abstract

In China, the absence of a phonics instructional guide hinders pre-service EFL teachers' preparation for phonics instruction. To bridge the gap, the purpose of this article is to lay the theoretical groundwork for developing a phonics instructional guide for Chinese pre-service EFL teachers and then to produce a research methodology for this instructional guide. The Bottom-up Theory of Reading Process; the S-R Theory with Reinforcement, particularly Instrumental Conditioning; and the Trial-and-Error Theory of Learning all have pedagogical implications for implementing explicit and systematic phonics instruction for EFL beginners in China. Additionally, in conjunction with the Andragogy Theory of Adult Learning, these theories provide a theoretical foundation for instructional design. Following the ADDIE sequential framework, a multi-phase mixed methods experimental design was used to collect data from 254 representative samples chosen through a stratified random sampling technique. The findings indicate that within the theoretical framework and with the incorporation of specific design frameworks into the ADDIE sequential framework, the instructional guide was successful, although some refinement is still needed. Furthermore, the findings suggest that additional research could be conducted on advanced evaluation levels.

**Keywords:** behaviourism, andragogy, instructional design, pre-service EFL teacher, phonics instruction

## 1. Introduction

Phonics, which refers to letter-sound relationships (Bear et al., 2020), is intended to equip beginners with basic decoding rules so they develop into autonomous word learners and readers (Nasir et al., 2019). As the International Literacy Association [ILA] (2018) noted, phonics is not a particular teaching strategy. Instead, synthetic and analytic approaches to phonics instruction are often applied to teach phonics. These two approaches exemplify two distinct models of oppositional reading: the Bottom-Up Reading Model and the Top-Down Reading Model (Gopal & Singh, 2020). The Bottom-Up Model emphasises explicit, direct, and systematic phonics instruction, from the smallest phoneme to more advanced reading components, so that the student develops into an independent reader. In contrast, the Top-Down Model emphasises that reading should begin with language learners' prior knowledge of whole words, with which they can discover or deduce letter-sound relationships (Suraprajit, 2019). According to the ILA (2019), explicit and systematic phonics instruction is more effective than the analytic approach to phonics instruction, which relies on previously acquired sight words. Moreover, Blevins (2017) and the ILA (2019) asserted that such a systematic and explicit synthetic phonics instruction approach is beneficial to all and harmful to none.

Hence, this article aims to lay the theoretical groundwork for the development of an instructional guide to demonstrate an acceptable research design throughout the study process. As a result, the research questions used in this article are as follows:

Q1: Which theories underpin a specific systematic and explicit phonics instruction approach?

Q2: What theoretical framework underpins the instructional design process?

Q3: What is the appropriate research design for this study?

## 2. Literature Review

### 2.1 Phonics Instruction Approaches

According to Bear et al. (2020), phonics is defined as the relationship between letters and sounds, and this is the content of an overall early reading strategy. It is a type of knowledge that can be taught (Blevins, 2017). From a behaviourist perspective, such knowledge can be transferred from more knowledgeable sources to less informed receivers (Robinson, 2018). Thus, phonics instruction refers primarily to the pedagogical practices that include instructing beginners to understand letter-sound relationships and apply this understanding in their early reading (ILA, 2018, 2019). According to Blevins (2017), the three major approaches are synthetic, analytic, and analogy phonics instruction. To determine which of these is appropriate in EFL contexts, the three principal approaches are discussed below.

#### 2.1.1 Synthetic Phonics Instruction Approach

Among the three approaches, synthetic phonics instruction follows a bottom-up pattern, beginning with individual phonemes and progressing to advanced ones such as digraphs and blends (Bear et al., 2020; Blevins, 2017; ILA, 2019). As Blevins (2017), ILA (2019), and Scarparlo and Hammond (2017) noted, this approach is appropriate for all beginners, particularly those who are struggling to learn to read and lack a rich English-language context, which generally includes EFL beginners. Additionally, as Bald (2007) and Johnston and Watson (2007) noted, beginners' phonemic awareness can be developed concurrently with such an approach, especially when they are practising the blending of individual phonemes. Hence, the explicit and systematic synthetic phonics instruction approach is appropriate for EFL beginners.

#### 2.1.2 Analytic Phonics Instruction Approach

The second approach is analytic phonics instruction, which follows a whole-to-part or top-down strategy that begins with some already-known sight words, which are then used to deduce and consolidate letter-sound relationships (Friedman, 2019). This approach is regarded as an inexplicit or indirect method of teaching phonics (Blevins, 2017). As Blevins (2017) and Parker (2019) noted, it may take five to six years to teach every alphabetic concept using this approach. Since this approach appears to be challenging and time-consuming for Chinese EFL beginners who lack a rich English-language environment and an accumulated sight vocabulary, this approach may not be the ideal choice for EFL beginners.

#### 2.1.3 Analogy Phonics Instruction Approach

The third approach is analogy-based phonics instruction, which is typically used in conjunction with the preceding two approaches to assist beginners in becoming familiar with some irregular words or decoding unknown words through the use of word families, such as “-ight” in the word “right” (Blevins, 2017). This is because 84 per cent of all English words are decodable, while 16 per cent are more problematic and may require decoding using similar word families. As mentioned previously, this phonics instruction approach is effective with word families, which are often referred to as phonograms. Blevins (2017) suggested that phonograms should be used cautiously with language beginners. This also implies that analogy phonics instruction may not be the most appropriate choice for beginners. Previous research has indicated that when beginners rely heavily on phonograms, it is difficult for them to establish fundamental letter-sound relationships and phonemic awareness, even though this approach can assist readers in vocalising unfamiliar words rapidly. As Blevins (2017) indicated, it can be incorporated into a continuum of systematic and explicit synthetic phonics education to assist beginners in addressing irregularities.

