

The Impact of Personal Learning Environments on Chinese Junior High School Students' Spoken English Narrative Competence

Menglin Zhang, Dongguan Tangxia No. 2 Junior High School, China

Xiaoshu Xu, Wenzhou University, China*

YunFeng Zhang, Macao polytechnic University, China

ABSTRACT

This study designed and implemented a personal learning environment platform for spoken English teaching in a junior high school in China to improve students' spoken English narrative competence. Altogether, 83 junior high school year one students took part in this study. The participants were divided into experimental and control classes for the two-month-long experiment. The personal learning environment-based spoken English platform was implemented in the experimental class, while the control class used traditional face-to-face instruction. Pre- and post-spoken English tests and semistructured interviews were used in the study. The data analysis revealed that PLEs has the potential to boost students' learning motivation and enthusiasm and improve their spoken English narrative performance as well. This study advanced practical research of PLEs in junior high school and enhanced the theoretical research in spoken English teaching.

KEYWORDS

junior high school, personal learning environments, spoken English teaching, spoken narrative competence

INTRODUCTION

The Internet is rapidly changing the way knowledge is created, acquired, and used, as well as opening up new and promising avenues for education (United Nations Educationnel, Scientific and Cultural Organization & Tsinghua University, 2022). During Coronavirus Disease 2019, to ensure "school is suspended without suspension," many schools started online teaching. Therefore, the dual impact of technological progress and public health events increased users' demand for quality online learning platforms that can bring them authentic and personalized learning experiences.

As Central People's Government of the People's Republic of China stated (2010), "Information technology had a revolutionary impact on the development of education and must be prioritized."

DOI: 10.4018/IJVPLE.329599

*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

With the rapid development of information technology, the Internet now stimulates profound changes in the field of education. Information and communication technology (ICT) held enormous promise for educational reform. For example, a well-designed platform could support students' differentiated learning with technology while also promoting students' overall development.

As stated in the Ten-Year Development Plan for Information of Education in China (Ministry of Education of the People's Republic of China, 2010), "We should provide learners with an information-based environment and service for personalized learning." The development of adaptive online learning platforms has been proposed in our country's education informatization development plan. Additionally, there has been a discernible integration of personalized training initiatives into national and regional policy documents, aiming to foster increased flexibility and personalized learning across all levels of education.

Meanwhile, as part of the new curriculum reform process, as the *English Curriculum Standards for Compulsory Education* (2022 edition) (Ministry of Education of the People's Republic of China, 2022) stated, it was proposed to promote the deep integration of information technology and English teaching. In light of this, greater emphasis was placed on the reform of teaching and learning practices in the realm of educational informatization.

Furthermore, there is a potential to leverage modern information technology as a valuable support system for English teaching in accordance with the stipulations of the curriculum standards. Specifically, the curriculum mandates that junior high school students should spend a minimum of 30 minutes per week to engage in extracurricular audiovisual activities. In light of this, modern information technology can play a vital role in facilitating and enhancing such activities, contributing to the overall efficacy of English language instruction.

As a result of the swift evolution of the Internet, online learning has grown in popularity, and learning is no longer limited to the traditional classroom and a set period of time. Consequently, a growing number of researchers started to integrate big data and artificial intelligence technologies into the field of education.

The primary aim was to cater to a broader spectrum of learners with personalized and high-quality learning resources and tools. The integration of information technologies in education has been going on for more than two decades, with learning management systems (LMSs) emerging as one of the most popular applications. Numerous Chinese scholars have attempted to apply LMSs to junior high schools's spoken English teaching in recent years. For example, Zhang and He investigated the application of the Liulishuo app in junior high school English teaching, while Li designed the English interest Dubbing app to encourage junior high school students' enthusiasm for spoken English teaching, etc. These applications facilitated online teaching and learning (Shen, 2018).

Table 1 shows the advantages and disadvantages of some spoken English learning software in China:

However, due to the challenge of designing tasks suitable for all levels of students, only a small percentage of students were actively engaged in these online learning platforms. Therefore, individual differences in learning were ignored, and students with weak foundations were unable to participate in class activities, particularly in spoken activities (Wang & Zhang, 2014).

Furthermore, teachers generally evaluate students' performance by using unified standards, so students cannot be evaluated individually, which makes it difficult to pique students' learning interests and foster their learning confidence.

Given these circumstances, the purpose of this study was to investigate the impact of the Personal Learning Environment-based Spoken English platform (PLEs-SE) on junior high school students' spoken English narrative competence.

Thus, the following research question was posed:

Question: How does the PLEs-SE platform affect junior high school students' spoken English narrative competence?

Table 1. Advantages and disadvantages of educational apps in China

Software	Advantages	Disadvantages
Liulishuo	-Abundant resources -Multiple choices for students	-Lack of clear targets -Cannot match to learners' levels
Daily English Listening	-Rich in resources -Free to choose the type of teaching materials -Support different accents	-No tests -Few types of textbooks
English Dubbing	-Adapt to various teaching materials -Support dubbing and correction	-No scoring system -The dubbing effect is not ideal -Difficult
Dingding	-Announcements release -Good interaction -Support for uploading resources	-Cannot generate a learning profile

Note. Source: self-made by the authors

CONCEPT AND DEVELOPMENT OF PERSONAL LEARNING ENVIRONMENT

The term “Personal Learning Environment” originally appeared at the Personal Learning Environment subsession of the Joint Information Systems Committee (JISC)/UK Council for Educational Technology Interchange Standards (CETIS) meeting in 2004 (Liao, 2009). A review of the literature revealed three distinct definitions associated with PLEs: a PLEs as a platform, a PLEs as a technology, and a PLEs as a pedagogy. Each of these conceptualizations contributed to the understanding of the Personal Learning Environment.

As stated by Attwell (2007), when viewed as a platform, a PLEs is defined as a “collection of technologies and tools that enable individuals to construct, access, and manage their own learning environments.” A PLEs was defined in this definition as a platform or set of tools that enabled learners to customize and personalize their own learning environments (Manca & Ranieri, 2016; Wang et al., 2011).

The second perspective regarded PLEs as a technology. Schrader et al. (2019) defined a PLEs as “an individual’s self-selected set of tools and resources that support and enhance lifelong learning.” This definition emphasized the learner’s active role in selecting the tools and resources that make up their PLEs, while also highlighting the importance of lifelong learning. The authors further stated that a PLEs was a dynamic and evolving collection of tools and resources that changed over time as the learner’s needs and preferences evolved. Gritzalis and Politis (2015) proposed similar definitions.

