Research Article

Research on the Current Situation and Countermeasures of English Listening Teaching Based on Multimedia Intelligent-Embedded Processor

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In order to improve the effect of English listening teaching, this paper combines the interactive needs of English listening teaching to analyze the current problems in English listening teaching. Moreover, according to the actual needs of the intelligent English teaching system, this paper conducts research on the high-order cumulant signal-to-noise ratio estimation method and combines data analysis to improve the algorithm to obtain an intelligent algorithm suitable for English listening teaching. In addition, this paper combines the algorithm to construct an English listening teaching system based on a multimedia intelligent-embedded processor and applies the embedded processor to intelligent English listening teaching. Finally, this paper builds an intelligent system to solve the current problems in English listening teaching and improve the effect of English teaching.

1. Introduction

At present, there are still major problems in English listening teaching in some colleges and universities, but this teaching link is the key to improving students’ English ability. Therefore, in the future development process, colleges and universities need to continuously improve and innovate teaching models and teaching ideas based on current problems and use advanced teaching methods to improve students’ English skills. From the perspective of teachers, English teachers in colleges and universities do not pay enough attention to the teaching of English listening, and the formalization is obvious, and the recording of English texts is mainly played in the class, and the mode is relatively simple. Some teachers think that the English listening link is a waste of most of the class time, so they often omit this link in class, resulting in lower listening proficiency of students [1]. From the perspective of students, there are two main factors that affect the improvement of their English listening level: knowledge barriers and noninformation barriers. The so-called intellectual barriers are problems in cultural background knowledge and language knowledge, including grammatical knowledge, vocabulary knowledge, and phonetic knowledge. Having good speech skills is the prerequisite and foundation of listening. Individual learners have been practicing English for many years, and their reading and writing skills have reached a certain level, but their listening skills are relatively low. The main reason is the lack of phonetic knowledge [2]. In recent years, the scale of enrollment of colleges and universities has been expanding, and the entrance threshold has been gradually reduced. Due to the poor English foundation of students, their pronunciation skills are even worse. Nonintellectual barriers refer to barriers in listening methods, skills, and psychology. College students have poor learning foundations and skills, so they will inevitably have emotions such as fear and anxiety during the learning process, which directly leads to a decrease in their interest in English learning. In addition, methods and skills are also key factors that affect the improvement of English listening ability, so they need to be paid attention to. From the perspective of college English courses, although this subject is a basic course, there is still a problem of a small amount of courses. However, the emergence of this problem will directly cause students to ignore this course and attach importance to other “professional” courses that involve more. In addition, even if the amount of courses is up to
the standard, some colleges and universities still involve less
listening courses and cannot provide students with compre-
prehensive listening training [3]. The emotional factors that
affect college students' English listening learning include
motivation, attitude, personality, belief, and self-confidence.
The learning motivation is the inner force that promotes
students to carry out learning activities and directly affects
the learning effect. It mainly includes result motivation,
integration motivation, and instrumental motivation. Self-
confidence is the judgment and evaluation of students on
their own learning process, which can guide students to
actively participate in learning activities. All in all, emotion
is the filter of knowledge learning, and the knowledge
input to the brain can only be fully absorbed by students
after being filtered. Interaction design has developed rapidly
in recent years, and along with the cross-development of
other professions and technologies, it has produced many
amazing results, changing and subverting people's lifestyles,
the behavioral relationship between "people and things," and
"people and things." The group relationship of "people" and
the cultural relationship of "people and society" have
been redefined under the impetus of new technology. The
revolution of information technology has brought tremen-
dous changes to the development of human society and
directly promoted the overall innovation of production
methods, communication channels, and business models
related to the design discipline. From the perspective of disci-
plinary development, we need to review interaction design
from the perspective of evaluation and then reverse the eval-
uation method of interaction design. This paper combines
the multimedia intelligent-embedded processor to analyze
English listening teaching and builds an intelligent English
listening model to improve the effect of English listening
teaching.