### 2.2 Bottom-Up Theory of Reading Process with Phonics

Morrison et al. (2019) stated that learning theories are intended to depict the process of learning to achieve specific learning objectives. The Bottom-Up Reading Process Theory holds that reading begins with the simplest sub-skills at the phonological level and progresses to more advanced layers, such as the semantic level (Aldhanhani & Abu-Ayyash, 2020; Tahir et al., 2021). In terms of phonics-based reading, decoding and comprehension are two distinct sub-skills (Aldhanhani & Abu-Ayyash, 2020). When greater capacity (mental energy) is devoted to decoding to recognise words, less capacity is devoted to more advanced sub-skills, such as comprehension (Aldhanhani & Abu-Ayyash, 2020; LaBerge & Samuel, 1974; Roembke et al., 2018). From this standpoint, a direct, explicit, and systematic phonics instruction approach that primarily relates to synthetic phonics instruction may be the most appropriate for Chinese EFL beginners. Analogy phonics instruction may be beneficial for teaching sight words, particularly complex words, as indicated by Blevins (2017). As the ILA (2019) highlighted, being systematic requires synthetic phonics instruction to follow a continuum from simple to sophisticated abilities so that sub-skills are gradually integrated. Being explicit requires that letter-sound relationships be taught explicitly and directly.

Additionally, being systematic entails following a review and repetition cycle of decoding rules practice, which assists learners in achieving mastery and progressing directly and conspicuously to new achievements. In this instance, beginners may find it easier to acquire or grasp decoding rules and apply them to word recognition during their early reading (ILA, 2019). Subsequently, this elaboration is supported by the Stimuli-Response (S-R) Theory with Reinforcement, particularly the Laws of Exercise and Effect under Thorndike's Trial and Error Theory of Learning (Schunk, 2020). To address question one adequately, Thorndike's Trial and Error Theory of Learning must be discussed.

### *2.3 S-R Theory with Reinforcement and Phonics Instruction*

Behavioural learning theory views learning as a process of modifying behaviour in response to environmental stimuli (Robinson, 2018). 'Reinforcement' in the S-R Theory with Reinforcement (Schunk, 2020) is defined as the stimuli or input that is delivered to cause the behavioural change (Schunk, 2020). During the stimulus-response process, knowledge can be transmitted from an informed source to less knowledgeable recipients so that the outcome can be attained (Robinson, 2018). This demonstrates that EFL beginners can acquire phonics knowledge from their more knowledgeable teachers, who control the input. Two sub-theories have been posited: Thorndike's Trial and Error Theory of Learning and Skinner's Instrumental Conditioning (Schunk, 2020).

### *2.4 Implications of Instrumental Conditioning Theory for Phonics Instruction*

Instrumental Conditioning views learning as the result of a cause-and-effect relationship, in which the input serves as the cause and the effect serves as the learning outcome (McConnell et al., 2020). Importantly, this learning outcome should be objective and measurable (Driscoll, 2018). In this theory, the input is sometimes referred to as reinforcement, most notably positive reinforcement, which refers explicitly to the knowledgeable source of information (Robinson, 2018). One pedagogical implication of this theory is that it can shape complex behaviour composed of successively linked and interconnected sub-behaviours (Schunk, 2020). As previously stated, the early reading process comprises a progression through successive sub-skills, ranging from alphabetic recognition to comprehension, which can be regarded as a complicated task (Liu et al., 2023). Moreover, in the early stages of reading with phonics, alphabetic recognition and phonics decoding principles are the simplest activities. As Sivakumar and Dhanaraj (2017) asserted, teaching vocabulary or spelling is a classic example of the complicated behaviour moulding process. Thus, Instrumental Conditioning provides a theoretical justification for delivering phonics instruction in this context.

### *2.5 Implications of Trial-and-Error Learning Theory for Phonics Instruction*

Thorndike's Trial and Error Learning Theory also has pedagogical implications for phonics instruction. Three laws govern this theory. First, the Law of Readiness has educational implications for beginners' preparation for phonics instruction. According to the Law of Readiness, learning occurs when learners are prepared to learn (Islam, 2015; Schunk, 2020). Blevins (2017) and the ILA (2019) emphasised that before introducing decoding rules, beginners should recognise the alphabet and possess phonemic awareness, which are the two prerequisites for phonics instruction. This is consistent with the Law of Readiness. Similarly, the Law of Exercise and the Law of Effects have educational implications for the process of phonics instruction.

Second, the Law of Exercise highlights the need for learning exercise and implies that drills should be supplied throughout the learning process (Chen, 2011). As explained, reading begins with symbol-sound connections (Amadi & Offorma, 2019). Word recognition occurs due to regular and consistent exposure to certain words (Friedman, 2019). As Blevins (2017) emphasised, phonics aids in word recognition by arming beginners with the sub-skills necessary to decode unfamiliar words. With repetition, word recognition is attained to improve reading fluency. Hence, more capacity for comprehension is available. The Law of Exercise led Blevins (2017) to advocate that decodable text should be used to reinforce beginners' previously acquired decoding rules along the systematic synthetic phonics instruction continuum. Meanwhile, reading decodable text with acquired phonics decoding rules may enhance beginners' confidence, which consequently serves as positive reinforcement and bolsters their motivation to learn to read. This is consistent with the Law of Effect. Thus, the three laws underpinning the Trial-and-Error Theory of Learning have educational implications for the process of phonics instruction, particularly an explicit and systematic synthetic approach.

The first question has therefore been addressed: the Bottom-Up Theory of Reading; the S-R Theory with Reinforcement, particularly Skinner's Instrumental Conditioning Theory; and the laws of Thorndike's Trial and Error Theory of Learning all support the expansion of explicit and systematic phonics instruction. However, to design and develop a phonics instructional guide for pre-service EFL teachers to follow so that they can teach phonics

systematically and explicitly, the instructional process theory should be examined, as guided by research question 2: “Which theories underpin the instructional design process?”