The third category considered PLEs to be a pedagogy. Tsai et al. (2018) defined PLEs as “an individual’s unique and personalized learning environment that is built around his or her personal preferences, needs, and objectives and that integrates various learning resources, tools, and services to facilitate learning anytime and anywhere.” In this context, a PLEs was defined in this definition as a pedagogy or approach to learning that emphasized learner autonomy and self-directed learning (Blair, 2016; Koutsoudis et al., 2018).

Scholars have not only delved into the theoretical underpinnings of Personal Learning Environments but also have demonstrated successful implementations of the concept. Numerous educational institutions have undertaken a series of innovative endeavors in this regard. The University of Bolton in the United Kingdom pursued integrating social networking services with technology, while the University of Manchester in the United States explored the integration through the creation of desktops and networks. Similarly, Klagenfurt University in Austria attempted to create a Personal Learning Environment with integration. In the United States, the University of Mary Washington attempted to create a Personal Learning Environment for teachers and students using a blog system.

However, in order to maximize the impact of personal learning, a balance must be struck between teacher control and learner autonomy.

Khoja and Shaikh (2012) conducted a thorough investigation into the role of teachers in Personal Learning Environments. They contended that technology was reshaping the teaching and learning process and that traditional teachers were incapable of providing appropriate guidance in such student-centered learning environments. Based on Saadatmand and Kumpulainen (2013), content aggregation and knowledge-sharing activities in PLEs help learners to learn effectively.

In China, scholars attempted to combine technology with PLEs as well. Mou et al. (2012) stated that they investigated and designed the concept of creating a Personal Learning Environment based on cloud computing from the standpoint of independent learning and personalized learning. They successfully adapted the virtual learning environment model based on the eyeOS desktop and introduced modifications to align with the specific requirements of PLEs, resulting in a refined system function and structure. In addition, Yu and Zhu (2012) developed a cloud-based a Personal Learning Environment platform based on e-bookbags and conducted application research.

Furthermore, Chinese researchers investigated the relationship between PLEs and learner performance. Lu and Li (2013) carried out a practical study involving an iGoogle-based Personal Learning Environment and curriculum teaching application, employing the Web 2.0-based PLEs model as the guidance. This research ultimately concluded that the W-PLEs model could effectively improve learners' professional learning performance, information literacy, and collaborative learning abilities.

According to the findings stated by Xie and Li (2012), a Personal Learning Environment can effectively enhance students' knowledge management, knowledge building, and comprehensive ability.

Despite their potential benefits for learners, the implementation of the Personal Learning Environment in primary and secondary education has been limited. This constraint can be attributed to the following reasons:

- Technical challenges: PLEs often require a high degree of technical knowledge and skills, which may be difficult for primary and secondary school teachers and students to acquire and use effectively (Attwell, 2007).
- Lack of awareness and understanding: Many teachers and school administrators may be unfamiliar with the concept of a PLEs or may not fully understand its potential benefits and how to effectively implement it (Kukulska-Hulme & Traxler, 2013).
- Lack of support and infrastructure: PLEs may require significant investments in infrastructure and support, including access to appropriate technologies, high-speed internet connections, and technical support (Johnson & Liber, 2008).
- Concerns about privacy and security: PLEs may involve the use of personal data and sensitive information, which may raise concerns about privacy and security among parents, teachers, and school administrators (Buchem & Hamelmann, 2010).
- Institutional constraints: The implementation of PLEs may be constrained by institutional policies, practices, and norms, which may be difficult to change or adapt to new approaches to learning (Attwell & Hughes, 2010).

Concept of Spoken Narrative Competence

Spoken narrative competence necessitates complex and high-level cognitive activities. Students made their actions and events more meaningful by narrating them. There was no set standard for assessing spoken narrative competence.

In general, the macro- and microstructure of spoken narrative competence were examined by Wang et al. (2016). Previous research has also explored the link between macro- and microstructure. Westerveld et al. (2004) studied the spoken narrative competence of students aged 4–7 years old and

found that students over the age of 5 used longer sentences in story retelling than in picture telling and personal life experience narration. In another study, Heilmann et al. (2010) utilized picture books to assess the spoken narrative competence of students aged 5–7. They discovered a significant positive correlation between the total number of words and the average sentence length of students with the performance of macrostructure. Mills et al. (2013) conducted a study on primary students from Grade 2 to Grade 5, concentrating on the picture book narrative and personal life experience narrative abilities. Their findings indicated the significant differences in macrostructure performance of students in different narrative types. Students' stories exhibited more expressive elaborations, while personal life experiences were narrated using more diverse words. Similarly, Lucero (2015) investigated the spoken narrative competence of primary students in Grades 1 and 2 using picture books. The results also revealed a positive correlation between students' word diversity and the macrostructure of their spoken narrative competence.

Scholars in China have explored the connection between students' personal life experiences and their oral communication skills. Wang et al. (2014) made an intriguing discovery, a distinction between students' abilities to narrate personal life experiences and that of picture books. Obviously, students aged 3–6 developed their capacity to narrate their personal life experiences before being able to read pictures effectively. Pan (2017) conducted an investigation into the vocabulary development of students aged 3 to 6 and discovered that the number of different words used by students increased with age. Cui et al. (2017) examined the vocabulary level of 2-year-old students, discovering that girls exhibited more words than boys at this age. However, the gap between boys' and girls' vocabulary gradually narrowed with the increase in age. Liu (2018) studied the story continuation ability of students aged 3–5 and found that with the growth of age, students can tell more complete and complex sentences and use a more diverse vocabulary when they continue to tell stories. According to the review, scholars primarily focused on preschool children's spoken narrative competence, with little research on primary and junior high schools.

RESEARCH METHODS

The study used a pre- and posttest and a semistructured interview to answer the research question.

Participants

The research and all experimental protocols were approved by the Academic Committee of the School of Foreign Studies at Wenzhou University, China. All procedures were carried out in accordance with the applicable guidelines and regulations. Participants in this study were informed about the purpose of the study and were asked to sign a written consent form. Participants were also informed that they could leave the experiment at any time. The identities of the participants and their responses were kept confidential and remain anonymous. Due to the COVID-19 pandemic in China, convenience sampling was used in the study.

Convenience sampling was a nonprobability sampling technique in which participants were chosen because they were easily accessible and available to the researcher. It was a popular sampling method in educational research because it was simple to implement and less expensive than other probability-based sampling techniques (Burns & Grove, 2010; Creswell, 2017).

The study included 83 Grade 1 students (aged 12–13) from two classes at a junior high school. The spoken pretest revealed no statistically significant difference in spoken level between the two classes.

