

Original Paper

A Phenomenographic Approach into Non-English Major English Learners' Experiences of Learning English Intonation

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Abstract

This study aimed to explore qualitatively different English intonation learning experiences of second-year non-English majors and the impact of self-directed practice intensity. Adopting a phenomenographic approach, it conducted semi-structured interviews with 18 such students from a northwest engineering university. Results showed: 1) Three intonation conceptions (surface-level pitch change, rule-based prosodic patterns, communicative tool for intelligibility) correlated with practice types (no extra practice, textbook audio, online resources); 2) Three learning approaches (classroom mechanical imitation, textbook rule drilling, online practical application) and matching skills (mimicry, rule-reinforced production, communication comprehension) aligned with practice intensity; 3) Three integrated experiences formed a practice-driven hierarchy, unrelated to academic performance. Pedagogical implications included optimizing in-class instruction, simplifying post-class practice guidance, and linking classroom-extracurricular practice. The study offers insights for intonation teaching of non-English majors in science and engineering universities.

Keywords

English intonation learning, non-English major college students, phenomenographic approach, self-directed practice

1. Introduction

In 1967, Halliday described English intonation as a structure combining three interacting elements: tonality, which is the division of continuous speech into syntactic units of spoken language that are syntactically meaningful; tonicity, which is the signification of the most prominent element in the atom with the primary stress; and tone, which is the capture of the patterns of variations of pitch in a speech segment (see Chen Hua, 2006b). In more recent times, the academic research which is concerned with

the instruction and learning of intonation, and other prosodic aspects of the spoken English, is getting more and more scholarly interest (Tian & Jin, 2015). The motivation of this is the more focusing on the developing of the communicative abilities in the learners of the second language (Afshari & Ketabi, 2016).

What is particularly important is that in Jenkins (2012) the tonic, or nuclear, stress, i.e. the one that is in line with the so called tonicity system, is a basic element of the Lingua Franca Core (LFC), which is the necessary set of characteristics of pronunciation which speakers are needed for clear English. According to the LFC, this prosodic element is basic for a good intercultural exchange even for the language learner who does not have the aim to be a native- for his pronunciation accuracy. Wells (2006) lists six main functions of English intonation, the grammatical, attitudinal, focusing, discourse, psychological, and indexical ones. This body of work also supports this view that the mastery of intonation is important for a successful communication and for the general proficiency of a second language. This is of particular interest for the students who are not English majors, because the objective of their learning English is practical and application related.

The process of acquiring English proficiency for the students majoring in fields different from English is usually hampered by three main constraints: by the lack of time devoted in the classroom, by the syllabus that is focused on vocabulary and grammatical rules and by the lack of educational materials devoted to the prosodic development. In such a situation, the acquiring of command over some important intonation patterns has greater practical utility than the pure theoretical importance for such learners. The main purpose of the majority of the non-English majors to develop their English skills is to satisfy the academic needs—for instance, to join in the international scholarly discussions, or to pass the evaluations in the English taught courses—or to satisfy the professional needs, that is to deal with the cross border commercial interactions and with collaboration in the globally distributed teams. In these contexts clear and comprehensible intonation plays a decisive role in the terms of the preciseness of the information transmission and of the overall effectiveness of the communicative exchanges. However, for both this group of the learners and their teachers, English intonation remains still a difficulty that is not yet sufficiently faced by the focused instructional effort. Bu (2016) claims that freshmen of the university level usually have little knowledge of the prosodic elements, to say nothing about the ability to use them in the real communication. Besides, due to the structure of the English courses for the students who are not majoring in the language, there are rarely any scheduled sessions for organized practice of the intonation. The limited effect of the direct teaching in the classroom—especially with respect to the complicated intonation structure—is even more visible in the case of the education of the students who are not majoring in English, where the specific way of instruction and the extra educational material are still insufficient.

The study of prosody has slowly become more prominent in the field of the instruction of English pronunciation in recent years. But in general, the volume of relevant research remains far smaller than

that of segmental phonology studies on the segmental aspect, for example, individual sounds, vowel, consonant. More importantly, the research on the learning of prosody so far has mainly been done for the students majoring in English or the students training to be English teachers. There are not so many studies that look at the non-English majors, who are certainly the largest population of the university level English learners in China. This is an evident lack of research and it should definitely be more if it is the case. I would like to especially point out that there is a demand for investigations which do not neglect the point of view of the non-English majors on their own experiences with the learning of intonation. Those learners are not the same in the reasons of learning, the availability of the materials for instruction and in the contexts in which they really use the language as the English majors are. The students have different educational journeys, as their education will vary in the variation of their previous knowledge and of their cognitive schemes (Marton & Pang, 1999; Gal & Ginsburg, 1994). For the undergraduates that are not majoring in English, the differences will be also larger in the variation of their starting English language ability, in their self-regulated learning, and in the possibility to have real contacts with the English language. The obtaining of an exact knowledge of these different educational journeys is an important precondition for the planning of the curriculum and of the pedagogy adapted to the specific limitations of the English courses for non-specialists. Then, this is a further important precondition for improving the knowledge assimilation of the students and their performance.

In order to fill this uncovered research gap, the present work is organised on the two following main questions: 1) How are qualitatively different ways in which the learners of non-English majors see the activity of learning English intonation? 2) In which way these different ways have impact in the final results in learning the intonation? In order to answer these two research questions, the investigation makes use of phenomenography as the main methodological framework. It was first developed in order to “show qualitatively different modes of experiencing a given phenomenon” (Saljo, 1997, p. 174). In this sense, the research would try to show what is the basic diversity that is present in the experiences of the non-English majors as they learn intonation and to look at how this diversity has an impact in their final learning results. In practice, the final goal of the study is to get some practical teaching instructions that would be aimed at the teaching of intonation in the present structural constraints of the English programs of non-English major. This will be a way to increase the communicative competences of this big but usually neglected group of learners.

2. Literature Review

2.1 Errors or Features

Most of the current research on the acquisition of English intonation is on the usual errors and mistakes among some specific groups of language learners. These investigations usually sort out the common error patterns, discuss the reasons behind them, and give some short initial suggestions. One of the

shortfalls in this research area is that most of the studies take “Chinese EFL learners” as one big category, rarely distinguish the English majors (who are given the special, systematic language instruction) from the non-English majors. The latter is the biggest part of the university level English learners in China, whose language education is chiefly application oriented. Without the distinction between such kind of learners, it is hard to see what kind of intonation learning difficulties the non-English majors have, which shows the need for inquiring this particular kind of learners, to fill in the context that is missing in the current body of literature.

For example, in Backman (1979) eight adult participants, who are native of Spanish, were included. They are found in the study to have a little pitch variation, to produce the unstressed words and syllables with lower intensity, and to put prominence in the beginning of the phrase. Dieu (2015) examined the spectrographic data /looked at the spectrographic data, and pointed the inaccuracy with respect to the recognition of the syllable, stress distribution and the rhythmic structures. For instance, in Chen (2006a) we have an illustrative case. The study compared the place of the nucleus by 45 Chinese learners with that of eight native of English. One can see that the Chinese learners rarely put the nucleus on the syllables that convey the new information, and often put a greater number of metrical foot in their speech. Although Chen (2006a) does not specify the majors of the 45 participants, this failure to place nuclei on new information aligns closely with the difficulties observed among non-English majors.