### *2.6 The S-R Theory with Reinforcement and Instructional Design*

Fundamentally, learning and teaching are inextricably linked and instructional theories are rooted in learning theories (Morrison et al., 2019), while both Skinner’s Instrumental Conditioning Theory and Thorndike’s Trial and Error Theory of Learning logically support the development of the guide presented in this study. In brief, the S-R Theory with Reinforcement affects instructional design because it assumes that behavioural change occurs due to the supplied stimuli, without considering other aspects such as cognitive processing (Driscoll, 2018). The reinforcement in the S-R Theory with Reinforcement is the input that may result in the desired behavioural change (Nazir, 2018). From an instructional design perspective, the instructional task can be regarded as a behavioural change, and the instructional process is the process of environmental stimulation (Morrison et al., 2019). Thus, the S-R Learning Theory with Reinforcement also has implications for instructional design from an educational standpoint. Conjointly, instructional design can profit from reinforcement, assisting trainees to acquire targeted information or abilities within the context of stated and implemented learning objectives.

Alternatively, teachers control the stimuli and the process of behaviour modification (Budiman, 2017). Conceivably, teachers should receive training on the proper use of phonics instruction, as their expertise may be critical in developing their students’ phonics skills in early reading (Aldhanhani & Abu-Ayyash, 2020; Stark et al., 2020). As Blevins (2017) and the ILA (2017, 2019) noted, a teacher’s subject matter content knowledge of phonics affects his or her ability to implement phonics instruction because pedagogical decisions or strategies are derived from this type of knowledge (Zhang, 2019). This also provides a rationale for pre-service EFL teachers to improve their knowledge base so they can teach phonics systematically and explicitly.

The ultimate purpose of this study is to develop an instructional guide for pre-service EFL teachers on how to implement systematic, explicit, and direct phonics instruction that primarily focuses on conditioning desired changes in recipients (pre-service EFL teachers) through reinforcement, also known as instrumental conditioning (instructional design). Simultaneously, the guide’s contents are based on systematic, explicit, and direct synthetic phonics, which aligns with the Bottom-Up Theory of Reading Process discussed in the previous sub-section. Thus, as Morrison et al. (2019) noted, behaviourism influences instructional design, and all instructional goals should be expressed in observable terms that can be quantified using norm-referenced instruments (Robinson, 2018).

In general, instructional design is based on the educational implications of the S-R Learning Theory with Reinforcement. The Bottom-Up Theory of Reading Process (Amadi & Offorma, 2019) highlights the guide’s content design. In brief, behaviourism theory informs instructional design, firstly by indicating that while developing the phonics instructional guide, the focus should be on systematic synthetic phonics training with a systematic teaching plan. Second, a direct and teacher-centred form of instruction progresses from component to whole or from bottom to top. Thirdly, a norm-referenced evaluation is used to determine the learning/training outcomes (Robinson, 2018).

Additionally, as Brown and Green (2016) noted, the systematic instructional design process should centre on the previously discussed instructional theories to ensure the highest possible quality of the instructional design. However, this is currently insufficient. Brown and Green (2016) also recommended following a systematic instructional design process, mainly basing the goal-setting process on feasible learner needs to assure quality, as the success of instructional design is contingent on achieving learners’ desired changes. As a result, it is critical to conduct a needs assessment before the design and development stages. The theory underlying needs assessments is discussed in conjunction with behaviourism to aid in the instructional design process.

### *2.7 Andragogy Theory of Adult Learning and Needs Assessments*

The instructional guide presented in the current study is intended for adult pre-service EFL teachers in China. Chen (2011) and Sinelnikova et al. (2022) stated that adults are problem-oriented rather than subject-oriented. This view is based on the Andragogy Theory of Adult Learning, which enables researchers to examine adult learners’ training needs (Chen, 2011). It implies that adult trainees need to know what they lack so they can decide what they want, which specific skills or knowledge they must acquire, and what problems might have been solved after their training (El-Amin, 2020; Knowles et al., 2015; Kurt, 2020). As a result, needs assessments are required at the outset of instructional design. Additionally, as Brown and Green (2016) stated, the instructional design goals and objectives can be immediately translated from the needs assessments results. In this regard, the Andragogy Theory of Adult Learning also serves as a theoretical underpinning for instructional design.

Thus, the article’s second research question has been addressed: the Bottom-up Reading Process Theory, the S-R

Theory with Reinforcement, and the Andragogy Theory of Adult Learning provide the theoretical framework for designing and developing a phonics instructional guide for pre-service EFL teachers interested in learning how to implement systematic and explicit phonics instruction.

### 2.8 Instructional Design Frameworks

To address research question 3, “What research design is appropriate for this study?”, the first step is to identify needs, as previously discussed. The entire instructional design process is directed by the goals and objectives established in response to the adult trainees’ needs. Therefore, to achieve this, the most frequently utilised ADDIE sequential framework (Knowles et al., 2015) was followed, which consists of three phases and five actions (Brown & Green, 2016). Branch (2018) defined the five ADDIE actions as follows: firstly, assessing needs; second, deriving goals and objectives from needs; third, developing materials; fourth, trying out the materials; and finally, evaluating the instructional product. Each activity in the ADDIE sequential framework generates output for a subsequent action and receives input from the preceding one, creating a circular waterfall effect (Chen, 2011). To clarify, “ADDIE” is a sequential framework or a guideline for the systematic instructional design process, rather than a content framework (Knowles et al., 2015). Hence, specific frameworks must be incorporated into each action in different phases (Brown & Green, 2016).

## 3. Methods

The main goal of this study is to develop a phonics instructional guide for pre-service EFL teachers that prepares them to teach EFL beginners through the systematic and explicit phonics instruction approach. As a result, this study is classified as a type 1 developmental study; these generally focus on the instructional product (Richey & Klein, 2005). This type of study entails five steps that align with the ADDIE sequential framework: analysing needs, designing, developing, trying out, and evaluating. Therefore, the present study is divided into three study phases with five actions:

**Table 1.** Study Phases

Phase No.	Phase Name	Actions
Phase I	Analysis Phase	Assess needs
Phase II	Design & Development Phase	Design the guide Develop guide
Phase III	Implementation & Evaluation Phase	Implement guide Evaluate guide

The research design is presented using the phases of the theoretical framework and based on the segmented phases.