2. Related Work

In the embedded field, embedded processors play an impor-
tant role and are leading the development of the entire
embedded field. Many domestic and foreign companies have
participated in the development boom of embedded proces-
sors and developed various products. The development ver-
sion of the commercial embedded processor has further
promoted the research and application of embedded proces-
sors [4]. At present, the embedded processor system is
widely used, and the smart terminal field is widely optimis-
tic. Many domestic and foreign developers are increasing
investment and developing new products. The embedded
processor will be their preferred operating system. As an
excellent representative of free software, Linux has devel-
oped rapidly in less than ten years due to its unique charac-
teristics of high efficiency, safety, and dynamic loading [5].
At present, the scope of application of embedded systems
at home and abroad mainly includes aerospace, NASA's
Mars Climate Orbiter, "Polar Lander," and "Deep Space
Two," and other Mars probes use embedded systems. In
the VxWorks system, information appliances include digital
set-top boxes, digital TVS, video phones, home networks,
and mobile PDAs; the industrial market has control equip-
ment, industrial control boards, instruments, etc. [6]; in
addition to advanced medical diagnostic equipment, smart
houses, smart office, etc. are indispensable for the core tech-
nology of embedded systems [7]. Due to the rapid develop-
ment of technology, the diversification of user needs, and
the continuous advancement of differentiation, the develop-
ment of embedded intelligent terminal systems has become
an emerging scientific research field and industry. According
to the definition of the British Institute of Electrical Engi-
neers, an embedded system is a device that controls and
monitors auxiliary equipment, machinery, or even factory
operations [8]. Embedded systems mainly include hardware
and software. With the increase in system complexity and
the development of hardware integration technology, a
higher-performance microprocessor has become the core
hardware component of the embedded system; the software
has only the program block with a single control function
which has developed into a software system with layers
and embedded operating systems [9]. With the deepening
of the information age, the development of digitization has
become an inevitable trend, and one of the core technologies
digitization is digital signal processing [10]. Digital signal
processing is the use of computers or special processing
equipment to collect, transform, filter, estimate, enhance,
compress, and identify signals in digital form to obtain a sig-
nal form that meets people's needs. Digital signal processing
(DSP) is an emerging discipline that involves many disci-
plines and is widely used in many fields at the same time
[11]. For example, in the field of mathematics, calculus,
probability and statistics, stochastic processes, and numeri-
cal analysis are all basic tools for digital signal processing
and are closely related to network theory, signal and system,
cybernetics, communication theory, and fault diagnosis. In
recent years, some emerging disciplines, such as artificial
intelligence, pattern recognition, and neural networks, are
inseparable from digital signal processing [12]. It can be said
that digital signal processing takes many classic theoretical
systems as its theoretical basis and at the same time makes
itself the theoretical basis of a series of emerging disciplines.
With the rapid development of computer and information
technology, digital signal processing technology emerged
and developed rapidly. Especially in the application of
embedded computers, DSP technology has become one of
the mainstream directions of computer technology develop-
ment today, mainly in the field of measurement and control.
The purpose of the embedded system is to provide a com-
plex digital system with multitasking and networking as
the core which is easy to develop. From the perspective of
digital technology and information technology, embedded
systems have become the basic technology of modern infor-
mation network technology applications and have become
the basic technology in the field of modern industrial control
[13]. Although the theory of digital signal processing has
developed rapidly, it is no exaggeration to say that the birth
and development of DSP chips have played a very important
role in the technical development of communications, com-
puters, and control in the past 20 years [14]. The task of dig-
ital signal processing needs to be completed by DSP devices
to a large extent. DSP technology has become a cutting-edge
technology that people are paying more and more attention to and getting rapid development. DSP is a device that processes a large amount of information with digital signals. The new DSP not only has data processing capabilities but also integrates more and more other components inside, which can form a new DSP-embedded application system, which not only has other microprocessing. The advantages of the embedded system of the processor and the single-chip microcomputer have a unique high-speed digital signal processing capability [15].

3. High-Order Cumulant Signal-to-Noise Ratio Estimation Method

The main step of the high-order cumulant method is to calculate the result of the conversion of high-order quantities into signal moments. According to the connection of signal moment, noise power, and signal power, the estimated value of signal and noise power is calculated, respectively, and then, the corresponding signal-to-noise ratio is obtained. For a zero-mean k-order random process \( x(n) \), the values of \( l \) have different time nodes: the higher-order moments and higher-order cumulants of \( x(n) \), \( x(n-k_1) \), \( x(n-k_2) \), \( x(n-k_{l-1}) \) are defined as equations (1) and (2):

\[
m_l(k_1, k_2, \ldots, k_{l-1}) = \text{mom}\{x(n), x(n-k_1), \ldots, x(n-k_{l-1})\},
\]

\[
c_l(k_1, k_2, \ldots, k_{l-1}) = \text{com}\{x(n), x(n-k_1), \ldots, x(n-k_{l-1})\}.
\]