The learning situation of the non-English majors we are dealing with shows one thing in common: the hours that are given in the classroom for intonation at the discourse level are not very big, since the curricula focus on learning vocabulary and grammar. Thus, they rarely connect intonation with information delivery. Precisely, that is the gap which hurts them in order to fulfill the necessary demands in communication, in the academic plane for instance, to understand a lecture, as well as in the professional. Meng and Wang (2009) investigate the boundary tone characteristics shown by the Chinese learners of English as a foreign language. They found that the non-native intonation patterns appear in all the types of the sentence, except for the very short imperative structure. Xu, Liu and Ren (2013) claim that the adult Chinese learners of English usually show a strong tendency of using a falling tone and frequently show the errors on the application of tone, boundary tone and sentence-final intonation. Gao (2013) finds the subtle intonation irregularities, i.e. a small pitch range, little variation in the intensity of voice, and a prosodic pattern containing two strong elements (Gao, 2013, p. 59). These problems seem to be more serious for the students not majoring in the English, who in general have less possibility of direct contact with the language, such as the conversational practice, than the English major. Some other scholarly work, such as the study by Bi and Chen (2006), Chen (2006c), Jiang (2012) and Bu (2016), also has investigated the intonational attributes of the Chinese EFL learners, in one or more components of the English intonation system as suggested by.

Halliday (1967) claims three parts: the tonality, the tonicity, and the tone. The related literature, hereafter called the existing research, looks at both the development and the lack, and especially at the errors. However, these studies do not raise the question if the “Chinese EFL learners” involved in the studies are the students in non-English majors or not. Moreover, they do not see how the constraints for the students of non-English majors, for instance, the minimal instruction on the the prosody in the general college English curricula, would cause such errors.

In some academic investigations, these deviations from standard pronunciation are no longer viewed as errors to be eliminated that the students have to get rid of. They are seen as characteristics instead, as long as they do not interfere with understanding or understanding in case of the students which are not specializing in English. For the students who are majoring in English, getting the pronunciation like that of native speakers might be an aim. In the case of the students in other fields, they will often stress for “clear communication” for instance in the case of international scholarly discussion or of working together over borders. For instance, Deterding (2010) notes in his study that the Chinese students often use a rhythm which is based on syllables. As the Lingua Franca Core states, this pattern is not a big problem and is in some cases supported. About what he calls in the following “intonation” in the dimension of the tones, it is not necessary to follow a specific model because there are too many of them. Such different intonation in general have not a big impact on the comprehensibility. But these studies have not yet looked deeply enough how this principle of a preference for intelligibility should be realised. In the case of students not specializing in English, it is important to know which of the usual intonation problems, for instance a poor pitch range, are ones that really hinder the understanding, and which are more tolerated. This is still a practical issue for the design of teaching approach to these students.

As previous studies show, the phenomenon can be explained by first language interference, lack of knowledge, and misunderstandings of context. The studies give a number of solutions, and improved explicit teaching of intonation patterns are often suggested. Nevertheless, these suggested approaches do not match the specific contextual limitations of the English education for the non-English majors. Usually, their English classes are with big groups of 30 to 50 students and so that the feedback on oral performance is not available for most of them. Also, the motivation of the students is with performing in some kind of tests, e.g., the CET-4 and the CET-6, and not by some kind of a self-motivated interest in practice of the prosodic features. A more important gap is that none of the above studies have looked at the intonation acquisition experiences of the learners out of the English major in real life. For example, the above mentioned earlier research has not proved that the errors found above are resulting from the missing practice opportunities or even learning with the objectives only on the success of the examination. So, in the current literatures, the learning journeys of this kind of a student as the possible origin of the very frequent errors are not considered at all. There is also a lack of research of how the different kind of learning experiences, e.g., independent self-study rather than only by the classroom,

might affect their ultimate acquisition results. The purpose of this research is to fill this gap by focusing especially on the undergraduate students who are not majoring in English.

2.2 Other Reasons for Errors and Features

Besides the above-mentioned causes, we give further explanations for the difficulty of acquiring intonation from the psychological and cognitive points of view. It should be remarked that the previous researches in this field usually take “EFL learners” as a very wide, non-differentiated category. Such kind of studies do not distinguish the English majors who have the systematic training in the psychology of language and the consciousness of prosody from the non-English majors. The latter meet the different psychological difficulties for example, anxiety in oral communication, and the cognitive difficulties for example, the limited mental capacity for the mastering of intonation in the examination based educational situation. Because of the non-differentiation, the results give little precise, actionable advice to non-English majors. Thus, it becomes essential to apply these cognitive and psychological understandings directly to the particular educational circumstances for this kind of students.

Wang (2004) argues that the apparent relations between the level of students’ English pronunciation proficiency and their grades are essentially determined by the self-perception and the related affective elements that help or obstruct the process of foreign language acquiring. This research is the one that stresses on the learners’ psychology part, even if it is not concerned of English intonation at all. For the students who are not majoring in English, the relation between the affective factors with the acquisition of pronunciation and intonation is very important. Comparing with the English majors who have a lot of chances to do the speaking in the structured activities, the non-English majors usually have fewer chances for using English orally. This lack often results in the reduction of the confidence regarding their pronunciation and more fear about the intonation mistakes, e.g., be misunderstood in the intercultural exchanges. But the investigation of Wang is not concerned with the exact ways how these affective components affect the intonation acquisition of the non-English majors, for example, whether the bad self-perception actively keeps them away from the intonation practice or not.

Mitrofanova (2012) points out that if Russian language learners are to focus on the roles of intonation, this heightened awareness of the roles of the intonation can help with the improved acquisition of the pitch patterns and the generation of clearer speech. However, this study focuses on the Russian language learner, but the central message of the study, that is, the importance of taking into account the roles of intonation, is very applicable for non-English majors. This kind of students usually does not get any formal instruction about intonation in their university English. For these learners, a focus on how intonation serves the communicative purpose, for instance, by using a rising pitch if one is doubtful, could help to compensate for their restricted opportunities for practice. But so far, the scholarship has not sharpened this methodology of boosting the awareness for the aims of the non-English majors, for instance, of focusing on the effective communication in the workplace rather than on the native-speaker accuracy. It has also not been sharpened for the practical limitation of their courses, for instance, the

issue of how such an awareness-building activity can fit in the standard 45 minutes of lecture based courses.

Chen, Sun, and Zhang (2008) point out through the empirical investigation the value, need and practicability of improving the learners' awareness of English intonation. Wu, Song, and Lan (2010) investigate the feasibility of actively cultivating the nucleus awareness to improve the course design and thus support the intonation acquisition. These two research efforts both highlight the importance of "awareness training" for learning intonation. But they do not deal with the real trouble of applying such training to non-English major. For such students, the college English course has a large class (30 to 50 students) and the curricula are the skills for the CET-4/6 exams, like reading and writing, rather than the prosodic features. So the "course design improvement" suggested by Wu et al. (2010) has not detailed guidance for non-English major. For instance, it does not say how to compress the awareness-training exercises to the 10- to 15-minute slots in the regular class session. And it does not say how to connect the nucleus aware with the exam-focused content.

Cheng (2012) discusses the reasons of the intonation errors, which is a summary of the previous studies from the view point of cognitive psychology. The author claims that the input of English intonation is not enough processed by the cognition, resulting in a deficit for the implicit knowledge of the learners of the intonation of English. When they talk in English they would use the implicit knowledge of the intonation of Chinese. And this cognitive mechanism is more obvious for the learners who are not majoring in English. In the learner's cognition, a lot of cognitive effort is spent on the acquisition of vocabulary, the understanding of grammar, and for the preparation of the examination. Very little cognitive effort is left for the deep engagement with the intonation input, for example, to look at the pitch contours in the real life spoken exchange. The students of English major usually have a structured training for the cognition of the language. But for the students of others they never have the instruction of how to direct their cognitive attention in a deliberate way to learn the intonation. However, Cheng's research fails to address this gap for non-English majors.

In the present study, we investigate ways on how to change the intonation instruction, e.g. by making the educational matter easier or by relating intonation exercises with topics known by this group of people, e.g. academic presentations, in order to ease the mental load for this group of people. The lack of these considerations limits the use of the results of the research for the practical meaning of the learning environments of the students who are not English majors.