Class 1 was designated as the experimental group, using the PLEs-SE platform. Class 2 was designated as the control group, using the traditional face-to-face teaching method. Experiments were conducted by two teachers using the same teaching material and schedule. The experiment lasted for 2 months, from October to December 2021.

Design of the PLEs-Spoken English Platform

The PLEs-SE was developed with the aim of augmenting students' spoken English narrative competence. This platform was developed based on Moodle. The resource in the PLEs was created based on the Listening and Speaking part of the Wenzhou Junior High School English Academic Proficiency Test. The last part of the test was chosen to be researched in this study. Figure 1 depicts the platform's layout.

1. Tests

These include a pretest, a middle test, and a posttest.

Figure 1. Assessment

Note. Source: From self-developed PLEs-Spoken English platform

The screenshot shows a web browser window displaying a Moodle course page. The course is titled '初中英语' (Junior High School English) and is managed by 'menglin Zhang'. The page layout includes a navigation bar, a course title, and a 'Turn Editing On' button. The main content area is titled 'Assessment' and features a 'Pretest' activity. The pretest instructions are in Chinese, asking students to speak for 1 minute based on a topic and key points. The topic is '名著' (Famous Works) and the key points are: (1) '我们学校有个图书馆。我经常去借书。' (Our school has a library. I often go to borrow books.), (2) '我喜欢读...(作者及作品)' (I like reading...(author and work)), and (3) '我觉得.....(观点)' (I think.....(view)). The pretest is scheduled for Sunday, 5 December 2021, 12:00 AM, and is due on Sunday, 12 December 2021, 12:00 AM. Below the pretest details is a 'Grading summary' table.

Grading summary	
Hidden from students	No
Participants	43
Submitted	42
Needs grading	3
Time remaining	Assignment is due

At the bottom of the page, there are two buttons: 'VIEW ALL SUBMISSIONS' and 'Grade'.

2. Resources

Students in the experimental class can learn based on the results of their pretest. This section featured 43 English themes. Each resource contained relevant vocabulary, audio, and video, as well as some key grammar as shown in Figure 2.

3. Weekly forum

Students can discuss the topic in the forum. They can share their opinions and read more ideas from their classmates

Due to time constraints, only one topic was chosen for each test in this experiment. Students' learning records revealed that the average learning time for each student in the experimental class was 65 minutes per week.

During the 2-month experiment, three discussions were started in the forum, with a total of 96 posts.

Research Instruments

This study employed a mixed-methods approach, including spoken English tests and interviews. The spoken exam was structured by using a question format based on the Wenzhou Junior High School English Academic Proficiency Test, with the content and themes related to junior English textbooks and school life. The tests were suitably tailored to the proficiency level of junior school students and intended to assess students' language organization ability, spoken English level, and pronunciation level, as well as provide students with a platform to demonstrate their overall spoken English competence.

The scoring standard from the Wenzhou Junior High School English Academic Proficiency Test was used in this study, and students' logic, fluency, and pronunciation were emphasized when scoring. To ensure fairness and objectivity, two master's students were recruited as examiners in this study, both of whom majored in English and had prior experience teaching English in junior high schools. They were thoroughly briefed on the scoring standard prior to the commencement of the experiment. The tests were scored by the two examiners, and the average scores were used in the subsequent analysis.

An interview was conducted to further investigate the PLE's impact on the main factors influencing their spoken English proficiency. The interview questionnaire consisted of five questions that aligned with the research objectives.

Appendix A contains the corresponding items.

Research Procedure

Convenience sampling was applied among 83 students. Class 1 was designated as the experimental group (using the PLEs-SE platform), while Class 2 was designated as the control group (using traditional face-to-face teaching). This research was designed in three phases:

In the initial phase, students, including the experimental and control classes, completed a pretest before engaging with the PLEs platform. Then, students in the control class continued to study in a traditional class, while students in the experimental class were recommended to appropriate levels of learning materials according to the pretest result. Following Krashen's (1992) input hypothesis of the "i+1" model, that is, students scoring two points on the pretest were suggested to learn at level three. Students engaged in self-directed learning, freely accessing learning content, including audio and video resources on vocabulary, pronunciation, grammar, sentences, and passages. This learning approach allowed students to study at their convenience, irrespective of time and location.

Next, students were encouraged to discuss in the forum after 1 week's study, and topics were added weekly. The topics were usually provided by teachers. Such discussions provided students

Figure 2. Learning resources

Note. Source: From self-developed PLEs-Spoken English platform

初中英语

Dashboard / My courses / jhsx101

TURN EDITING ON

+ Resources

Grade 6 [6666] MARK AS DONE Edit +

Grade 5 [5555] MARK AS DONE Edit +

Grade 4 [4444] MARK AS DONE Edit +

Grade 3 [3333] MARK AS DONE Edit +

+ ADD AN ACTIVITY OR RESOURCE

6分题库 订阅链接 保存到网盘 下载 保存到手机 举报

2022-08-28 10:54 过期时间: 永久有效

返回上一级: 全部文件 > 6分题库 > 话题音频+视频

☐ 文件名	大小	修改日期
☐ 43.Eating customs 饮食习惯	-	2021-11-28 21:16
☐ 42.Community社区	-	2021-11-28 21:16
☐ 41.Environmental protection 环境保护	-	2021-11-28 21:16
☐ 40.Countries and nationalities国家与民族	-	2021-11-28 21:16
☐ 39.Rules and suggestions规则与建议	-	2021-11-28 21:15
☐ 38.Life at home家庭生活	-	2021-11-28 21:15
☐ 文件名	大小	修改日期
☐ 3.拓展视频	-	2021-11-28 21:14
☐ 2.课文视频	-	2021-11-28 21:15
☐ 1.词汇表+音频+句型	-	2021-11-28 21:14
☐ 文件名	大小	修改日期
☐ "做"运动, 应该用"play, do, go"里的哪个? .q1v	1.6M	2021-11-28 21:16
☐ "Make"和"do".q1v	773KB	2021-11-28 21:16
☐ not only和but also的语法规则.qsv	8.3M	2021-11-28 21:16
☐ between...and, 和among的区别用法.qsv	5M	2021-11-28 21:16
☐ BBC一分钟英语: 学习辨析"while"和"during"的用法区别.q1v	1.2M	2021-11-28 21:16
☐ BBC一分钟英语: 如何使用"both, either, neither".q1v	1003KB	2021-11-28 21:16