### 3.1 Research Design

#### Phase I: Analysis Phase

##### *Needs Assessment Framework*

As mentioned in the Andragogy Theory of Adult Learning, adult learners need to understand what they are expected to learn and which issues they are encountering so they can choose their desired changes and be motivated to study (Appova & Arbaugh, 2018; Knowles et al., 2015). Thus, the first task in facilitating learning is to assist adult learners to become aware of what they need to know and discover for themselves the gap between their current and desired positions. Hence, Nation and Macalister’s (2010) framework for assessing needs is applicable in this scenario. Three distinct aspects of needs should be determined through this needs assessment approach.

According to Nation and Macalister (2010), the first dimension is “necessities”, which refers to what learners must learn or what the designer desires to learn to complete a particular activity. As a result, it is sometimes referred to as required knowledge extrapolated from prior research. The second dimension of needs is “lacks”, which refers to present knowledge, while the third dimension is “wants”, which refers to desired changes. Johnson and Bendolph (2018) stated that, considering the Andragogy Theory of Adult Learning, a needs assessment should be conducted to assess learners’ present knowledge and desired changes. As a result, the present study used a test with 30 multiple-choice questions and a questionnaire with a five-point Likert scale to collect data on the pre-service EFL teachers’ present knowledge and desired changes.

## Phase II: Design & Development Phase

This phase, following the ADDIE sequential framework, consists of two actions: design and development. As indicated by Branch (2018), this phase encompasses the formulation of goals and objectives based on the needs assessment results; the selection and sequencing of content within the objectives; and the development of instructional materials. Although implementing strategies and assessment plans should be anticipated during the design phase, the two topics are covered during the implementation and evaluation phases to provide logical consistency.

### *Procedures in Design Action*

Prior to initiating the design process, it is necessary to define the goals and objectives. As discussed, ADDIE is a sequential framework rather than a comprehensive content framework (Knowles et al., 2015). Therefore, to establish goals and objectives based on the needs assessment results, Brown's (1995) framework was followed:

- (1) Examine the needs
- (2) State the needs in terms of realisable goals
- (3) Narrow the scope of the goal statements
- (4) State smaller and more specific goals as objectives

The content of the guide must be selected and sequenced based on the stated goals and objectives. As with formulating goals and objectives, a specific framework is required. According to Nation and Macalister (2010), the following procedures should be taken:

- (1) Decide the content, focus, difficulties, and even what to omit based on the goals and objectives, then group the knowledge into teachable units.
- (2) Sequence the content of knowledge by considering a useful way to identify a clear relationship between the goals and objectives.

Thus far, this study has reported the formulation of goals and objectives, as well as the content selection and sequencing frameworks for design action.

### *Procedures in Development Action*

In terms of development, the instructional guide was developed using Brown's (1995) suggested framework:

- (1) Analyse
- (2) Classify
- (3) Fill gaps and reorganise
- (4) Re-examine

In the preceding steps, Brown (1995) noted that after the materials have been located, the designer should attempt to organise the most valuable parts to correspond with the instructional guide's various objectives. Then, additional complementary resources should be sought to cover the unpaired objectives to ensure that all the objectives are covered by relevant content.

## Phase III: Implementation & Evaluation Phase

### *Implementation Strategies*

This phase involves trying out and evaluating the guide. To try out the guide and to assure the study's credibility, it was necessary to first decide on the instructional strategies. Employing the concept of behaviourism, instruction should be methodical, direct, bottom-to-top, part-to-whole, and teacher-centred (Robinson, 2018). Additionally, given the EFL environment in China, the guide's demonstration could only be in the form of a teacher-centred lecture to a large group. According to Gagné et al. (2005), a large group is a class with more than 15 trainees. In such a large class, not every trainee receives the same quantity of information from the trainer, implying that efficacy is probabilistic. In this study, the trainees were adult pre-service EFL teachers with the capacity for self-directed learning (Appova & Arbaugh, 2018) to compensate for any lack of effectiveness (Knowles et al., 2015). As a result, the nine instructional strategies are appropriate for this study since they are universal to all forms of learning (Gagné et al., 2005).

More precisely, the nine strategies are capturing trainees' attention, informing trainees of learning objectives, stimulating acquired knowledge, presenting new content, providing learning guidelines, encouraging in-class

performance, providing feedback, assessing performance, and assisting knowledge retention via reinforcement. These strategies are based on behaviourism, particularly Skinner's Instrumental Conditioning Theory, which argues that learning objectives should be clearly stated to ensure readiness; that question-and-answer sessions are necessary to aid in recalling prior knowledge, which assists in the acquisition of new skills or knowledge; and that immediate and positive feedback is necessary as this serves as positive reinforcement (Chen, 2011). As a result, the nine strategies were adopted for the implementation process.

### *Evaluation Framework*

To conduct evaluations following the ADDIE sequential framework, a specific evaluation framework was also required. A type I developmental study requires a summative evaluation following the use of the product (Klein & Richey, 2005). Kirkpatrick and Kirkpatrick's (2006) summative evaluation framework was suggested since it provides multiple aspects for examining the efficacy of the instructional design output (Rothwell et al., 2016). Essentially, this framework necessitates evaluation on four levels: learning, perception, behaviour, and result level (Johnson & Bendolph, 2018). The first two levels are more frequently evaluated since the third and fourth levels have more uncontrollable limitations and require more investment of time, energy, and funds. As a result, the present study conducted an evaluation based solely on the learning and perception levels.

As Chen (2011) noted, behaviourism is occasionally referred to as objectivism, as behaviourism focuses on objective, observable, and quantifiable learning outcomes. Thus, from a behaviourist perspective, the evaluation of developmental products should be based on an objective assessment (Brown & Green, 2016). Furthermore, behaviourism requires a norm-referenced assessment (Robinson, 2018). Since the guide was delivered via lecture mode in a large group, the instructional efficacy may be probabilistic, so a norm-referenced assessment was suggested (Gagné et al., 2005). Meanwhile, considering behaviourism, the trainees' acquired knowledge had to be objectively measured and a one-group pretest-posttest design experiment would be sufficient (Johnson & Bendolph, 2018). To increase the credibility of the assessment results, a non-equivalent (pretest and posttest) control group design was also advised (Johnson & Bendolph, 2018). However, in China, no such phonics instructional guide exists to be applied with a control group (Long, 2019; Yan, 2018; Zhao, 2019; Zhong, 2020; Zhong & Kang, 2021). Therefore, a one-group pretest-posttest design experiment was adopted as the main method of evaluating the learning levels (Johnson & Bendolph, 2018). Meanwhile, Branch (2018) suggested assessing knowledge retention across time to determine retention. Thus, a delayed retention test was also used as part of the learning level evaluation.