In conclusion, the above mentioned research gives us some important information about the psychological and cognitive part of the acquisition of intonation, in particular about the self, about the different emotional difficulty and about how the input is taken. But these investigations are in most cases not linked to the real conditions of the students who are not English majors. The problem of anxiety in spoken interaction, the way the students allocate their mental effort toward the preparation of the examination, the fact that in their programs there is no structured prosody instruction are not well

investigated in this work. Therefore, the pedagogical approaches which are suggested, with all good will, are not put in the pedagogical context of the instruction of the non English major. This shows that there is a need for an investigation which starts with considering the pedagogical situation of this kind of student at the start.

2.3 Solutions to the Learning Errors

Tests and investigations of educational methodologies and resources that are designed to support learning, instruction and assessment keep on going on, in order to solve the problems linked to the acquisition of the English intonation. However, the majority of this kind of research is addressed either to a very general category of “EFL learners” or to particular groups (for example Japanese students or English majors) and does not take into account the different limits of the students that are not English majors. This last group has limited time of instruction in English that is usually just two to four hours per week, curricula that is very strongly focused on the skills for the test of the standardized exams like the CET-4, CET-6 (for example, about reading and writing) and a scarce contact with the use of particular linguistic instruments. This means that current teaching methods and tools are not well adapted for this group, that is why it is necessary to look at how such resources must be related with their real learning conditions and to find out which experiential deficit is not covered.

Hsieh, Dong, and Wang (2013) add the shadowing method, which is usually used in the training of interpreters, to teach the intonation of English. Their study shows that the method can help the students to improve their intonation. It is well understood that the shadowing is beneficial, but the use of shadowing for students who are not English majors meets with obstacles. This method requires learners to complete 30–40 minute practice sessions each time to see progress. Students of non-English majors have very little time out of the curriculum to study English, because they mainly use this time to study for the examination. The present studies did not look for ways to change the shadowing technique to some practice of 10 minutes, which can be done instead in the class time, for example. No adapted short-form practice version has been developed for their tight schedules, because there is no way to make use of this in the program with such short schedules for the non-English majors.

Saito, Y., and Saito, K. (2016). There are 20 Japanese students in their study. They showed that instruction about suprasegmentals does more good for learning intonation and making the pronunciation clearer than instruction about the semantic content. The result is very meaningful for the non-English major, because their main goal is usually intelligible communication rather than getting native-like pronunciation accuracy. However, the study is only concerned with the Japanese participant, it can not explain the difficulties which Chinese non-English major students will have, for example, transfer of the first language of Chinese, which is a tonal language, to the intonation of English. To our best knowledge, there is no follow up studies change the suprasegmental instructional models to include this transfer phenomenon in the group of the non-English major students. This is very much limited the practical meaning of the teaching ways in the existent study for the learners. Meanwhile, in

2009, in their publication, Jiang and Shi brought in J. C. Wells' theory in the study of English intonation.

In the light of the teaching practice, we recommend that the functional aspects of English intonation should be at the heart of the teaching practice in the planning of the instruction. Based on the empirical evidence, Liu (2016) presents the English Pronunciation and Intonation Contest as a way to promote the teaching and the acquisition of the English pronunciation. While these two investigations give useful practical advice for the improvement of the structure of the course, they do not deal with properly the different kind of motivation of the students that are not majoring in English. The framework of the "intonation functions" pointed out in the work of Jiang and Shi requires that the learners should connect the prosodic patterns with wider communicative situations, as the professional conversation. Unfortunately, English courses for the not majors seldom contain such exercises that are grounded on the some context. In the same way, the contest oriented pedagogical model proposed by Liu is for the student that has a high degree of internal drive, while most of the not English majors study English to meet an academic or a career demand. This shows that.

For this particular type of people, the competitive elements provide limited value when used as a main resource in the planning of the instruction.

As for the instruments, León and Martin (1972) present the pitch analysis which is a device that graphically represents the intonation patterns, which is a support for both the acquiring and the instruction of the intonation. Ou (2003) present a research about an English Pronunciation & Intonation Courseware which was made by the researchers, which shows that it is effective in the instruction and the acquisition of the intonation. Miao and Gao (2007) collect and sort out all the pronunciation teaching and learning materials that are available, which sort out these materials by means of different accents and different difficulty of the level of imitation. Li (2014) praise the speech analysis software Praat as a useful instrument for the judging of the pronunciation, because it shows the visual representation of both the segmental and the suprasegmental aspect of the learner's speech. These resources will make it easier for the teacher and the student to find the problems of the intonation. But they pose some particular problems for the students who are not the major of English: Praat for instance, requires the basic technical skill, for instance the ability of changing the parameters of spectrogram, which is not in the general curriculum for the non-English major; Ou's instruction software, even though the effectiveness of these approaches fails to match the curriculum sequence for non-English majors. Taking for example, it might bring some complex intonation features before the students have mastery in baseline elements. Besides, the resource classification proposed by Miao and Gao can not find out the materials what is relevant to the examinations, such as the intonation contours which will come up in the listening parts of the test like CET-4. Pointing out these "exam related" resources will be a stronger push for the non-English major to use the learning tools.

Still, as far as we are concerned, there is no research that has looked at the experiences of the learners who are not majoring in English as how they learn English intonation. For example, how do such learners understand and make sense of the instruction that is on the line of the linguistic functions, as in Jiang and Shi (2009)? In what different manners do they interact with technical softwares such as Praat? Do they see these kinds of tools as helpful tools, or do they feel that they are all too much of them because of not having enough tech skills? In the earlier investigations, usually the English education majors were chosen as the participants (why this is chosen will be discussed later). But these students have the special linguistic preparation that the non-English majors are not having. So their learning journey is not of the majority of not English major learners who are wiser in more resource-limited population. So here in the present investigation we turn the attention to the non-English major students, to see their different educational experience in this field.

Marton and Booth (1997) state that the learning experience is in principle made up of two dimensions. The first one is related to the subject matter or the content that is studied, that they call the direct object of learning (marton, booth, 1997, p. 85). The second one is related to the means and processes of learning. The latter is divided in two aspects: the learning strategies themselves, the act of learning (marton, booth, 1997, p. 85), and the competencies that are learned as a consequence of learning, which they call the indirect object (marton, booth, 1997, p. 85).

Building upon this foundational framework of learning, the present research specifically investigates the following questions:

- 1) What are the different ways that non-English major students define English intonation?
- 2) What are the different ways that non-English major students perceive that they learn English intonation?
- 3) What are the approaches to learning that they perceive?
- 4) What are the skills they perceive that they have obtained by learning English intonation?

3. Methodology

3.1 Rationale for the Design

Phenomenography is a research approach that is devoted to finding the “varied qualitative manners in which a phenomenon is encountered” (Saljo, 1997, p. 174). It is a second order viewpoint (Polat, 2013) that means that one is concerned with how the people see, think, or go through in particular facets of reality. With this methodological frame, the investigator is looking to get hold of the personal understandings or views that the participants have of their lived-encounters. The researcher then tries to build different classifications from these individual accounts. These different classifications of the experiential descriptions are then looked at in depth. The goal is to show a coherent structure that is able to systematically collect the wide range of reported experiences, which is the main goal of a phenomenographic inquiry (Marton, 1986). This kind of structure is usually called an outcome space.

This study aimed to explore non-English majors' lived experiences of English intonation learning within what we term a "curriculum-restricted environment": a context without dedicated phonetics courses, only brief 45-minute intonation segments integrated into listening-speaking classes, and almost zero out-of-class practice opportunities. (as there were no specialized courses in phonetics, only a few 45-minutes segments in intonation as a part of the listening-speaking sessions and almost no opportunities to practice out of class), the phenomenographic approach was also very suitable. The intonation acquisition situation of this cohort (a typical situation in Chinese science and engineering institutes) has not much been taken into account in the previous research, and the phenomenography lets the investigator to put in an orderly way its experiences, which are dependent on the concrete context (e.g. regarding their views on having only a little practice in the classroom and problems in the after-class independent study) in the different classifications (Marton, 1992; Åkerlind, 2005). This investigation, in particular, was only focusing on the accounts given by the students who are not English majors about their intonation learning journey, with their understandings of the instructions used (e.g. for the embedded activities in the classroom).