We assume that \( X = (x_1, \ldots, x_l) \) is a vector and \( I = (1, 2, \ldots, l) \) is the indicator set of vector \( X \). If \( I \subseteq I_x \), then \( x_I \) represents each component of \( l \) vectors. Suppose the vector \( x_I = (x_{1}, \ldots, x_{l}) \), and if \( x_i = 1 \), then \( i \in I \), and if \( x_i = 0 \), then \( i \notin I \). These vectors have a one-to-one correspondence with the set \( I \subseteq I_x \). Therefore, you can get [16]

\[
m_x(I) = m_x^{(I)},
\]

\[
c_x(I) = c_x^{(I)}.
\]

In other words, \( m_x(I) \) and \( c_x(I) \) are the moments and cumulants of the subvector \( X \) of \( X_I \). According to the above formula, we get [17]

\[
c_x(I) = \sum_{I_p \subseteq I} (-1)^{q-1}(q-1)! \prod_{p=1}^{q} m_x(I_p).
\]

Among them, \( C_x(I) \) represents the sum in all divisions of \( \Pi_l \leq q \leq N(I) \).

For formula (4), \( l = 1, l = 2, \) and \( l = 3 \) are as follows:

\[
l = 1 : c_1(x_1) = E\{x_1\},
\]

\[
l = 2 : c_2(x_1, x_2) = E\{x_1x_2\} - E\{x_1\}E\{x_2\},
\]

\[
l = 3 : c_3(x_1, x_2, x_3) = E\{x_1x_2x_3\} - E\{x_1\}E\{x_2\}E\{x_3\} - E\{x_2\}E\{x_1x_3\} - E\{x_3\}E\{x_1x_2\} + 2E\{x_1\}E\{x_2\}E\{x_3\}.
\]

Based on the previous derivation of the formula and their respective connections, for a complex random variable with zero mean, the moment is defined as [18]

\[
M_{p\times q \times r} = E[x^p(x^*)^q].
\]

We define its cumulative amount as

\[
C_{p\times q \times r} = \text{cum}\{x, \ldots, x^*, \ldots, x^*\}.
\]

Among them, \( x \) is the \( p \) item, and \( x^* \) is the \( q \) item. For a complex random process \( x(n) \) with zero mean, we have

\[
cum_x^1(l_1, l_2, l_3) = \text{cum}_x[X^*(k), X(k + l_1), X(k + l_2), X^*(k + l_3)] = E[X^*(k)X(k + l_1)X(k + l_2)X^*(k + l_3)]
\]

\[
- E[X^*(k)X(k + l_1)]E[X(k + l_2)X^*(k + l_3)]
\]

\[
- E[X^*(k)X(k + l_2)]E[X(k + l_1)X^*(k + l_3)]
\]

\[
- E[X^*(k)X(k + l_3)]E[X(k + l_1)X(k + l_2)],
\]

\[
(10)
\]

\[
cum_x^2(l_1, l_2, l_3) = \text{cum}_x[X(k), X(k + l_1), X(k + l_2), X(k + l_3)]
\]

\[
= E[X(k)X(k + l_1)X(k + l_2)X(k + l_3)]
\]

\[
- E[X(k)X(k + l_1)]E[X(k + l_2)X(k + l_3)]
\]

\[
- E[X(k)X(k + l_2)]E[X(k + l_1)X(k + l_3)]
\]

\[
- E[X(k)X(k + l_3)]E[X(k + l_1)X(k + l_2)],
\]

\[
(11)
\]

\[
cum_x^3(l_1, l_2, l_3) = \text{cum}_x[X(k), X(k + l_1), X(k + l_2), X^*(k + l_3)]
\]

\[
= E[X(k)X(k + l_1)X(k + l_2)X^*(k + l_3)]
\]

\[
- E[X(k)X(k + l_1)]E[X(k + l_2)X^*(k + l_3)]
\]

\[
- E[X(k)X(k + l_2)]E[X(k + l_1)X^*(k + l_3)]
\]

\[
- E[X(k)X^*(k + l_3)]E[X(k + l_1)X(k + l_2)],
\]

\[
(12)
\]