Figure 3. Discussion forum

Note. Source: From self-developed PLEs-Spoken English platform

The screenshot displays a web browser window with the URL <http://course.esper.cn/course/view.php?id=33>. The page title is '初中英语' (Junior High School English). The user 'menglin Zhang' is logged in. The 'Weekly Forum' section is active, showing a list of discussions. The 'Mobile phones' discussion is selected, showing a thread of posts. The posts are as follows:

Group	Started by	Last post	Replies	Subscribe
English	menglin Zhang 8 Dec 2021	梦欣林 7 Jan 2022	28	ON
Mobile phones	menglin Zhang 31 Dec 2021	路遥 胡 7 Jan 2022	38	ON
Money	menglin Zhang 17 Dec 2021	一帆包 1 Jan 2022	30	ON

The 'Mobile phones' discussion thread includes the following posts:

- Mobile phones** by menglin Zhang - Friday, 31 December 2021, 9:58 PM
Mobile phones are necessary for middle school students. VS. Mobile phones are not necessary for middle school students.
- Re: Mobile phones** by 梦欣林 - Friday, 31 December 2021, 10:01 PM
I think mobile phones not necessary for middle school students. Because for some students, they can't control themselves not to play mobile phones. They will not study in order to play with their mobile phones.
- Re: Mobile phones** by 路遥 胡 - Friday, 31 December 2021, 10:07 PM
Yes. Because middle students can search for some knowledge they don't understand on their mobile phones.
- Re: Mobile phones** by 路遥 胡 - Friday, 31 December 2021, 10:17 PM
Mobile phones are not necessary for middle school students because they are bad for our eyes.
- Re: Mobile phones** by 立洲 潘 - Saturday, 1 January 2022, 4:17 PM
I think mobiles are not necessary for middle school students, because student in middle school, they needn't have mobile.
- Re: Mobile phones** by 路遥 胡 - Saturday, 1 January 2022, 5:18 PM
I think I want to, because mobile phones can help us learn.

with opportunities for interactive learning and collaboration with their classmates. After 2 weeks of learning, a test was planned for participants, and they were regrouped to a suitable level, while students in the control class kept learning in a traditional way.

After 2 months, a posttest was conducted for control and experimental classes. The data were analyzed through Statistical Product and Service Solutions (SPSS) 23.0.

In addition to the tests, an interview was planned for the experimental class students. The experimental class students were divided into three groups according to their posttest performance. Then six students were randomly selected from these three groups to participate in an anonymous printed interview.

RESULTS OF THE EXPERIMENT

Independent Samples t-Test Results of Pretest Scores

According to the descriptive statistics of the pretest, as shown in Table 2, the average scores of the students in the experimental and control groups were 2.49 and 2.21, respectively, with a total score of 6, indicating a marginal difference of 0.28 between the two groups.

The *t*-test results, as shown in Table 3, revealed that Levene's Test for Equality of Variances (Sig.) indicated equality of the variances for the pretest scores in the two groups.

Consequently, the *t*-test results of the assumed equal variances were examined, and its Sig. (two-tailed) value was below .130.

Furthermore, the 95% confidence interval (CI) of the difference between the test variables contained 0, indicating that there was no significant difference in the two classes' spoken English proficiency prior to the experiment. This result supported the decision to proceed with the experiment.

Paired Samples t-Test Results of Pretest and Posttest Scores

The descriptive statistics of the experimental class's pretest and posttest scores, as shown in Table 4, revealed that the average pretest and posttest spoken English scores in the experimental class were 2.49 and 3.98, respectively, reflecting a notable increase of 1.49.

Table 2. Group statistics of pretest in EC and CC

	Class	<i>n</i>	Mean	Std. deviation	Std. error of the mean
Pretest	EC	41	2.49	.810	.127
	CC	42	2.21	.813	.125

Table 3. Independent samples test of pretest in EC and CC

		Levene's Test for Equality of Variances		<i>t</i> -Test for equality of means						
		<i>F</i>	Sig.	<i>t</i>	<i>df</i>	Sig. (two-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
									Lower	Upper
Pretest	Equal variances assumed	.171	.680	1.536	81	.129	.274	.178	-.081	.628
	Equal variances not assumed			1.536	80.964	.129	.274	.178	-.081	.628

Table 4. Paired samples statistics of pretest and posttest in EC

		Mean	<i>n</i>	Std. deviation	Std. error of the mean
EC	Pretest	2.49	41	.810	.127
	Posttest	3.98	41	.880	.137

The *t*-test, as depicted in Table 5, further revealed the significance of these results. The significance probability Sig. (two-tailed) of the two variables was at a significance level of .00 (<.05), indicating that there was a significant difference in the pretest and posttest scores within the experimental class.

Furthermore, the significance probability ranged from about –1.66 to –1.31, excluding 0, further emphasizing the substantial significance of the enhancement in spoken English competence.

In conclusion, using a PLEs platform led to a significant improvement in students' spoken English proficiency.

Paired Samples t-Test Results of Pretest and Posttest Scores

The descriptive statistics of the pretest and posttest scores in the control class, as presented in Table 6, showed notable outcomes. The average scores of the pretest and the posttest of spoken English in the control class were 2.21 and 2.93, with an increase of .72.

The *t*-test, as shown in Table 7, revealed that the significance probability of the two variables was at a significant level, indicating that there was a significant difference in the control class's pretest and posttest scores.

The mean difference was about –.9 to –.5, with 0 excluded from the interval. This indicated that the mean difference between the pretest and posttest scores was statistically significant.

Table 5. Paired samples statistics of pretest and posttest in EC

		Paired differences					<i>t</i>	<i>df</i>	Sig. (two-tailed)
		Mean	Std. deviation	Std. error of the mean	95% confidence interval of the difference				
					Lower	Upper			
EC	Pretest — Posttest	−1.488	.553	.086	−1.662	−1.313	−17.219	40	.000

Table 6. Paired samples statistics of pretest and posttest in CC

		Mean	<i>n</i>	Std. deviation	Std. error of the mean
CC	Pretest	2.21	42	.813	.125
	Posttest	2.93	42	.997	.154

Table 7. Paired samples statistics of pretest and posttest in CC

		Paired differences					<i>t</i>	<i>df</i>	Sig. (two-tailed)
		Mean	Std. deviation	Std. error of the mean	95% confidence interval of the difference				
					Lower	Upper			
CC	Pretest Posttest	−.714	.708	.109	−.935	−.494	−6.535	41	.000

Overall, the control class's spoken English level improved significantly after 2 months of English learning, but the improvement was not as obvious as observed in the experimental class.