Moreover, Rothwell et al. (2016) advised combining a quantitative questionnaire with a focus group discussion to collect data on trainees' perceptions. In comparison to questionnaire data, focus group discussions may provide a more in-depth understanding of trainees' perceptions. Additionally, Rothwell et al. (2016) emphasised the importance of multi-source data, so a trainer's teaching reflection was added to contribute qualitative data to the perception-level evaluation, which would establish triangulation validity among those instruments (Yang et al., 2019). As Creswell and Creswell (2018) stated, in such a mixed-methods experimental design, quantitative approaches provide primary data while qualitative approaches serve as secondary sources to supplement the quantitative data. Along with the ADDIE sequential framework, the specific frameworks chosen after considering the theoretical framework are reported for each action in each study phase.

### *3.2 Samples*

In Phase I, through a random stratified sample technique, 172 pre-service EFL teachers were selected as representative samples (Johnson & Christensen, 2019) from a total population of 1,243 individuals in four already-established strata, since these teachers attend for four academic years. Each stratum contained one class that was randomly chosen. Freshmen (N=39), sophomores (N=41), juniors (N=48), and seniors (N=44) comprised the sample distribution. Each participated in a test and completed a questionnaire assessing their needs.

In Phase III, stratified random sampling and random selection via the odd-even number technique were adopted to select 82 representative samples to undertake the training and quantitative evaluation. The sample distribution was as follows: freshmen (N=21), sophomores (N=23), juniors (N=22), and seniors (N=16). Concerning the focus group participation, a purposive sampling technique was used to ensure that valuable information was gathered (Kumar, 2019).

### *3.3 Instruments*

In Phase I, a test comprised of 30 multiple-choice questions (MCQs) with sufficient reliability and face validity was utilised to elicit information about the pre-service EFL teachers' existing knowledge. A five-point Likert scale questionnaire with acceptable reliability and validity was used to collect data on their desired changes.

To enhance internal validity in Phase III, Creswell and Creswell (2018) advised that learning levels should be evaluated using parallel tests with alternative wording as a pre-test, post-test, and delayed test. In terms of perception levels, a five-point Likert scale evaluation questionnaire with fair validity and reliability was employed to collect data on the trainees' perceptions of the guide and its implementation. Along with the questionnaire, a focus group discussion centred on seven specific questions was held to elicit qualitative feedback from five trainees. In addition, to ensure multi-source data, as suggested by Rothwell et al. (2016), a trainer's reflection provided insight into the guide and its training from an alternative perspective to those of the trainees.

#### 4. Results

In terms of learning levels, the results of the paired samples t-test indicated that the trainees improved by 23 per cent of their total knowledge base. However, the research findings indicated that the trainees did not make progress in phonemic awareness or sound system knowledge, which were not among their priorities. However, the trainees improved in the remaining sections, including phonics-related general knowledge, decoding rules, phonics instruction approaches, sight word instruction, and phonics rules reinforcement. The improvement rates were 29 per cent, 32 per cent, 25 per cent, 37 per cent, and 41 per cent, respectively. The delayed retention test results indicated that the knowledge acquired via the guide was retained appropriately.

At the perception level, the evaluation questionnaire, focus group, and trainer's teaching reflection all contributed to triangulation validity (Yang et al., 2019). These elements provided input on the following aspects: first, the guide and its implementation were generally regarded as helpful in assisting the pre-service EFL teachers to acquire the subject matter content knowledge necessary for teaching phonics. Second, a multilingual version of the guide was recommended. Third, it was suggested that phonemic awareness and sounding system knowledge should be removed from the guide, as the participants believed that the former was unnecessary and the latter had been covered in phonology class. Fourth, in terms of implementation, the trainer applied nine instructional strategies but it was recommended that additional training sessions should be arranged.

#### 5. Discussion

The purpose of this article is to elaborate on a theoretical framework to demonstrate the proper research design, including the specific frameworks used in this study to support the development of a phonics instructional guide for pre-service EFL teachers to teach phonics. According to the literature, no phonics instructional guide has been developed to assist such teachers in teaching phonics explicitly and systematically (Zhao, 2019; Zhong, 2020; Zhong & Kang, 2021). To accomplish this, the first step was to construct a theoretical framework to investigate the feasibility of bridging the gap by conducting such a developmental study using an appropriate conceptual framework. A review of the existing literature determined that the Bottom-Up Theory of the Reading Process underpins a systematic and explicit synthetic phonics instruction approach. S-R Theory with Reinforcement provides educational implications for implementing phonics instruction to EFL beginners and instructional design. Notably, Andragogy Theory of Adult Learning provides support for conducting needs assessments during the instructional design process. As a result, the study's first two research questions could be addressed and the theoretical framework was established.

To address research question 3, "What is the appropriate research design?", the ADDIE instructional design guideline was followed to develop a guide based on the needs assessment results. The guide was then tried out and evaluated on learning and perception level (Branch, 2018). In this multi-phase type I developmental study (Richey & Klein, 2005), Phase I employed Nation and Macalister's (2010) needs assessment framework in light of Andragogy Theory of Adult Learning. In Phase II, Brown's (1995) framework was adopted to formulate the instructional goals and learning objectives. The framework outlined by Nation and Macalister (2010) for content selection and sequencing was employed to determine the guide's contents. The draft guide was then completed using Brown's (1995) framework of content development. In Phase III, the nine instructional strategies outlined by Gagné et al. (2005) were adopted to try out the guide, taking into account behaviourism and the Andragogy Theory of Adult Learning. Then, following a mixed-methods experimental design (Creswell & Creswell, 2018), an evaluation was conducted following Kirkpatrick and Kirkpatrick's (2006) summative evaluation framework, focusing especially on the learning and perception levels.