According to the formula of the above algorithm, the MPSK signal is simulated below, assuming that the complex digital sequence of the MPSK signal is

\[
r_k = \sqrt{E}a_k + n_k = x_k + n_k \quad k = 1, 2, \ldots, N.
\]

In the formula, the noise of the mean value is zero, the variance is the complex Gaussian random variable with the variance \( N_0 \), \( E \) is the energy of the transmitted symbol, and \( a_k \in \{ \exp(j2\pi(m-1)/M), m = 1, \ldots, M \}, M \) is the signal modulation order.

It is defined that the signal \( x_k = \sqrt{E}a_k \) and the noise \( n_k = n_{lk} + jn_{qk} \) are not related to each other. According to the previous definition, we can get complex Gaussian random
variables with \( n_{rk} \) and \( n_{qk} \) mean zero and variance \( N_0/2 \), and they are not related to each other. SNR \( = E/N_0 \) is the signal-to-noise ratio.

For MPSK signals with \( A \exp \left( j2\pi (m - 1)/M \right), m = 1, \ldots, M \), \( A = \sqrt{E} \). Normally, to define that the transmitted signals are not related to each other, it is only necessary to calculate the value of the cumulant function when \( l_1 = l_2 = l_3 = 0 \).

\[
E[X(k)X^*(k)X^*(k)] = \frac{1}{M} \sum_{m=1}^{M} A^4 \exp \left( \frac{j2\pi (m - 1)}{M} \right) \left\{ \begin{array}{ll} A^4, & M = 2, 4, \ldots, \\ 0, & M = 8, 16, 32, \ldots \end{array} \right.
\]

From formula (18), we can get the following:

\[
E[X(k)X^*(k)X^*(k)] = \frac{1}{M} \sum_{m=1}^{M} A^4 \exp \left( \frac{j2\pi (m - 1)}{M} \right) \left\{ \begin{array}{ll} A^2, & M = 2, 4, 8, \ldots \\ 0, & M = 4, 8, \ldots \end{array} \right.
\]

Because the fourth-order cumulant is zero, noise and signal are not related to each other. According to the previous formula and properties, we can get the following:

\[
C_{r21} = C_x, \quad \frac{1}{21} C_n
\]

(18)

\[
C_{r41} = C_x
\]

(19)

\[
C_{r42} = C_x, A^4
\]

(20)

\[
\sigma_s^2, \sigma_n^2, \text{ and } \sigma_x^2 \text{ represent the variances of received signal, sent signal, and noise, respectively. When } M = 2, \text{ that is, BPSK signal, there are}
\]

\[
C_{x,21} = \sigma_s^2 = E, \quad C_{x,42} = -2E^2, \quad C_{x,41} = -2E^2.
\]

(21)

When \( M \geq 4 \), which is a high-order MPSK signal, there are

\[
C_{x,21} = \sigma_s^2 = E, \quad C_{x,42} = E^2, \quad C_{x,41} = 0.
\]

(22)

From the above, we can get the relationship between the cumulant of MPSK signal and its symbol energy, as shown below:

\[
E = \sigma_s^2 = \begin{cases} \sqrt{C_{r42}/2}, & M = 2, \\ \sqrt{|C_{r42}|}, & M \geq 4. \end{cases}
\]

(23)

From formula (20), \( C_{r42} = C_{x,42} \), and formula (23) can be written as follows:

\[
E = \sigma_s^2 = \begin{cases} \sqrt{C_{r42}/2}, & M = 2, \\ \sqrt{|C_{r42}|}, & M \geq 4. \end{cases}
\]

(24)

From formula (18), we can get the following:

\[
\sigma_n^2 = \sigma_s^2 + \sigma_x^2.
\]

(25)

In summary, we can give the steps of signal-to-noise ratio estimation as follows:

(1) The algorithm obtains the cumulant estimated value \( C_{r42} \) and the variance estimated value \( C_{r21} \) according to the collected signal \( r_k, k = 1, 2, \ldots, N \)

(2) The algorithm calculates the noise variance estimate \( \sigma_n^2 = \sigma_s^2 - \sigma_x^2 \)

(3) The algorithm calculates the energy \( E \) of the signal

The following algorithm calculates the estimated signal-to-noise ratio.