Independent Samples t-Test Results of Posttest Scores

The descriptive statistics of the experimental and control classes' posttest scores, as displayed in Table 8, revealed that the average posttest scores of the two classes are 3.98 and 2.93, respectively. This resulted in a notable difference of 1.05 in favor of the experimental class.

The independent samples *t*-test (Table 9) was conducted on the posttest scores of the experimental and control classes. Sig. is .742 (>.05), and it indicates that the variances of the two variables on the posttest score variables were equal. Therefore, the *t*-test results further revealed a significant level of Sig. (two-tailed).

Moreover, the 95% confidence interval did not contain zero, indicating that there was a significant difference in the average spoken English scores between the two classes following the experiment.

This set of data demonstrated that the PLEs-SE platform used in the experimental class produced remarkable results, with a significant improvement in spoken English performance compared to the control class prior to the experiment.

DISCUSSION

The results of the spoken English test revealed a remarkable improvement among students in the experimental class of PLEs. This notable enhancement can be attributed to several factors, which can be mainly summarized into three aspects, including clearer personalized learning objectives, rich spoken English learning resources, and diverse tasks and activities.

- Clearer personalized learning objectives

First, PLEs offered personalized learning objectives. Personalized learning objectives refer to the development of progressive learning targets tailored to individual student's differences. This

Table 8. Group statistics of posttest in EC and CC

	Class	<i>n</i>	Mean	Std. deviation	Std. error of the mean
Posttest	EC	41	3.98	.880	.137
	CC	42	2.93	.997	.154

Table 9. Independent samples test of posttest in EC and CC

		Levene's Test for Equality of Variances		t-Test for equality of means						
		<i>F</i>	Sig.	<i>t</i>	<i>df</i>	Sig. (two-tailed)	Mean difference	Std. error of the difference	95% Confidence interval of the difference	
									Lower	Upper
Posttest	Equal variances assumed	.109	.742	5.067	81	.000	1.047	.207	.636	1.458
	Equal variances not assumed			5.075	80.192	.000	1.047	.206	.636	1.458

approach allowed students to experience a sense of accomplishment after achieving the goals of each stage, thereby stimulating students' intrinsic learning motivation to better achieve the subsequent learning objective (Meng et al., 2022). In this experiment, three tests were conducted to facilitate the implementation of personalized learning objectives. The pretest assessed students' initial spoken English proficiency, allowing them to select appropriate learning resources based on their performance. The midtest evaluated their progress after 3 weeks of learning so that they could progress to the next stage of learning. Lastly, the posttest was designed to assess their overall progress in their learning journey. These tests empowered students with the ability to make independent decisions about their learning objectives.

In a traditional classroom, teachers expect all students to strive for the same set of learning objectives. However, this approach cannot meet the learning needs of students at various levels. In contrast, personalized learning in the PLEs platform can compensate for this limitation by empowering students to take charge of their learning autonomy. By allowing them to independently choose and monitor their learning progress based on their learning preferences, students have greater control over their learning journey.

- Rich spoken English learning resources

The PLEs platform provided a plethora of spoken English learning resources, which was a critical guarantee for personalized learning. The enrichment of resources on the PLEs-SE platform involved two key aspects: first, it diversified the presentation forms of learning resources, which were no longer a single, static paper textbook but dynamic elements such as video, audio, electronic text. This diverse range of resources catered to students' diverse learning styles and cognitive preferences (Patall et al., 2008), which allowed them to choose the learning materials that best suited their individual needs. The second one was the enrichment of teaching methods. It was no longer a teacher-centered but rather a student-centered learning environment. Students were given a variety of learning resources that could meet their learning needs and learning styles. In a traditional classroom, this was time-consuming and overloaded for teachers in the classroom teaching system.

- Diverse tasks and activities

Meanwhile, students demonstrated that they had increased their vocabulary, phrases, and even sentences during the interview. The pretest tendency to use simple words has evolved into a trend of expressing ideas with collocations and phrases. The variety of PLEs-SE learning materials, as well as the types of tasks and activities designed on the platform, all contributed to an increase in students' accumulation of vocabulary, phrases, and sentences. Learning in PLEs can help students understand more English culture and gain different expressions, which was greatly helpful to their linguistic organization and logic. The increase in the macro and micro aspects also had a significant impact on the improvement of spoken English.

According to previous research, there is a strong correlation between vocabulary knowledge and reading, listening, speaking, and language ability (Lehmann, 2007). The spoken English levels of the students were also closely related. At the same time, students can practice spoken English independently on the PLEs platform, including listening, imitation, self-testing.

Students became more familiar with the content and form of the task as they repeated activities, and they became more proficient in the required vocabulary and pronunciation, improving their fluency in spoken expression. This also confirmed the findings of some researchers who discovered that repetition improved spoken expression fluency (Zhu et al., 2014). Students in traditional classes practiced the language further through learning activities designed by the teacher.

To summarize, the PLEs learning mode not only increased the likelihood of language practice but also improved its effectiveness. Students' pronunciation and intonation can be improved to an ideal level with imitation and emotion regulation. Phonological imitation training can directly promote the improvement of Chinese learners' phonological ability (Wu & Zhao, 2013). The PLEs platform provided students with a wealth of audio and video resources. Students can improve their pronunciation and boost their self-confidence by practicing imitation. They can help to reduce learning anxiety and improve pronunciation skills to some extent.

INTERVIEW DATA ANALYSIS AND DISCUSSION

To ensure the reliability of the coding process, the interview data were coded independently by two researchers. The coding was based on a set of predetermined codes and categories that were developed through an iterative review and refinement process.

After the initial coding was completed, the two researchers compared and discussed their codes to resolve any discrepancies and ensure the consistency and accuracy of the coding. This intercoder reliability process is commonly used in qualitative research to improve the validity and trustworthiness of data analysis. Table 10 indicates the categories and subcategories of the data analysis:

The data analysis revealed that students had a generally positive attitude toward the Personal Learning Environments, and they mentioned several benefits of this learning mode during the interview. Controlling their own learning, independent thinking, improved interaction, and more opportunities to practice spoken English are all advantages.