In terms of learning level, the findings indicate that the trainees significantly improved their overall knowledge from which to implement systematic and explicit phonics instruction, indicating that the desired change had been achieved through reinforcement. This was consistent with the educational implication of the S-R Theory with Reinforcement



in that the phonics instructional guide played a reinforcing role. More precisely, under the umbrella term of the S-R Theory of Reinforcement, the findings also reflected the educational implication of Instrumental Conditioning (groups' complex behaviours can be conditioned by reinforcement), in that the guide was the reinforcement and learning was the complex behaviour (Schunk, 2020). Furthermore, since groups' behaviours are shaped, a norm-reference assessment was the right choice for the evaluation framework, in which a learning outcome is observable and measurable (Robinson, 2018).

More precisely, the trainees produced astonishing gains in the phonics-related general knowledge, decoding rules, phonics instruction approaches, and sight words instruction sections. These findings were in accordance with previous literature and imply that adult trainees learn more effectively when training is tailored to their prioritised needs and assists them in resolving certain problems encountered in real-world situations, as described in the Andragogy Theory of Adult Learning (El-Amin, 2020; Kurt, 2020). Moreover, as previously noted, EFL teachers, particularly novice teachers, have acknowledged their lack of familiarity with phonics decoding rules, phonics instruction approaches, and strategies for dealing with irregulars (sight words) (Zhao, 2019; Zhong, 2020). In other words, these components of their prioritised subjective needs are the ones addressed in the newly developed guide. Besides, it is hoped that the findings of the delayed retention test in this study enrich the related literature because these results would indicate the guide's effectiveness in assisting pre-service EFL teachers to acquire and retain knowledge rather than just knowing it. The literature on this topic is still scarce.

Nonetheless, the trainees made no progress in the phonemic awareness and sound system knowledge sections in the post-test, which was contrary to the findings in previous literature. The evaluation questionnaire and focus group discussion revealed the truth: phonemic awareness knowledge was not considered practical in the trainees' actual context and they had already gained some knowledge of the sound system in phonology class. Therefore, the knowledge in these two sections was not on their prioritised needs list. In a sense, triangulation validity is formed from multi-source data (Yang et al., 2019). In turn, this phenomenon reflects the Andragogy Theory of Adult learning that adults are motivated to learn as they experience the needs that the training will satisfy, while experience is a source of their decision making (Knowles et al., 2015). In this regard, it is also hoped that the present study contributes to the literature in this domain.

In terms of perception levels, both the trainer and the trainees considered the guide and its training to be effective. In addition, both demanded a translated version and more training sessions. From this perspective, triangulation validity was again formed among the instruments (Yang et al., 2019). Therefore, those findings generally verified the proper establishment of the theoretical framework and the appropriateness of the conceptual framework. In other words, research question three had been answered: the research design was appropriate for this study.

## 6. Conclusion

To summarise, the findings of this study indicate that the proposed phonics instructional guide, which was designed and developed using the proposed theoretical framework, in conjunction with the ADDIE guide and by utilising the specific frameworks of Brown (1995) and Nation and Macalister (2010), was effective in assisting pre-service EFL teachers to acquire the knowledge necessary to implement phonics instruction. This study aimed to contribute to the body of knowledge in this field by addressing the following three research questions: "Which theories underpin a systematic and explicit phonics education approach?", "What theoretical underpinnings support the creation and development of a phonics teaching guide for pre-service EFL teachers?", and "What is the most appropriate research design for this topic, including the frameworks?" Nonetheless, due to the inherent limitations of type 1 developmental studies (Richey & Klein, 2005), the current findings are limited to a specific setting. Future researchers could include a more extensive sample from another teaching college to generalise to a larger population. Also, a one-group pretest-posttest design experiment is comparatively weaker than a non-equivalent pretest-posttest control group design experiment, which might be the main limitation of this study. In the future, if the situation permits, a more robust experimental design may be adopted. Additionally, this study evaluated only learning and perception levels, so a future longitudinal study could use trained pre-service EFL teachers as mediating variables to observe their teaching efficacy when they are actually teaching their EFL students using the same theoretical framework. Generally, this study contributes to the related body of literature and should stimulate further research on the topic of EFL contexts in China. Also, the present study emphasises the importance of conducting needs assessment before designing any instructional materials. Third, this study provides a significant implication on teacher's pedagogical knowledge. Last, the present study findings show a dire need of having curriculum reform for teacher education programs in China. Furthermore, based on the implications and limitations of the present study, a

different research path connected to the present study may be to examine teacher educators' knowledge base for teaching phonics and their requirements.