\[
SNR \frac{E}{N} = \frac{S_n}{S_s} = \frac{S_x}{S_f - S_s} = \begin{cases} \sqrt{C_{r42}/2} \quad \text{BPSK signal} \\ \sqrt{|C_{r42}|} \quad \text{MPSK signal} \end{cases}
\]

(26)

When the modulation order is unknown, certain calculations are required. The algorithm first performs a simple analysis of the order and uses the analysis results to make the following assumptions:

\[
\Delta = \frac{|C_{r41}|}{|C_{r42}|} \begin{cases} >0.5 \text{ The received sequence is BPSK signal,} \\ <0.5 \text{ The received sequence is a non-BPSK signal.} \end{cases}
\]

(27)

Theoretically, the results obtained by formula (26) and the second-order fourth-order estimation method ((3)–(28)) are the same.
\[
\text{SNR}_{\text{complex}} = \frac{\sqrt{2M_2^2 - M_4}}{M_2 - \sqrt{2M_2^2 - M_4}},
\]
(28)

\[
\text{SNR}_{\text{real}} = \frac{(1/2)\sqrt{6M_2^2 - 2M_4}}{(M_2 - (1/2))\sqrt{6M_2^2 - 2M_4}} = \frac{\sqrt{M_4 - 3M_2^2}/2}{M_2 - \sqrt{M_4 - 3M_2^2}/2}.
\]
(29)

In the above formula, \(M_2\) and \(M_4\) are the second-order and fourth-order quantities of the received sequence \(r(n)\). The following formulas \(M_2\) and \(M_4\) are related to the power of the collected signal.

\[
M_2 = \frac{1}{N} \sum_{n=0}^{N-1} |y_n|^2,
\]

\[
M_4 = \frac{1}{N} \sum_{n=0}^{N-1} |y_n|^4.
\]
(30)

For the above formula, there is such a relationship between the moment and the cumulant, as shown below:

\[
M_2 = E[|X|^2] = C_{21},
\]

\[
\]
(31)

When \(M \geq 4\), \(C_{20} = 0, C_{42} = M_4 - 2M_2^2\). When \(v\), since the constellation diagram of the BPSK signal is one-dimensional, so \(C_{20} = C_{21}\), then \(C_{42} = M_4 - 3M_2^2\) at this time. Figure 1 shows the root-mean-square error of the signal-to-noise ratio estimation by the higher-order cumulative estimation method.

In actual situations, generally speaking, when perceiving the spectrum, the prior information of authorized users will not be obtained. Therefore, there are certain limitations to the estimation of the signal-to-noise ratio. In order to improve the accuracy of spectrum sensing, appropriate channel quality metrics and related reliable estimation algorithms are required. The following will expand the range of modulation methods to estimate the unified signal-to-noise ratio.

\[
Y_i = X_i + W_i.
\]
(32)

In the formula, \(Y_i\) is the received signal, \(X_i\) is the transmitter signal, and \(W_i\) is the channel noise. The other \(v\) represents the second moment of the received signal \(Y_i\).

\[
M_2 = E[|Y_i|^2] = E[|X_i|^2] + 2 \text{Re} \{E[X_i W_i^*]\}
\leq E[|X_i|^2].
\]
(33)

\(E[\cdot]\) is the statistical mean value formula. The fourth moment of the received signal \(Y_i\) can be expressed as follows:

\[
M_4 = E[|Y_i|^4] = E[|X_i|^4] + 2 \text{Re} \{E[X_i W_i^*]^2\}
\leq 4 E[|W_i|^4].
\]
(34)

We assume that the signal \(X_i\) and the noise \(W_i\) are independent zero-mean random processes, and \(W_i\) is a complex Gaussian; the kurtosis of \(Y_i\) is defined as follows:

\[
C_Y = \frac{M_4}{M_2^2} = \frac{E[|Y_i|^4]}{E[|X_i|^2]^2}.
\]
(35)

Similarly, the kurtosis of \(X_i\) is represented by \(C_X\). Through some algorithm operations, the estimated value \(\hat{\gamma}\) of the average signal-to-noise ratio can be derived from (32)–(35).

\[
\hat{\gamma} = \frac{E[|X|^2] + 2 \text{Re} \{E[X W^*]\}}{E[|W|^4] + 4 \text{Re} \{E[X W^*]^2\}} + \frac{4.3 \sqrt{(4 - 2 C_X)^2 - (C_X - C_Y)(2 - C_Y)}}{2(C_X - C_Y)}.
\]
(36)

The derivation of the above formula not only satisfies the low-order statistics BPSK and MPSK but is also suitable for 16QAM and 64QAM. This expands the range of modulation methods. Figure 2 shows that the improved SNR estimation algorithm can satisfy 16QAM SNR estimation. Figure 3 shows that the improved SNR estimation algorithm can satisfy 64QAM SNR estimation.