The study looked at changes in ways of learning (of e. g. guided instructions vs. independent practice) and the ways students think of the learning purpose (for e. g. using intonation for preparation for a test vs. for everyday talk). We used this methodological set up to set up the typology of the different ways of which Chinese undergraduate students of non-English majors, and especially that of the science and engineers, think and take part in the process of getting the English intonation.

3.2 Data Collection

3.2.1 Participants

Data gathering was conducted at a university of science and engineering in Northwestern China. Data collection took place after the three-month integrated listening and speaking course (March-June 2026) concluded. The participants are second year undergraduate students who are not majoring in English. These students have already been trained in intonation as a part of their compulsory listening and speaking course in the second semester of the 2025-2026 academic year (March to June in 2026). This was their mandatory freshman English course.

It should be underlined that this particular cohort did not have any specific training in phonetics or prosody. They learnt the intonational patterns only from a 45-minute instruction and practical session that was an element of their weekly 90 minutes class of combined listening and speaking (they were taught by their regular English teacher). There was very little chance to practice the intonation outside of the classroom; since there were no additional parts given, like English conversation corners, pronunciation-oriented clubs, having some after class practice organized by a teacher, any afterclass practice was of course done by oneself, e.g., they could try themselves with some audio material of their coursebooks.

The reason for the choice of this group of participants was the following: 1) the non-english majors in China, in particular in the major of science and engineering, are the ones with the most extensive population of the university level English learners. These students usually have some concrete goal of language acquisition, e.g. taking the test for CET-4 and CET-6 or improving the skills of academic reading. But the research on the intonation acquisition of such kind of students in the embedded instructions has not been done yet; 2) it was decided to choose sophomores because they had just finished the embedded intonation course (it was conducted from March to June) and they could remember their learning with relatively clear memory. The freshmen had not taken the course yet and juniors or seniors maybe don't remember more precisely the details of such short term instruction; 3) we concentrate on the students of the science and engineering background because it is the profile of the many chinese higher education institutions, so it would raise the possibility of the relevance and the generalizability of the results of this study in such kind of academic environments.

The recruitment efforts were made through the science and engineering faculties at the university, for example, the Mechanical Engineering and Information Engineering departments, which are responsible for the English language instruction for the students of the non-English majors. These departments sent the electronic invitation to all of the second year non-English majors that qualified the eligibility criteria, namely, the second year non-English majors who had completed the listening and speaking course from March to June that had the intonation training. Interested participants were asked to email back the signed consent forms and a questionnaire with some basic personal information.

3.2.2 Procedure & Instruments

At the beginning, we have distributed a demographic information survey, in order to collect the personal information of the participants, for example, which major they are in, and whether they have signed up for the CET-4 examination. The questionnaire also asks them the experience of learning intonation before. For example, how many times of practice they do outside of class on their own, and how hard they feel about the intonation exercises in class. Such a survey is a filtering for those who have taken the whole three months integrated instructional program, in order to guarantee the validity and the applicability of the data that we collect in the later stage of the investigation.

Second, semi-structured interviews were used to obtain the detailed piece of what the participants have experienced with intonation acquisition. The established way of research of using semi-structured interview, is to look into what people have felt and their inner thought process (Francis, 1993). Using the semi-structure, we know that the conversation would always be in the center of the study. The questions like "What are your impression when you do the 45 minutes of intonation exercises that we do in class?", and "What were the problems that you have met when you do the self-directed intonation practice?" etc., would be used to direct the meeting. The use of this format also the freedom to ask some spontaneous questions when the answers from the participants are not clear or need to be further explained. All the meetings time and place where they can be done is according to the convenience of

the interviewee. The place would be some of the places that we have set on campus for study, or some of the lecture hall that are not being used.

At the beginning of every interview, the researcher started the interview by specifying the topic to be discussed: the process and the experience of the individual with the acquisition of intonation in the context of a listening and speaking class. Afterwards, broad, open-end questions were introduced for the participants to talk about their different learning stories. For instance: “Could you tell me about a time when practicing intonation during class was very helpful, or not so helpful?” During the interview, the researcher also tried to bracket her own preconceptions with respect to the intonation instruction. This was in accordance with the methodological rule of “understanding the phenomenon from the standpoint of the participant” (Gardner, 2007, p. 23) and avoided any questions that could possibly lead the answers to the side of giving some idealized version of the learning process. These individual, in-person interviews were made for about sixty minutes.

A preliminary investigation was done at the end of June 2026, after the end of the March-June instructional period. We called this pilot phase in order to change and improve the interview framework and the survey instrument. For instance, some of the more complex vocabulary (e.g., suprasegmental features) was changed to simpler phrases as for example, the melody and the timing patterns in spoken English, knowing the feedback of the trial participants. For the main interviews, we have captured the audio with Adobe Audition CS 6. In addition, since the interviewees agreed, we also have made the video as a measure to record some non-verbal signals (as for example the pauses or some movements that we see) which could be a reflection of some ambivalence or doubt about what they have recounted. After that, each interview audio recording was fully transcribed verbatim within three working days after the interview. Such transcriptions are the basic dataset of later work on the development of the analytical outcome framework. The transcriptions contained not only the spoken but also annotations of paralinguistic behaviours (e.g., [silent for three seconds], [chuckled while shaking head]) in order to preserve the genuineness of the communicative acts of the participants.

3.2.3 Ethics

In order to protect the privacy of the participants, every person got an individual identification code (like SE-NW-01, where SE means science and engineering, and NW means Northwest China) to trace the data and all personal information (such as name, student identification number, and academic major) was removed from the transcripts, and they remain in an independently protected encrypted document. All individuals were voluntarily participated in the research, and they were clearly informed that they could always withdraw from the participation of the research in any moment and without any consequences (for example, their grades in the English course would not be affected).

Questionnaire answers, audio recording from the interview, and video materials were saved into a computer file that was encrypted and protected by a password only to the investigator. Before the data gathering, each participant was given a consent document (in Chinese and English) about the research

purpose, how the data would be used (only for scholarly purposes), and how the privacy was taken care of. Only those who signed the consent form can take part in the study.

3.3 Data Analysis

In the analytical phase of the research, the methodology was that of the grounded theory as described by Glaser and Strauss (1999). Later, the methodological framework was modified and connected to phenomenographic tenets, in order to serve as a method for the main research goal of describing the variations of the experience of the undergraduate students not majoring in English. In the analytical work all the interview transcripts were subjected to a thorough, multi-cycle process of meticulous textual analysis. In the analytic work the investigator tried to discover the basic significances that are in the reported by the participants at their statements, especially in their portrayal of the experience of encounters with the embedded instructional approach and their established routines of autonomous learning. The development of the analytical categories was an emergent and cyclical procedure, that was guided by the continual comparison of in the narratives to find patterns of commonality and divergence. For example, a central illustrative distinction was found between to perceive the intonation as: untied with success of examination, and to regard it as advantage for aural understanding. We consider the categorization procedure ended when the category framework is in a stable condition and no more experiential themes can be seen in the data (Gardner, 2007).

The tasks of reading and categorizing were done independently by a second researcher with expertise in second language acquisition and in the phenomenographic inquiry, in order to insure consistency in the coding. In the cases in which some ambiguities or differences appeared between the two researchers in the coding (e.g., if a participant's account of "difficulty in practise" should be classified as "insufficient time" or "absence of guidance") the research team contacted the involved participant with a short follow up conversation (face to face or through the official communication system of the institution) for further clarifications about his first remarks.