## References

- Aldhanhani, Z. R., & Abu-Ayyash, E.A.S. (2020). Theories and research on oral reading fluency: What is needed? *Theory and Practice in Language Studies*, 10(4), 379-388. <http://dx.doi.org/10.17507/tpld.1004.05>
- Amadi, E.A. (2019). Bottom-up theory and phonics instruction: Implications for beginning reading. *European Journal of Applied Linguistics Studies*, 1(2), 89-100.
- Amadi, E. A., & Offorma, G. C. (2019). Effects of two phonics instructional modes on English as second language learners' achievement in reading. *Studies in English Language Teaching*, 7(2), 236-245. <http://doi.org/10.22158/sel.v7n2p236>
- Appova, A., & Arbaugh, F. (2018). Teachers' motivation to learn: implications for supporting professional growth. *Professional Development in Education*, 44(1), 5-21. <http://doi.org/10.1080/19415257.207.1280524>
- Bear, R. D., Invernizzi, M., Templeton, S., & Johnston, F. (2020). *Words their way* (6th ed.). Pearson Education.
- Blevins, W. (2017). *Phonics from A to Z: A practical guide* (3rd ed.). Scholastic.
- Branch, R. M. (2018). Characteristics of foundational instructional design models. In A. R. Robter & V. D. John (Eds.), *Trends and issues in instructional design and technology* (4th ed., pp23-30). Pearson.
- Brown, J. D. (1995). *The elements of language curriculum: A systematic approach to program development*. Heinle & Heinle Publishers.
- Brown, A. H., & Green, T. D. (2016). *The essentials of instructional design: Connecting fundamental principles with process and practice* (3rd. ed.). Routledge.
- Budiman, A. (2017). Behaviorism in foreign language teaching methodology. *English Franca*, 1(2), 101-114. <http://dx.doi.org/10.29240/ef.v1i2.171>
- Carroll, M. J., Crane, B. C., Duff, J. F., Hulme, C., & Snowling, J. M. (2011). *Developing language and literacy: Effective intervention in the early years*. John Wiley and Sons, Ltd.
- Chen, I. (2011). Behaviorism and developments in instructional design and technology. In S. Clarke, M. E. Jennex, A. Becker & A.V. Anttiroiko (Eds.), *Instructional design: Concepts, Methodologies, tools and applications*. Information Science Reference.
- Creswell, J. W., & Creswell, D. J. (2018). *Research design* (5th ed.). Sage publications.
- Driscoll, M. P. (2018). Psychological foundations of instructional design. In A. R. Robter & V. D. John (Eds.), *Trends and issues in instructional design and technology* (4th ed., pp52-60). Pearson.
- El-Amin, A. (2020). Andragogy: A theory in practice in higher education. *Journal of Research in Higher Education*, 4(2), 54-69. <http://doi.org/10.24193/JRHE.2020.2.4>
- Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design* (5th ed.). Thomson Learning.
- Gopal, R., & Singh, C. K. S. (2020). Arising reading patterns in understanding literary texts. *Students in English Language and Education*, 7(2), 407-420. <https://doi.org/10.24815/siele.v7i2.16663>
- International Literacy Association. (2017). *Standard for the preparation of literacy professionals*. Retrieved from [https://www.uas.alaska.edu/education/documents/reading/ila\\_standards.pdf](https://www.uas.alaska.edu/education/documents/reading/ila_standards.pdf)
- International Literacy Association. (2018). *Explaining phonics instruction: An educator's guide*. Retrieved from <https://literacyworldwide.org/docs/default-source/where-we-stand/ila-explaining-phonics-instruction-an-educators-guide.pdf>
- International Literacy Association. (2019). *Meeting the challenges of early literacy phonics instruction*. Retrieved from <https://www.literacyworldwide.org/docs/default-source/where-we-stand/ila-meeting-challenges-early-literacy-phonics-instruction.pdf>
- Islam, M. H. (2015). Thorndike Theory and its application in learning. *At-Ta'lim: Jurnal Pendidikan*, 1(1), 37-47. Retrieved from <https://ejournal.inzah.ac.id/index.php/attalim/article/view/166>

- Johnson, R. B., & Bendolph, A. (2018). Evaluation in instructional design: A comparison of the major evaluation models. In A. R. Robter & V. D. John (Eds.), *Trends and issues in instructional design and technology* (4th ed., pp87-96). Pearson.
- Johnson, R. B., & Christensen, L. (2019). *Educational research: Quantitative, qualitative and mixed approaches* (7th ed.). Sage Publications, Inc.
- Johnston, R. & Watson, J. (2007). *Teaching synthetic phonics*. Learning Matters Ltd.
- Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating training programs: The four levels* (3rd ed.). Berrett-Koehler.
- Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2015) *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). Routledge.
- Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). Sage Publications Ltd.
- Kurt, S. (2020, July). *Andragogy Theory-Malcolm Knowles*. Retrieved from <https://educationaltechnology.net/andragogy-theory-malcolm-knowles/>
- LaBerge, D., & Samuel, S. J. (1974). Toward a theory of automatic information processing in reading. *Cognitive Psychology*, 6(2), 293-323. [http://dx.doi.org/10.1016/0010-0285\(74\)90015-2](http://dx.doi.org/10.1016/0010-0285(74)90015-2)
- Liu, M, M., Chano, J., & Luo, M, L. (2023). Enhancing Japanese reading comprehension skills among students: An instructional model perspective. *Journal of Curriculum and Teaching*, 12(6), 318-329. <https://doi.org/10.5430/jct.v12n6p318>
- Long, Y. H. (2019). *On the current situation and countermeasures of applying phonics to English teaching of rural middle schools-Take Jiujiang Middle School of Shuangliu District in Chengdu for example* (Masters' thesis, Sichuan Normal University). Retrieved from <https://kns.cnki.net/KNS8/Detail?sfield=fn&QueryID=25&CurRec=6&DbCode=CMFD&dbname=CMFD202001&filename=1020015165.nh>
- McConnell, C., Conrad, B., & Uhrmacher, P.B. (2020). *Lesson planning with purpose: Five approaches to curriculum design*. Teachers College Press.
- Morrison, G. R., Ross, M. S., Morrison, R. J., & Kalman, H. K. (2019). *Designing effective instruction* (8th ed.). Wiley.
- Nasir, C., Gani, S. A., & Haqqini, D. (2019). Group investigation technique for better reading comprehension skill. *Studies in English Language and Education*, 6(2), 251-26. Retrieved from <http://www.jurnal.unsyiah.ac.id/SiELE/article/download/13619/11114>
- Nazir, F. B. (2018). Stimulus-response theory: a case study in the teaching and learning of Malay language among year 1 pupils. *The journal of Social Science Research*, 4(10), 153-157. <http://doi.org/10.32861/journal.7.2018.410.153.157>
- Nation, I. S. P., & Macalister, J. (2010). *Language Curriculum Design*. Routledge.
- Parker, S. (2019). Synthetic phonics: What it is and what it is not. *Bulletin Learning Difficulties Australia*, 51(2&3), 17-20. Retrieved from <https://www.lidaustralia.org/Parker%20on%20Synthetic%20Phonics,%20LDA%20Bulletin,%20Vol%2051,%20Nos%202%20and%203,%20Summer%202019.pdf>
- Reyolds, J-E. (2018, May). *Implication of learning theories on instructional design*. Retrieved from <https://elearningindustry.com/learning-theories-instructional-design-implications>
- Richey, R. C., & Klein, J. D. (2005). Developmental research methods: Creating knowledge from instructional design and development practice. *Journal of Computing in Higher Education*, 16(2), 23-38. <https://doi.org/10.1007/BF02961473>
- Robinson, J. M. (2018). Evaluation of teaching methods to improve reading performance of English language learners. *Advancement of Educational Research International*, 12(1), 25-33. Retrieved from <https://eric.ed.gov/?id=EJ1209451>
- Roembke, T. C., Hazeltine, E., Reed, D. K., McMurray, B. (2018). Automaticity of word recognition is a unique predictor of reading fluency in middle-school students. *Journal of Education Psychology*, 111(2), 314-330. <http://dx.doi.org/10.1037/edu0000279>