The PLEs' favorable learning environment and flexible learning strategies can effectively stimulate students' learning motivation. For example, interviewees stated:

"Flexible learning strategies have increased my interest in learning English... When I study in PLEs-SE, I can take control of my own progress and learn anything I am interested in..." (Interviewee A)

Table 10. Categories and subcategories of the interview data

Categories	Subcategories
Evaluation	Positive attitude Control learning Independent thinking Improved interaction More practicing opportunities
Learning difficulty	Simple operation Tidy layout Understandable learning material
Continuation	Learning autonomy Learning resources Flexible strategies Favorable learning environment
Adaptation	New learning experience Learning interest New learning method
Improvement	Rich vocabulary Complete sentences Accurate grammar Correct pronunciation Fluent intonation

“There is enough knowledge in the PLEs-SE platform that makes me very interested in it and constantly challenge myself...” (Interviewee C)

“Some interesting English videos in PLEs not only gave me a lot of fun but also helped me improve my pronunciation. It is a good learning experience...” (Interviewee F)

This is consistent with Sun et al.'s (2018) findings that the flexible learning method can greatly stimulate students' learning interests. Therefore, the trigger of learning interest increases the enjoyment of learning.

Furthermore, the PLEs learning experience improved the students' spoken performance, including their pronunciation and intonation. Meanwhile, they have amassed a wealth of vocabulary, particularly phrases and even sentences, and they can use it more effectively and accurately. For example, interviewees stated: “My spoken English has improved a little, and I have corrected some of my pronunciation. And I can use the words more accurately when speaking English. Meanwhile, I can use the linking words...” (Interviewee A) “My spoken English has improved a lot, especially in pronunciation and grammar.” (Interviewee D) “I think I have made great progress in my spoken English. I have accumulated some collocations and can use some sentence patterns. And I learn some grammar...” (Interviewee E) “...my vocabulary has increased a lot, and I can speak more sentences...” (Interviewee F)

In Zhang et al. (2020), they also concluded that if teachers cannot provide personal support, students' performance would decline. On the PLEs-SE platform, students can choose learning content according to their own preference. Then they can make evident progress.

Finally, students agreed that the Personal Learning Environment platform was a new type of learning for them. They preferred this method of learning over traditional classrooms because of the PLEs platform's learning autonomy and rich learning resources. Some interviewees, for example, stated: “The platform is easy and convenient to use, and the way of forum discussion allows me to exchange ideas with my classmates. It is the first time for me to communicate with my classmates in English, which is a great experience!” (Interviewee B) “The operation of the platform is simple and easy to learn. We can choose the knowledge we are interested in and learn it by ourselves. Besides, it also provides many extra-curricular resources, which saves a lot of time compared with finding them ourselves.” (Interviewee C) “When I just entered the platform, I was not good at operations. I did not know some words, but I learned them quickly. I like to read after the text radio on the platform, which is very helpful for my spoken English.” (Interviewee E) “At the beginning, I was not familiar with some operations on the platform, but I soon got used to it. The abundant audio and video resources on the platform have greatly helped my spoken English and boosted my confidence.” (Interviewee F)

Researchers, such as Jenou et al. (2019), pointed out the importance of learning autonomy for online learning. Other researchers claimed that there was a strong correlation between rich learning resources and language ability. Therefore, the improvement in vocabulary level was closely related to students' oral English level (Lehmann, 2007)

CONCLUSION AND FUTURE RESEARCH

This study explored the impact of a Personal Learning Environment on spoken English teaching and learning in a Chinese junior high school setting. The findings indicated that the implementation of the PLEs-based Spoken English platform had a positive effect on students' learning motivation and enthusiasm, as well as their narrative competence in spoken English. These results highlight the potential of PLEs as a pedagogical tool for improving language learning outcomes in secondary education.

Meanwhile, the PLEs-SE platform provides excellent external conditions for students to learn English, particularly in this age of lifelong learning. When learning through PLEs, self-directed learning is critical. Further research could look into the relationship between students' self-directed

learning ability and their PLEs learning outcomes. Furthermore, PLEs platforms can be tested on other subjects to see how effective they are.

Finally, additional research methods, such as classroom observation and case studies, can be used to examine the impact of PLEs on learners' learning motivation, effectiveness, and ICT literacy.

There are some limitations to the study. First, due to limited human and material resources, this study only selects two classes of spoken English for the experiment, so the small number of participants may influence the generality of the results.

Second, the experiment only lasts 2 months with spoken English as the subject, which may not be sufficient to explain the long-term effect of the PLEs-SE platform on other subjects.

More research is needed in the future to investigate the potential of the PLEs in high school education beyond spoken English. This study establishes a solid foundation for the practical application of PLEs in junior high school settings, and future research could broaden the scope to include other subjects, such as math, science, or social studies.

To improve the generalization of the results, future studies could consider increasing the number of participants from different regions of China or even different countries. Other research methods, such as classroom observation, peer evaluation, and tracking students' learning behaviors and outcomes over time, might be utilized as well. Overall, this study will add to our understanding of the potential impact of PLEs on high school students' learning motivation and narrative competence.

Future research could build on this foundation to investigate the efficacy of PLEs in different educational settings and identify best practices for implementing and utilizing PLEs in the classroom.

AUTHOR NOTE

Corresponding author: Xiaoshu Xu.