The above simulation results show that the improved SNR estimation algorithm can more accurately estimate the SNR for 16QAM and 64QAM modulated signals. Figures 4 and 5 show the simulation results of BPSK and MPSK signals by the improved SNR estimation algorithm under the same conditions as the classical high-order cumulants.

Derived by the above formula, the simulation results obtained are shown in Figures 4 and 5. For BPSK and QPSK
signals, the improved SNR estimation algorithm is not only equivalent to the high-order cumulant, but the improved algorithm can estimate the SNR of 16QAM and 64QAM more accurately.

Through the above research, the embedded processor signal-to-noise ratio processing method of this paper is constructed. This method is applied to English listening teaching, and then the embedded system of English listening teaching can be constructed.

4. English Listening Teaching System Based on Multimedia Intelligent-Embedded Processor

As a basic compulsory course for college students, college English listening and speaking is essential to improve students’ comprehensive ability and employability. In recent years, many scholars have conducted research on multimedia teaching and the newly emerged “hybrid” teaching, “flipped classroom” and “MOOC,” and other computer-assisted teaching methods, but their focus and classification methods are not the same. The article regards “hybrid” teaching, “flipped classroom,” “MOOC,” and “online live broadcast” commonly adopted by Chinese universities and primary and secondary schools during the epidemic as "new多媒体 teaching.” However, the current English listening teaching in colleges and universities in my country has not fully utilized the advantages of the "new multimedia," which has caused a waste of valuable resources such as new multimedia resources and teacher and student time. Teachers combine their own years of teaching experience and summarized the questions collected in the form of tests, interviews, and questionnaires from the three aspects of students, teachers, and schools. According to previous researches, college students generally have problems in the cognitive and technical aspects of the multimedia teaching style of college English listening courses. First of all, at the cognitive level, the vast majority of students are basically ignorant of “new multimedia teaching.” According to previous investigations, students are already familiar with multimedia teaching synonymous with PPT. However, the “new multimedia teaching” form synonymous with “hybrid” teaching, “flipped classroom,” “MOOC,” and “online live broadcast” has only begun to appear and mature in recent years. Even in colleges and universities with relatively better teaching conditions, it is still not popularized, especially in primary and secondary schools. Therefore, most college students have never heard of new multimedia forms such as “hybrid” teaching, “flipped classroom,” and “MOOC” before
entering the school. The lack of understanding of new multimedia teaching methods will create obstacles for them to quickly adapt to college listening courses. Secondly, at the technical level, students have insufficient grasp of the technology and operation methods required by the new multimedia. Although the current college students are called the “indigenous people” of the Internet age, there are still some students with poor family conditions who are unfamiliar with the operation of computers and mobile phones. In addition, even students who are proficient in the operation
of computers and mobile devices are basically only familiar with a few instant messaging, social software, shopping, and film and television software. For a new client developed for learning purposes, students may not be able to operate it at all. In the new multimedia environment, few students have any knowledge of the audio clips, video clips, and subtitle addition technologies and corresponding software often assigned by listening teachers. Therefore, students currently lack the skills needed to complete multimedia assignments and activities.