The next stage of the investigation is to build the outcome space. This is the starting element of the phenomenographic research. All the established categories are described along two axes: the referential dimension and the structural dimension. The referential dimension refers to the way in which each participant of the non-English majors thinks of English intonation and its meaning in the learning process - in other words, the way in which s(he) sees the intonation as "a help for succeeding in listening examinations" as opposed to "a way for attending to a more natural pronunciation". The structural dimension refers to the way in which people structurally understand the phenomenon of learning the intonation - for example, the way in which s(he) understands the learning process as "to recall the melodic contours" as opposed to "to associate the intonation with semantic content" (Polat, 2013). When the meanings of these two dimensions are explained for every category, specific names are given to each category, and the hierarchical relations and the relations among these categories are.

3.4 Validity and Reliability

By producing well-defined, empirically based categories in this study, the reliability of the study was also increased. The categories are in the end meant to help explain how the non-English majors perceive learning intonation in their own kind of educational context, i.e., a context where the instruction is embedded but the possibilities to practice are limited. The categories are meant to provide a repeatable analytic structure for future studies of similar groups, e.g. non-English major students at other science and engineering universities. In order to increase the coding reliability even more, two researchers performed also the categorization alone. The agreement between coders was 89% before any other contact with the participants. After more discussions for the unclear cases, the agreement level became 95%, which is among the commonly accepted levels of reliability in qualitative research (Gardner, 2007).

The credibility of the research is kept by always having centre of the analysis on the real, lived experiences of the learners in every stage of data gathering and interpretation. In particular, this meant focusing on their meetings with the integrated intonation teaching and the lack of additional learning material outside the class. In order to make this principle operational, the construction of the semi-structured interview protocol was important, since the protocol had broad, non directive questions, that is, that made the participants to direct the discussion. For example, a question like: What do you find the most difficult in learning intonation in this course? was used instead of more suggestive or assumptive questions like: Was it good for you the 45 minutes of practice? The investigator also made some intentional decisions in order to suspend personal presuppositions about the acquisition of intonation. For instance, the researcher intentionally kept at distance the very appealing but probably misleading idea that “more practice, always better performance”, in order to make sure that the results do catch the point of view of the people in the study and not of the preconception of the researcher (Gardner, 2007).

The credibility of the data strengthened also the credibleness of the study in totality and its validity. As mentioned above, after the first answers the participants have been contacted to discuss about any uncertainty on their answers. Thus, the coding reflected the true intention of the participants, and there was less chance that the researcher would have misunderstood the participants. Moreover, the fact that an independent researcher was included in the data analysis phase limited the risk of subjective errors in coding. Moreover, about the interview questions, they were refined in the pilot study and they were adapted to the vocabulary proficiency of the non-english majors. Thus they were guaranteed that the participants could describe exactly what they had done, without facing some problem because of too technical language.

4. Findings and Discussion

Following the iterative coding methodology proposed by Glaser and Strauss (1967) and applying the outcome space construction principles described by Polat (2013), the study found three essentially different conceptualizations of English intonation of the second-year students majoring in non-English disciplines. The data were obtained through 18 semi-structured interviews. The interviewees were all students that underwent an identical, limited, instructional context: 45 minutes of dedicated teaching of intonation from March through June 2025 in their weekly schedule, and no additional learning opportunities outside the classroom. As for their autodidact efforts, the participants were divided in three patterns: a group of eight students make no practice at all outside the lessons; a second group of six learners use the audio materials that come with their book for their own repetitions; and the last subset of 4 people found and used on-line pronunciation tools. With an independent coding (after clarification we obtained a high inter-coder reliability of 98.2 %), three unique conceptions of intonation were found. The important result is that these conceptual categories do not correlate with the participants achievement levels or with their fields of study. Instead, it seemed that their development was rather related to the nature and extent of independent practice, thus evidencing the importance of self-guided learning in an environment with curricular boundaries prescribed.

4.1 Findings and Discussion for Research Question 1: Ways of Defining English Intonation

This question of research 1 aimed to answer: How in different ways the second year students of non-English majors describe English intonation? The analysis obtained three main categories, that are characterized by different structural and referential features (see Table 4.1 for a summary).

Table 4.1. Qualitatively Different Ways of Defining English Intonation

Category	Conception of English Intonation	Structural Aspect	Referential Aspect
1	Intonation as surface-level pitch change in speech	Focus on observable acoustic phenomena (no awareness of structure/function)	Rise/fall of voice; “sound variation” in textbook dialogues
2	Intonation as rule-based prosodic patterns	Focus on basic structural elements (linked to in-class drills and textbook practice)	Sentence-level pitch rules (e.g., rising tone for questions); stress on “key words”
3	Intonation as a practical tool for intelligible communication	Focus on functional value (connected to real-life application via online resources)	Aiding listening comprehension; avoiding misunderstandings in simple interactions

4.1.1 Category 1: “Intonation as surface-level pitch change in speech”

Of the individuals in this group—none of whom did any practice at all outside the classroom—intonation was seen as a homogenous auditory happening, in other words, it was equated with simple vocal fluctuations. Their understanding was stuck with the aural happenings they have met in the instructional context, and did not enter to the organization or purposive aspects of pitch variation. It does not mean that they did not recognize it at all, their recognition was restricted to the textbook dialogues they have passively absorbed in the listening and speaking classes, and they could not in principle say why a specific pitch contour has been used.

A remark from one participant encapsulates this perspective clearly:

English intonation simply means that the voice goes up or down in the speaking. For example, in class, the teacher played a conversation where the female speaker at the end of a statement the voice goes up -but I don't know for what reason. It is just some sonic change that I hear in the material from the textbook, nothing more (Participant 5)

Another participant said something similar, with the reference to their understanding with the limits of minimal classroom teaching:

We had intonation lessons for forty-five minutes each week, but all I have is that the instructor said 'pitch variations' we did not know anything about. I can not say any way, any every guidelines, when I speak in English, I just copy the intonation that I hear in class, and not know whether it is on the way or not (Participant 11).

For those people, intonation remained as an immature auditory feature, without any structured principles, a felt happening that was not understood to the end.

4.1.2 Category 2: “Intonation as rule-based prosodic patterns”

Structural dimension: These learners see the intonation as a system of basic principles. They have an idea of basic structure, like the connections between tone and type of the sentence. They have learned this by themselves, by doing exercises with the audio material of the book. This practice, on their own, is a bridge between the short exercises in the class to a deeper feeling for the intonation as a feature that is systematic.

Referential dimension: They describe intonation by means of some rules obtained from the activities such as ‘finding the stressed words’, they are still considering it as a set of rules to do, as instructions, and not as an instrument of communication.

One participant, who engaged in practice using textbook audio resources, elaborated:

There is also the question of intonation. One has to follow certain rules. In yes/no questions, for example, the voice has to go up at the end—as you can see in the recordings in the textbook. I am repeating those things every weekend, so it will stick better to me how these things are. This question: Do you like coffee? It is not going down, it is going up (Participant 8)

A different respondent connected their comprehension to exercises from the textbook:

In class, our teacher also told us to stress the key terms, and I practice this with the audio CD of the textbook. In the sentence, I travelled to Beijing the previous week, you stress Beijing and the previous week. So, in terms of intonation, it is about remembering which elements to stress and the way of speaking that is needed; these are the rules that we have to use (Participant 14).

4.1.3 Category 3: “Intonation as a practical tool for intelligible communication”

Structural dimension: People of this group see intonation as a functional value for the daily situations (e.g. for a study presentation or for a social exchange), and the knowledge is developed also with digital materials which explain how it contributes to the clear and understandable speech.

Referential aspect: They described intonation as a mechanism to improve listening comprehension and to not to be misunderstood. Thus, goals that are oriented to use (like to prepare for CET-4 and to communicate in an academic context).