- Rothwell, W., Benscoter, B., & King, M. (2016). *Mastering the instructional design process* (5th ed.). Wiley.
- Schunk, D. H. (2020). *Learning theories: An educational perspective* (8th ed.). Pearson
- Scarparolo, G. E. & Hammond, L. S. (2018). The effect of a professional development model on early childhood educators' direct teaching of beginning reading. *Professional Development in Education*, 44(4), 492-506. <https://doi.org/10.1080/19415257.2017.1372303>
- Sivakumar, P., & Dihanaraj, P. P. (2017, Feb). *Theories of learning and its educational implications*. Retrieved from <https://tntess.blogspot.com/2017/02/theories-of-learning-and-its.html>
- Sinelnikova, K., Ivchenko, T., Pistunova, T., Regesha, N., & Skazhenyk, M. (2022). Enhancing the performance of andragogic education. *Journal of Curriculum and Teaching*, 11(1), 245-254. <https://doi.org/10.5430/jct.v11n1p245>
- Stark, H. L., Eadie, P. A., Snow, P. C., Goldfeld, S. R. (2020). The impact of a sustained oral language professional learning program on Australian early years' knowledge, practice and beliefs: a mixed-methods exploration. *Professional Development in Education*, 46(2), 178-194. <https://doi.org/10.1080/19415257.2019.1603170>
- Suraprajit, P. (2019). Bottom-up vs top-down model: The perception of reading strategies among Thai university students. *Journal of Language Teaching and Research*, 10(3), 454-460. <http://dx.doi.org/10.17507/jltr.1003.07>
- Tahir M. H. M., Shah, D. S. M., Shak, M. S. Y., Albakri, I. S. M. A., & Adnan, A. H. M. (2021). Explicit vocabulary instruction: Effects of vocabulary learning on Form Two ESL learners. *Studies in English Language and Education*, 8(3), 1227-1247. <http://doi.org/10.24815/siele.v8i3.19539>
- Yan, Y. W. (2018). *A research on the problems and countermeasures of phonics in primary school English teaching* [Masters' thesis, Liaocheng University]. Retrieved from <https://kns.cnki.net/KNS8/Detail?sfield=fn&QueryID=14&CurRec=1&DbCode=CMFD&dbname=CMFD201802&filename=1018824601.nh>
- Yang, L. X., Wang, S. E., Chang, H. C., & S, J. (2019). *Qualitative research in applied linguistics*. Foreign Languages and Research Press.
- Zhang, G. Q. (2019). *Performance and influencing factors of pedagogical content knowledge of teachers in English reading teaching in elementary schools* (Doctoral dissertation). Retrieved from <https://kns.cnki.net/KNS8/Detail?sfield=fn&QueryID=6&CurRec=1&DbCode=CDFD&dbname=CDFDLAST2019&filename=1019840278.nh>
- Zhao, Z. Y. (2019). *A Case study on primary school novice English teachers' beliefs and practice about phonics instruction* [Master's thesis]. Retrieved from <https://kns.cnki.net/KNS8/Detail?sfield=fn&QueryID=23&CurRec=1&DbCode=CMFD&dbname=CMFD202001&filename=1019096998.nh>
- Zhong, W. X. (2020). *A Study on the application of phonics in primary school English vocabulary teaching* [Master's thesis]. Retrieved from <https://kns.cnki.net/KNS8/Detail?sfield=fn&QueryID=2&CurRec=1&DbCode=CMFD&dbname=CMFD201701&filename=1016085684.nh>
- Zhong, B., & Kang, Y. (2021). Chinese EFL teachers' perception and practice of phonics instruction. *Journal of Language Teaching and Research*, 12(6), 990-999. <http://doi.org/10.17507/jltr.1206.15>

### Authors contributions

Dr. Chen and Dr. Yin were responsible for study design and revising. Dr. Chen and Dr. Wong were responsible for data collection. Dr. Chen drafted the manuscript and Prof. Raja and Dr. Charanjit revised it. All authors read and approved the final manuscript. In this paragraph, also explain any special agreements concerning authorship, such as if authors contributed equally to the study.

### Funding

This work was supported by:

- 1) "Empirical Study on the Improvement Path of In-Service EFL Teachers' Content Knowledge to Instruct

English Early Reading in Light of National Curriculum” [Grant Number: 2022SC006] from the Chinese Society for Tao Xingzhi Studies;

- 2) “Improving EFL students’ Language Abilities Via Phonics Instruction” [Grant Number: QJZD20220628] from China Basic Foreign Language Education Research & Training Center;
- 3) “A Study on the Impacts of Cross-Regional Instructional researches upon Teachers’ Professional Development in Nationality Areas” [Grant No. PDTR2017-1] from Sichuan Primary and Secondary School Teacher Development Research Center .
- 4) “Study on the development and application of school-based phonics resources in after-school service system” [Grant No. 23WY082] from Sichuan Social Science
- 5) “Study on the compilation and application of an instructional guide for phonics based on National English Curriculum for compulsory education” [Grant No. QD2023A28] from Mianyang Teachers’ College

### **Competing interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### **Informed consent**

Obtained.

### **Ethics approval**

The Publication Ethics Committee of the Sciedu Press.

The journal’s policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

### **Provenance and peer review**

Not commissioned; externally double-blind peer reviewed.

### **Data availability statement**

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### **Data sharing statement**

No additional data are available.

### **Open access**

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).

### **Copyrights**

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.