The “new multimedia teaching” model represented by “mixed” teaching, “flipped classroom,” and “MOOC” has appeared for many years and has become the development trend of college English listening teaching in the future. Some problems in the school may cause the development of “new multimedia teaching” to fail to achieve the expected results after years of development. First, the top-level design is not in place. The top-level design is one of the most critical influencing factors for the failure of universities to efficiently and smoothly carry out the new multimedia teaching reform. School management must fully realize the necessity, system, and complexity of “hybrid” teaching reform. According to the research team’s understanding, some colleges and universities have carried out “mixed” teaching reforms for many years, but they are still limited to a few classes of a certain profession led by a certain teacher in the initial experiment, and the reform effect has been minimal. The main reason is that the management only regards

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blended teaching as an attempt and has not seen that “blended” teaching is the inevitable direction of teaching reform in colleges and universities. Second, the hardware and technical guarantees are insufficient. Compared with traditional classrooms, new multimedia teaching is highly dependent on the overall construction of “network+computer/mobile terminal.” At present, college students have basically realized that each person has a smart phone. Even if they do not have a computer, they can use the smart phone client for online learning. However, because ordinary mobile data access is often expensive, students using the mobile network to study are equivalent to increasing the financial burden of students. In addition, the implementation of new multimedia teaching puts forward higher technical requirements for teachers, especially older teachers with high professional titles and teaching management departments, and it undoubtedly increases the workload of teachers and administrators.

Based on the above analysis, this paper combines multimedia technology and applies embedded processors to intelligent English listening teaching to build an intelligent system to solve the current problems in English listening teaching and improve the effect of English teaching.

The frame structure of the mobile streaming media server is shown in Figure 6. The working process is briefly described as follows: The system separates the audio and video data streams of English listening. The audio encoder and the video encoder are used to encode, respectively, and the streaming media data is transmitted one-to-one or one-to-many by RTP. Real-time Transmission Control Protocol (RTCP) provides a reliable transmission mechanism for sequentially transmitting data packets and provides flow control or congestion control. The Wireless Application Communication Protocol (WAP) technology is a standard for mobile terminals to access wireless information services. The user obtains the audio file list, audio file introduction, and audio file data by communicating with the WAP server. Moreover, it responds to the WAP server through the Hypertext Transfer Protocol (HTTP).

On the basis of absorbing the advanced technology of other audio and video on-demand systems, this paper combines many years of English listening teaching experience and the characteristics of English listening learning to construct an English listening on-demand system based on streaming media technology to provide comprehensive solutions and technical support for software development. The English listening streaming media on-demand system is mainly composed of three parts: a comprehensive service.

Table 2: English listening teaching effect of multimedia intelligent-embedded processor.

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platform, a switching routing network, and a user terminal. The system structure is shown in Figure 7.

The overall system architecture is shown in Figure 8. The front UI interface is displayed as three module entrances, which is a WPF design method. The realization of UI operation needs the support of BLL (business logic layer). DAL (data access layer) is the operating layer of the database, providing data for the business logic layer or presentation layer.

The function summary of the English listening test system is shown in Figure 9:

The system constructed above can effectively improve the current problems in English listening teaching and can test the teaching effect through the simulated listening test function. Next, the effect of the department of this paper will be evaluated through experimental research.

This paper evaluates the effect of the signal-to-noise ratio algorithm constructed in this paper in the processing of English listening sound waves through simulation experiments. The statistical results are shown in Table 1 and Figure 10.

The above experiments verify that the high-order cumulant signal-to-noise ratio estimation method is very effective in English listening speech processing. After that, the teaching effect of the English listening teaching system based on the multimedia intelligent-embedded processor constructed in this paper is evaluated, and the results shown in Table 2 and Figure 11 are obtained.

Through the above experimental analysis, it can be seen that the multimedia intelligent-embedded processor English listening teaching system constructed in this paper can play an important role in listening teaching and effectively improve the existing problems in listening teaching.

5. Conclusion

Listening teaching is a long-term comprehensive skill training process with strong continuous inertia. Relying on short-term intensive listening training cannot improve listening level in any way. Because of the different grades in middle school and university, foreign language teaching is basically test-oriented education, focusing on the dissemination of foreign language knowledge, neglecting the cultivation of foreign language ability, and reading and listening and speaking. This has caused the students to have defects in listening. One of the most important manifestations is that there are very few listening classes at each stage, and at the internship stage, English learning has been completely put aside. Because there is no regular learning and training, it is impossible to improve listening skills in any way. This paper combines the multimedia intelligent-embedded processor to analyze English listening teaching and constructs an intelligent English listening model to improve the effect of English listening teaching. The experimental analysis shows that the multimedia intelligent-embedded processor English listening teaching system constructed in this paper can play an important role in listening teaching and effectively improve the existing problems in listening teaching.

Data Availability

The labeled dataset used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares no competing interests.

Acknowledgments

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