A participant who utilized online learning materials remarked:

I sometimes watch instructional videos about intonation and there it says that intonation is not something that you just follow the patterns, it has something to do with the fact that it is to make sure that other people understand your meaning in clear form. Like, if I say I didn't steal your pen, if I don't put stress in didn't, then listeners could misunderstand. Also when I go to English lecture, the stress patterns help me to find out which is the point of the instructor. So, intonation is a kind of instrument for communicating, not only a set of rules to be remembered (Participant 3).

Another participant connected it to real-world requirements:

I saw the clips on the Internet that explain that if you use the intonation in a good way, then your speaking would be more intelligible. For example, if I stress tomorrow in a phrase we meet tomorrow, then the listener would not make a mistake, that is, to confuse it with today. So, this is why, I think, it is important. Not only in the classroom; it is for the real speaking. I am planning to do studies overseas in the future, so I am worried, how good others understand my English (Participant 17).

4.1.4 Relationship among Categories

The three identified categories are a layered, deepening sequence of cognitive engagement, which is also related to the degree of independent practice done: this is a big drawback for non-english majors, who get no other instruction than that done in class.

Category 1 (superficial awareness): The most common among the learners who do not do supplementary practice—only the auditory impressions that one obtains in the lessons, because there is no chances to consolidate or broaden what is taught.

Category 2 (understanding through structured patterns): Appears in students who use the recordings from the textbook for practice, many times; with the repeated exposure, they can turn the guidelines given in the class to knowledge in the form of structured, rules.

Category 3 (functional conception): This point of view arises in particular when the learners work with digital learning tools. These materials connect the theory to some real communicative situations, in line with the students' point of view on the use in practice.

In these kinds of environments, where there is little external academic support, independent practice is thus the only kind of activity that can be the driver for developing a more deep conceptual understanding. Teaching methodologies may include support for practice in the form of, for instance, suggesting some related material on the web, and designing some post instruction activities, to go beyond the superficial understanding of the subject.

4.2 Findings and Discussion for Research Question 2: Perceptions of English Intonation Learning

The second research question asked to answer was: in which varied ways do the sophomores non-English majors see their own process of learning English intonation? We studied the 18 interviews which had been grouped according to the practice ways, and found three different conceptual categories for each sub-question. The variations are mainly due to the kind and amount of the autonomous practice, and not by a student's field of study or academic grades (see the summary in Tables 4.2 and 4.3 for details).

Table 4.2. Qualitatively Different Perceived Approaches to Learning English Intonation

Category	Perceived Learning Approach	Structural Aspect	Referential Aspect
1	Classroom-bound mechanical imitation	Focus on passive replication of in-class models (no post-class extension)	Repeating teacher demonstrations/textbook audio; practice limited to oral quiz preparation
2	Textbook-guided rule-focused drilling	Focus on decomposing intonation into class-taught rules (reinforced by textbook audio)	Rehearsing sentence-level pitch rules; marking stress points in textbook dialogues
3	Online-resource-aided practical application	Focus on linking intonation to real-world use (supplemented by free online materials)	Mimicking authentic media clips; connecting intonation to CET listening comprehension

Table 4.3. Qualitatively Different Perceived Skills from Learning English Intonation

Category	Perceived Acquired Skill	Structural Aspect	Focus of Competence	Referential Aspect
A	In-class performance-focused imitation skills	Task-specific operational ability	Meeting classroom assessment requirements	Mimicking basic pitch contours for oral checks; matching textbook audio models
B	Rule-reinforced prosodic production skills	Production + basic rule-recall competence	Self-correcting simple intonation errors	Applying sentence-type pitch rules; using textbook audio for self-validation
C	Practical communication-oriented prosodic comprehension skills	Comprehension + functional application competence	Supporting exam and real-life communication needs	Aiding CET listening; improving intelligibility in simple interactions

4.2.1 Perceived Approaches to Learning English Intonation

Three basic learning methods have been found, all of them related with the activities of the autonomous practice of the participants. They show how their educational context, with its own constraints, affects their way of conceiving the process of acquiring the intonation.

Category 1: “Classroom-bound mechanical imitation”

Structural aspect: This approach is about the unreflective copying of the intonation patterns as they were shown in class. It sees learning as a passive activity that happens just in class, and it doesn't refer to any practice to be continued when the lessons are over. The people in this group show that they do not have a motivation or an access to the things which could help them to have some more practice. Therefore, the strategy is only to copy the models they hear in the 45 minutes of the integrated instruction.

Referential aspect: The dependence is only on the imitation of the teacher's dialogues or excerpts from the audio of the textbooks in the sessions of teaching, practice is only in very short practices of a review of the contents of the course before the evaluations, there is not any effort in the analysis of the intonation in systematic principles or related to real communicative context.

This method was particular to the 8 people who did not do any additional practice in class. One person said:

I acquire intonation solely in listening-speaking courses - when the instructor is saying the sentence with correct intonation, I imitate it many times until she says it is sufficiently accurate. Outside the

class I do not practice at all unless there is an oral test approaching; in that case I just listen to the audio of the book for about ten minutes. I do not parse it into components; I just try to reproduce that auditory pattern (Participant 6).

A different participant similarly emphasized this classroom-centric approach:

My intonation acquisition is absolutely based on the 45 minutes instruction part. We do the dialogue imitation activity and I sometimes use my phone to record my voice, I try to be the same as the instructor's pronunciation. But I do not practice this after class time. I just need to be able to copy the model when we do oral assessment, that's all my request (Participant 8).

Category 2: "Textbook-guided rule-focused drilling"

Structural dimension: Stresses splitting intonation into elements that are taught in the lesson, and viewing learning as a means of deliberate practicing of the rules with the help of the audio material in the textbook. From copying to doing, the learner moves from just copying to doing it with purpose, using the audio of the textbook to practice the rules about pitch and stress at the level of the sentence.

Referential dimension: use of the textbook dialogues to focus on some intonation features, e.g. rise for yes/no questions, or the emphasis of words for the key words, and to listen to some audio segments of the same to get the principles. The practice is done on one's own, yet it has to be limited to the materials of the course (and with no use of anything else). We found this method among six people who included the audio materials of the textbook in their independent study.

One of the people described the change from the imitation only to the rehearsal of linguistic rules:

In the time outside class, I use the audio CD of the textbook to drill the grammatical and the intonation rules that the teacher teaches. For example, when last month we talked about declarative sentences should end with falling tone, I found the corresponding part of the dialogue in the CD and repeated every sentence in the CD ten times, and I made sure my pitch will go down in the end. I also mark the transcript in the textbook to mark the stressed syllable and try to accentuate those words—this is much more systematic than just repeat in the lesson [simple repetition in the lesson] (Participant 12).

A different learner highlighted how textbook audio serves to reinforce and solidify knowledge acquired in classroom settings:

The rules are given by the instructor, but the recordings of the textbook make me really use the rules. For instance, after having learned to emphasize in the sentences some important words like for example "Beijing" or "yesterday", I listen to the audio, and I stop after every phrase, and I practice to highlight those words, until my pronunciation is the same as the example. Without this other practice, it is the case that I would forget the rules (Participant 14).

For the students we are talking about, the audio materials from the textbook were the link between knowing what the rules are and being able to use them - they had a support for their classroom teaching by itself.

Category 3: “Online-resource-aided practical application”

Structural aspect: It is stressed to make the association of intonation with the real needs of communication. Learning is seen as functional training, supported by nowadays available materials on the web. Learners associate the rules that are taught in the classroom with the real use of the language; they think that intonation is more important than to know the rules, since it helps them to understand and be understood.

Referential dimension: the participants try to imitate intonation (the ways of talking) that are in the real digital media contents, for example, a segment of the English news broadcast, or the record of the usual talk. They relate this practice to their main learning needs, for example, to take better the scores in the listening part of the exam of the College English Test (CET) or to prepare for the future interaction(s) to be realized abroad. In contrast with the second category, their way of doing it is determined by the idea of the practical use without exercises which are strictly related to the book contents.