REFERENCES

- Attwell, G. (2007). Personal Learning Environments-the future of eLearning. *eLearning Papers*, 2(1), 1–8. https://www.researchgate.net/publication/228350341_Personal_Learning_Environments-the_future_of_eLearning
- Attwell, G., & Hughes, J. (2010). *Pedagogic approaches to using technology for learning: Literature review*. <https://dera.ioe.ac.uk/id/eprint/2021>
- Blair, E. (2016). Personal Learning Environments: A conceptual framework and research directions. *Journal of Interactive Media in Education*, (1). doi:10.5334/jime.408
- Buchem, I., & Hamelmann, H. (2010). Microlearning: A strategy for ongoing professional development. *eLearning Papers*, 21(7), 1–15. https://www.researchgate.net/publication/341323117_Microlearning_a_strategy_for_ongoing_professional_development
- Burns, N., & Grove, S. K. (2010). *Understanding nursing research: Building an evidence-based practice*. Elsevier Health Sciences. https://books.google.com/books?hl=en&lr=&id=Y9T3QseoHiYC&oi=fnd&pg=PP1&dq=Understanding+nursing+research:+Building+an+evidence-based+practice&ots=_s271dC90N&sig=BJIHm35LtQ3TZMCvthqu38Bqp0E#v=onepage&q=Understanding%20nursing%20research%3A%20Building%20an%20evidence-based%20practice&f=false
- Central People's Government of the People's Republic of China. (2010). *The outline of the national medium- and long-term program for education reform and development* /国家中长期教育改革和发展规划纲要 (2010-2020年). Central people's Government of the People's Republic of China. https://www.gov.cn/jrzq/2010-07/29/content_1667143.htm
- Creswell, J. W. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications. https://books.google.com/books?hl=en&lr=&id=KGNADwAAQBAJ&oi=fnd&pg=PP1&dq=Research+design:+Qualitative,+quantitative,+and+mixed+methods+approaches.&ots=XDMbeg1jeX&sig=d-10P9WmI_BIVDFmuPb9S6GkoyU#v=onepage&q=Research%20design%3A%20Qualitative%2C%20quantitative%2C%20and%20mixed%20methods%20approaches.&f=false
- Cui, X. H., Zhang, N., Shao, Y. J., & Chen, G. (2017). Study on vocabulary development in 2-year-old children [2岁儿童词汇发育研究]. *Zhongguo Fuyou Baojian*, (4), 723–726.
- Gritzalis, D., & Politis, P. (2015). Personal Learning Environments: A comprehensive study on their adoption and use. *Journal of Educational Computing Research*, 52(1), 96–122. doi:10.1177/0735633114562252
- Heilmann, J., Miller, J. F., Nockerts, A., & Dunaway, C. (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children. *American Journal of Speech-Language Pathology*, 19(2), 154–166. doi:10.1044/1058-0360(2009/08-0024) PMID:20008470
- Jeno, L. M., Adachi, P. J. C., Grytnes, J.-A., Vandvik, V., & Deci, E. L. (2019). The effects of m-learning on motivation, achievement and well-being: A Self-Determination Theory approach. *British Journal of Educational Technology*, 50(2), 669–683. doi:10.1111/bjet.12657
- Johnson, M., & Liber, O. (2008). The personal learning environment and the human condition: From theory to teaching practice. *Interactive Learning Environments*, 16(1), 3–15. doi:10.1080/10494820701772652
- Khoja, S. A., & Shaikh, Z. A. (2012). Role of teacher in personal learning environments. *Digital Education Review*, (21), 23–32. doi:10.1344/der.2012.21.23-32
- Koutsoudis, A., Tsinakos, A., & Mikropoulos, T. A. (2018). Personal Learning Environments in higher education: Current trends and new directions. *International Journal of Technology Enhanced Learning*, 10(1), 1–20. doi:10.1504/IJTEL.2018.088328
- Krashen, S. (1992). The input hypothesis: An update. In *Linguistics and language pedagogy: The state of the art, Georgetown University Round Table on Languages and Linguistics 1991* (pp. 409–431). Georgetown University Press. https://repository.library.georgetown.edu/bitstream/handle/10822/555484/GURT_1991.pdf?sequence=1&isAllowed=y
- Kukulska-Hulme, A., & Traxler, J. (2013). Design principles for mobile learning. In *Rethinking pedagogy for a digital age* (pp. 268–281). Routledge. doi:10.4324/9781351252805

Lehmann, M. (2007). Is intentional or incidental vocabulary learning more effective. *The International Journal of Foreign Language Teaching*, 3(1), 23–28.

Liao, S. Q. (2009). The construction of web-based autonomous learning environment based on PLE concept [基于PLE理念的网络自主学习环境的构建]. *Continuing Education Research*, (5), 51–54.

Liu, S. Y. (2018). *Study on the development of learning story completion skills among children aged 3-5* [3-5岁儿童学习故事续编能力的发展研究]. [Unpublished master's dissertation, East Chian Normal University, Shanghai, China].

Lu, F., & Li, K. D. (2013). Study on the construction of PLE structure model based on Web2.0 [基于Web2.0的PLE结构模型构建研究]. *e- Education Research*, (9), 51–56. doi:10.13811/j.cnki.eer.2013.09.010

Lucero, A. (2015). Cross-linguistic lexical, grammatical, and discourse performance on oral narrative retells among young Spanish speakers. *Child Development*, 86(5), 1419–1433. doi:10.1111/cdev.12387 PMID:26082153

Manca, S., & Ranieri, M. (2016). Is Facebook still a suitable technology-enhanced learning environment? An updated critical review of the literature from 2012 to 2015. *Journal of Computer Assisted Learning*, 32(6), 503–528. doi:10.1111/jcal.12154

Meng, Y. L., He, J. X., & Huang, W. (2022). Strategies for improving online personalized teaching: From the perspective of deep learning [线上个性化教学的提升策略:深度学习的视角]. *Journal of Tianjin Academy of Educational Science*, (4), 41–49.

Mills, M. T., Watkins, R. V., & Washington, J. A. (2013). Structural and dialectal characteristics of the fictional and personal narratives of school-age African American children. *Language, Speech, and Hearing Services in Schools*, 44(2), 211–223. doi:10.1044/0161-1461(2012/12-0021) PMID:23633645

Ministry of Education of the People's Republic of China. (2010). *Ten-Year Development Plan for Informatization of Education* [教育信息化十年发展规划(2011-2020年)]. MoE. <http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/s3342/201203/133322.html>, 2016-01-23

Ministry of Education of the People's Republic of China. (2022). *English Curriculum Standards for Compulsory Education* [《义务教育英语课程标准》]. Beijing Normal University Publishing Group.

Mou, Z. S., Lu, G. H., & Feng, N. N. (2012). Research on cloud environment construction for personal learning based on eyeOS and Moodle [基于eyeOS+Moodle的个人学习云环境的构建研究]. *Modern Educational Technology*, (5), 93–96. <https://api.semanticscholar.org/CorpusID:201890210>

Pan, W. B. (2017). A corpus based study of vocabulary development of 3-6 year olds [基于语料库下的3-6岁儿童词汇发展研究]. *Journal of Beijing Institute of Graphic Communication*, (5), 30–32. doi:10.19461/j.cnki.1004-8626.2017.05.010

Patall, E. A., Cooper, H., & Robinson, J. C. (2008). The effects of choice on intrinsic motivation and related outcomes: A meta-analysis of research findings. *Psychological Bulletin*, 134(2), 270–300. doi:10.1037/0033-2909.134.2.270 PMID:18298272

Saadatmand, M., & Kumpulainen, K. (2013). Content aggregation and knowledge sharing in a personal learning environment: Serendipity in open online networks. *International Journal of Emerging Technologies in Learning*, 8(S1), 70–78. doi:10.3991/ijet.v8iS1.2362

Schrader, P. G., Lawless, K. A., & Mayes, J. T. (2019). Personal Learning Environments (PLEs): The challenges of designing a pedagogical framework for a complex and changing learning landscape. *Education and Information Technologies*, 24(1), 705–728. doi:10.1007/s10639-018-9785-5