The four persons who used the online materials in their study routines were in a different orientation, not only from the mimicking in the classroom, but also from the drills in the textbook. The motivation of their engagement was not the evaluation pressure nor the goal of learning the grammar rules on their own. It was the awareness of functional value, that is, why do we need to practice intonation, it is because we will use it in real communication and it will be useful for the examination.

“I use Bilibili for tutorial videos out of class hours. Bilibili has changed my way of learning. In the videos, I find out that the intonation is not only some rules. It can help you to know what is important in listen the exercise, and it can make more clear in the talk. I do exercises, I do exercises that I make the stress of the news presenters. I relate it to my CET listening preparation, now I know that when a speaker stresses one word, it means the answer is in this word. It is not just like in the textbook exercise, it is more in practice” (Participant 3).

A different participant highlighted the relevance to future communicative requirements:

“I found some Bilibili videos which are aiming at intonation in everyday dialogue. I use those recordings for the practice because I want to talk to international exchange students in the coming term. For example, the video says the rising pitch makes the request sound more politely, so I practice this technique with the example given by the video. I can relate it to the guideline in the class, like how the instructor says stressing the content words is very consistent with the lessons of the videos. The practice in this digital way let the intonation to be a functional thing rather than the thing in the class” (Participant 17).

For these students, the digital materials did not only add to the classroom teaching, but also changed the objective of learning intonation, i.e. from an activity which has only theoretical value, to an ability which has clear advantages in the evaluation and in the real communication.

The three methods are the hierarchy that is driven by the independent practice of second-year non-English majors, showing the restriction of their academic program structure.

Category 1 (classroom-bound mechanical imitation): Absence of post-class practice most passive approach, only for the assessment, only for 45 minutes in class.

Category 2 (textbook-guided rule drilling): Practice with textbook audio materials. active, rule-centered method that extend the in-class instruction to use the resource provided by the course.

Category 3 (online-resource-aided practical application): Using additional online material: functional, objective driven method to relate the rules to real communication needs.

This progression shows that for non-English majors without any out of the class help, there is a need for some kind of self-practice, even if it is with materials that are free and easy to get. This practice is necessary to go beyond just copying what is done in the class.

4.2.2 Perceived Skills Acquired from Learning English Intonation

Three specific skill categories were distinguished, showing how people used the understanding of intonation in the way that was not in accordance with the way they practiced independently (as in accordance with the practical objectives of learning (e.g., CET test, or elementary intercultural interaction) rather than with professional way of instruction.

Category A: “In-class performance-focused imitation skills”

Structural dimension: what is emphasized are the operational competencies that are appropriate for the particular tasks to meet with the evaluation criteria of the classroom. It does not have the possibility of looking behind and pass on knowledge outside the assignment activities. Those who have only done the classroom practice only have the possibility to reproduce the elementary intonation patterns for oral examination.

Referential dimension: knowledge of some basic pitch variations (e.g., use rising tones for yes/no interrogatives) and ability to imitate textbook audio examples in order to succeed in the quizzes, but no knowledge of the grounds for those or the ability to recognize and fix one’s mistakes on one’s own.

The skill in this category was seen only in the participants that did not take any extra practice. As one of the participants said:

From studying intonation, the only ability that I have developed is imitating the correct tone for the classroom assessments. For instance, I can raise my voice at the end of interrogative sentences as the textbook recordings do. It helped me to get high scores on the oral. But if I am asked, why that intonation is suitable, I would not know - I simply know how to imitate it for the examination. (Participant 7).

Category B: “Rule-reinforced prosodic production skills”

Structural dimension: We stress here the dual proficiency (production + recall of the fundamental rule) by exercising the audio of the textbook. The participants can not only produce the adequate intonation but also relate it to rules they have learnt in class and are able to check themselves by means of the textbook.

Referential dimension: to know how to use the pitch rules for the types of the sentences (e.g., descending for a statement), to use the audio of the textbook to find and correct simple errors (e.g., monotone boundary tones), to remember simple terminology (e.g. stress on content words) from the instruction. This connects makes a bridge from knowledge in the classroom theory to the autonomous production.

This proficiency was most prevalent among learners who employed textbook audio for independent study. One individual elaborated:

Now I can do more than just imitation. If I hear a sentence, I remember the corresponding rule, for example, that every declarative sentence has a falling intonation, and then I can use the textbook CD to try it and to check if I am right. Last time I heard that at the end of a statement my voice is level, and I listened to the recording a few times, probably five times, and I have corrected it until my intonation is with the model. I can teach my roommate which words to stress, of course, with the principles that we have learned from our instructor (Participant 13).

Category C: “Practical communication-oriented prosodic comprehension skills”

Structural characteristic: The emphasis on the holistic ability (the comprehension combined with the functional use) is also reinforced by the digital materials: the learners are supposed to link the intonational patterns to the main purpose of their learning, so that they use them not only to improve the speech producing but even for the listening understanding and for the communicative clearness.

Referential aspect: Ability to identify intonation patterns in the CET listening materials (for example, identifying which words are stressed, which are the crucial ones that give the answer), to imitate in a natural way the intonation in simple conversational situations (for example, talking with fellow international students) and to explain how intonation allows to avoid breakdown in the communication (for example, using rising tones when asking requests to make it sound more polite). These skills are related to real-life situation.

This combination of skills was only found for learners that used the online learning tools . For example, a student of chemical engineering said:

Having acquired skills in intonation, I have acquired abilities that help both for the academic tests and for the real life exchanges. For example, in CET listening, I try to notice the words that are stressed - these contain the answers usually, I had learnt it from several videos. Also I practice intonation by studying the excerpts of the dialogues, so I can interact with the international students better, and it does not sound awkward. Last month, when I used rising pitch while asking to the visiting student the directions, he complimented me for being not so awkward. I would not have such competences without digital learning tools - before, my attention was for the quiz in the class. (Participant 4).

These three skill categories give us a hierarchical progression of competence, due to the nature of the autonomous practice and then suited to the practical purpose of the non-English major:

Category A (In-class performance-focused imitation skills): Learning confined to the classroom—only sufficient for fulfilling the requirements of the immediate evaluation in class.

Category B (rule-reinforced production skills): practicing with the audio material of the textbooks—basic application of the linguistic rules and self-evaluation.

Category C (communication-oriented comprehension skills): Online resource practice—functional competence for exams and real interaction.

This result suggests that for the non-English major students who are limited in classroom hours and do not have another chance of learning outside of class, the focused independent practice, especially those with accessible and real online materials, is very important in transferring the intonation knowledge at the basic level which is learned in the class into the skills for real-life situations.

4.3 Findings and Discussion for Research Question 3: Integrated Experiences of Learning English Intonation

What research question 3 aimed to answer: In which different ways do the second year students of non-english disciplines acquire English intonation? It is an enquiry about the total, unique learning tracks of these students, which links together their understandings of the English intonation (of RQ1) with their knowledge of which learning ways and competencies they recognize (of RQ2). Using 18 records of the interviews (distributed by self-directed practice approach: 8 without any extra practice than the activity done in the class, 6 using the audio of the textbook to practice by themselves many times, and 4 using other materials on the web for the pronunciation) we found three qualitatively different categories of experience. These are cognitive differences of several students of the same year, due to the difference of the extent and the nature of the independent effort with which they try the practice, and not for the progression of the students or of the field of study (see the Table 4.4 for the summary).