Shen, Y. (2018). Discussion on the application of education teaching app in the age of “Education + Internet” [“教育+互联网”时代的教育教学APP应用探讨]. *Disciplines Exploration*, (30), 59–60. doi:10.16400/j.cnki.kjdkx.2018.10.029

Sun, L., Siklander, P., & Ruokamo, H. (2018). *How to trigger students' interest in digital learning environments: A systematic literature review*. University of Oulu. <https://urn.fi/urn:nbn:fi-fe202103258331>

Tsai, Y. C., Shen, P. D., & Huang, Y. M. (2018). Exploring the relationship between personal learning environments and academic performance in social media-based flipped learning. *Interactive Learning Environments*, 26(4), 488–503. doi:10.1080/10494820.2017.1351955

United Nations Educationnel, Scientific and Cultural Organization, & Tsinghua University. (2022). *Research report on digital transformation of higher education teaching and learning*. ICHEI. <https://ru.ichei.org/Uploads/Download/2022-05-16/62820a2a9bceb.pdf>

Wang, J., Li, W., & Wang, W. Y. (2016). The impacts of story elicited mode on 4~6 years old children's story retellings [故事诱发方式对4~6岁儿童故事复述的影响]. *Studies in Early Childhood Education*, (10), 47–56. doi:10.13861/j.cnki.sece.2016.10.005

Wang, Q., Chen, W., & Liang, Y. (2011). The effects of personal learning environments on self-regulated learning. *Journal of Educational Technology Development and Exchange*, 4(1), 1–14. https://www.researchgate.net/publication/319360049_The_Effects_of_Personal_Learning_Environments_on_Self-Regulated_Learning

Wang, Q., & Zhang, H. (2014). Revised edition of action research for English teachers [英语教师行动研究修订版]. Foreign Language Teaching and Research Press.

Wang, T., Wu, Y., & Wu, N. Y. (2014). Narrative research of 3~6 years old children in different narrative activities [3~6岁儿童在不同叙事活动中的叙事能力]. *Studies in Early Childhood Education*, (8), 17–25. doi:10.13861/j.cnki.sece.2014.08.002

Westerveld, M. F., Gillon, G. T., & Miller, J. F. (2004). Spoken language samples of New Zealand children in conversation and narration. *Advances in Speech Language Pathology*, 6(4), 195–208. doi:10.1080/14417040400010140

Wu, R. K., & Zhao, C. (2013). The effect of pronunciation and intonation imitation training on oral anxiety of Chinese English learners [语音语调模仿训练对中国英语学习者口语焦虑的影响]. *Journal of PLA University of Foreign Languages*, (5), 54–58.

Xie, Y. R., & Li, D. S. (2012). Research on the construction and application of individual learning environment based on curriculum learning [基于课程学习的个人学习环境构建与应用研究]. *e-Education Research*, (10), 28–33+49. 10.13811/j.cnki.eer.2012.10.011

Yu, X. H., & Zhu, Z. T. (2012). Study on the design of electronic schoolbag as cloud personal learning environment [电子书包作为云端个人学习环境的设计研究]. *e-. Education Research*, (7), 69–75. doi:10.13811/j.cnki.eer.2012.07.012

Zhang, J.-H., Zou, L., Miao, J., Zhang, Y.-X., Hwang, G.-J., & Zhu, Y. (2020). An individualized intervention approach to improving university students' learning performance and interactive behaviors in a blended learning environment. *Interactive Learning Environments*, 28(2), 231–245. doi:10.1080/10494820.2019.1636078

Zhu, X. M., Wang, L. Y., & Xiao, W. Y. (2014). The effects of task repetition on second language English learners' oral production [任务重复对第二语言学习者口语产出的影响]. *Journal of Xiangnan University*, (6), 66–70.

APPENDIX A

Interview

亲爱的同学:

我们是个人学习环境研究团队,此项目旨在调查您再个人学习环境平台上的学习动机。个人学习环境平台是“以学习者为中心,自主管控学习进度、参与各种社交网络以及使用一系列网络协议连结系统、资源的个人管控空间。”

您的信息对我们的研究有重大意义,请您根据在个人学习环境平台学习体验认真回答以下问题。您的答案将会被严格保密、妥善保管,非常感谢您的配合!

- 1.你是否喜欢我们平台?与之前的学习方式相比,你觉得平台哪些方面比较有吸引力?
- 2.你觉得使用平台学习是否有困难?主要是哪些因素?
- 3.如果有条件,你会继续使用平台学习吗?为什么?
- 4.你适应平台的学习方式吗?与传统学习相比,平台学习有哪些好的方面?哪些不足?
- 5.你觉得平台能够帮助你的口语学习吗?在那些方面能帮助你口语的提高?

APPENDIX B

Pretest score of EC

Number	Score	Number	Score
1	3	21	3
2	1	22	3
3	3	23	2
4	3	24	3
5	2	25	3
6	2	26	2
7	2	27	2
8	2	28	3
9	3	29	3
10	4	30	2
11	1	31	3
12	2	32	4
13	3	33	2
14	3	34	3
15	3	35	2
16	1	36	3
17	1	37	2
18	2	38	1
19	3	39	4
20	2	40	3
		41	3

APPENDIX C

Posttest score of EC

Number	Score	Number	Score
1	5	21	4
2	3	22	5
3	4	23	4
4	5	24	5
5	3	25	4
6	4	26	2
7	3	27	4
8	4	28	5
9	4	29	5
10	5	30	3
11	3	31	4
12	3	32	5
13	5	33	3
14	4	34	5
15	4	35	3
16	3	36	4
17	3	37	4
18	4	38	2
19	5	39	5
20	4	40	4
		41	5

APPENDIX D

Pretest score of CC

Number	Score	Number	Score
1	3	22	3
2	2	23	1
3	2	24	2
4	3	25	2
5	4	26	3
6	1	27	1
7	3	28	1
8	2	29	2
9	3	30	2
10	3	31	2
11	3	32	3
12	2	33	1
13	2	34	3
14	1	35	2
15	3	36	1
16	2	37	2
17	2	38	2
18	3	39	1
19	4	40	2
20	2	41	2
21	2	42	3

APPENDIX E

Posttest score of CC

Number	Score	Number	Score
1	3	22	2
2	2	23	5
3	4	24	1
4	5	25	3
5	4	26	2
6	2	27	2
7	5	28	3
8	3	29	3
9	4	30	1
10	4	31	3
11	3	32	3
12	4	33	3
13	5	34	2
14	3	35	3
15	3	36	3
16	3	37	2
17	2	38	3
18	3	39	2
19	2	40	2
20	3	41	3
21	2	42	3