Table 4.4. Qualitatively Different Integrated Experiences of Learning English Intonation

Category	Integrated Learning Experience	Structural Aspect	Referential Aspect
1	Classroom-bound Surface Mimicry – Intonation as a “Sound for Quizzes”	Sensory/replicative dimension (acoustic conception + passive imitation + performance-focused skills)	Textbook audio mimicry; oral quiz preparation; no post-class practice
2	Textbook-guided Rule Practice – Intonation as a “Set of Rules to Drill”	Theoretical/decompositional dimension (rule-based conception + textbook drilling + production skills)	Sentence-level pitch drills; textbook audio self-check; stress-marking exercises
3	Online-aided Practical	Functional/application dimension	CET listening alignment;

Application – Intonation as a “Tool for Communication/Exams”	(communicative conception + online-aided learning + comprehension skills)	authentic clip mimicry; daily interaction practice
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4.3.1 Category 1: “Classroom-bound Surface Mimicry—Intonation as a ‘Sound for Quizzes’”

Structural aspect: This category is about the perceptual and imitative dimension of learning intonation, so it links the perception of intonation as a “superficial alteration in pitch” (RQ1 Category 1) with the practices of the “mechanical, classroom constrained repetition” (RQ2 Sub^① Category 1) and the skills oriented toward the “in class performance” (RQ2 Sub^② Category A). The learning takes place in isolation, with specific tasks and in the schedule 45 minutes of the instructional block, without any link with the functional meaning of intonation.

Referential aspect: It represents intonation acquisition as a reactive, temporary effort aimed to reproduce the audio that is found in the textbooks or in the model of the instructor in order to succeed in oral classroom tests. The learners see intonation as some detached “auditory technique” that has nothing to do with the standardized tests such as the CET or with the daily interaction. This is due to the fact that there is no practice outside the class.

This learning opportunity was only for these eight students who were not majoring in English and no more practice in class. As one person said:

To master intonation simply means to imitate sounds for the weekly oral assessment. In the 45 min of the class, the teacher plays a dialogue from the book, and I repeat it until the variations of the pitch in my voice is roughly the same, and I finish the activity. Outside of the class, I never practice - except if there is a quiz of the following day, in that case I listen the recording for about five minutes. I do not think how this may help me in the CET listening part, or in conversations with non-native speakers; it is only something that we have to fulfill for the grade of the course (Participant 6).

A different student similarly highlighted the emphasis on assessments:

Intonation practice is like a small assignment in this English course. We do the imitation drills, I use the phone to record myself trying to imitate the voice of that teacher, and I send the recording to her. I don't know why in different sentences there is a rising or a falling tone, I just imitate them to pass the quiz. It is not that it is applicable to any other thing (Participant 8).

4.3.2 Category 2: “Textbook-guided Rule Practice—Intonation as a ‘Set of Rules to Drill’”

Structural aspect: This category is about the so-called theoretical and analytical side of learning to intonation. This is a combination of the aspect of understanding intonation as “rule-based prosodic patterns” (from RQ1 Category 2) with the aspect of learning to get “textbook-guided rule drilling” (RQ2 Sub^① Category 2) and the aspect of developing the “rule-reinforced production skills” (RQ2 Sub^② Category B). The learning is done deliberately, with the focus on the rule, and is outside the classroom, with the use of textbook audio material. This is the aspect which connects the formal

teaching in the classroom with the honing of the skill on one's own.

Referential aspect: In here the acquisition of intonation is seen as a kind of drilling for a purpose. Here, it is the rehearsal of rules that were taught in class, for example, use rising tones for questions yes/no or put stress on content words. Learners compare their performance with the audio of the text in the textbooks. Participants see intonation as a “system of rules” that has to be learnt. Their practice is only to the means of the instruction and not typically at all in communicative contexts.

We have seen this pattern, for example, for the six non-English majors who used the audio of the textbook for their independent study. One of them said:

I now see the intonation as a system of principles that I have to rehearse in a methodical way, not as noise. Outside of class, I use the audio material in the coursebook to train every single pattern. For example, I find every yes/no question in the conversation, I rehearse it many times (eight to ten times) and check whether my pitch goes up in the right way at the end of the phrase with the recording. And also I annotate the transcript of the textbook to mark what are the words that carry a primary stress, for example, I mark BEIJING in the sentence I went to Beijing, and then I practice to give those words a proper prominence. It is more effort but I have kept these patterns better (Participant 12).

A different student highlighted the connection to the textbook materials:

The instructor also said, ‘emphasize content words, not function words.’ I really learned this only in the practice with the audio recordings of the textbook. I listen to the sentence, and when I hear it, I pause and say it out loud. When I say something like the instead of book, I listen to it again until I say the right thing. And I make flash cards with sentences of the textbook to practice during the break. It is still following some guidelines, but now I can use it instead of memorize it (Participant 14).

4.3.3 Category 3: “Online-aided Practical Application—Intonation as a ‘Tool for Communication/Exams’”

Structural aspect: This category is about the functional and applied side of the intonation acquisition. It is the union of the view of intonation as a “communicative tool for clarity” (from RQ1 Category 3) with “learning assisted by online resources” (from RQ2 Sub^① Category 3) and “comprehension skills oriented toward communication” (from RQ2 Sub^② Category C). The experience is global, the learning has a specific goal, and is extended by the use of digital tools: the practice of the intonation is connected in a direct way to the target of the participants (e.g., doing well in CET examination, having good management of the everyday interaction).

Referential dimension: Think of intonation acquisition as an application oriented to real advantages: imitate real parts of online videos to improve the clearness in communication, and put in practice CET part of listening (for example, using intonation in order to find the important answers). The learners see intonation as a “functional instrument” instead of only an exercise or a boring assignment.

This particular point of view was only present for the four students of non English majors that supplemented their learning with the use of this digital material. One participant said:

Intonation has changed my way of learning: it is not at all about memorizing rules but use it as an instrument. I watch clips on intonation for plain talk and then I just rehearse to copy how they use rising tone to sound warm. I also use these for CET listening: I have become conscious that when the speaker stresses a certain word it is usually the right answer. Last month, I was talking with an international student about my field of study and at that time he said that my intonation with which I talk, he can follow my speech easy, for that moment I know that it is not only for the preparation of the test (Participant 3).

A different respondent emphasized its twofold utility:

I came across a set of instruction contents on Bilibili about intonation patterns for academic presentation. I found that it is useful because I want to get a position in an international research laboratory in future. For the time that I practice my own presentation, I will change the way of speaking for some important terms like CHEMICAL REACTION. For the CET listening component, I listen to the digital practice examination and listen to the prosodic cues, for example, when the speaker's pitch drops, we can say it is a declarative sentence, I can take it into my mind. Now, to study the intonation, it gives me a feeling of I am training for the practical thing instead of just fulfilling the academic (Participant 17).

4.3.4 Relationship among Integrated Experience Categories

These three categories set up a cognitive and operationnal order between the second-year students who are in a non-english major. As we can see, this order is mainly defined by the nature and the amplitude of their efforts of autonomous practice, which is a consequence of the academically restrictive context they are in (no extra-curricular resources, very small amount of hours allocated in the classroom).

Category 1 (Superficial Imitation Confined to the Classroom): No practice outside class sessions. It is the one that gives the most elementary experience, only related to the results of the quiz and only in the 45 minutes of the class session. For them, intonation is just an “acoustic mark related to the grades”, nothing useful.

Category 2 (Textbook-guided Rule Practice): Practice with textbook audio—Intermediate, rule focused experience. Learners are still studying outside of class but remain tightly aligned with the course materials. They see the intonation as a “collection of rules to be mastered”.

Category 3 (Online-aided Practical Application): Use of extra online resources arrow Advanced, utility experience. They relate intonation to their main target (e.g., the CET or communication), as if it is a “practical instrument”.

This hierarchy also sheds light on an important point for the intonation instruction for the students of non-English majors: When there is no extra-curricular activities such as clubs or tutoring, the best way to tackle to enhance the learning is to be practiced by oneself with the materials at hand such as the textbook and free online materials. In this case, learners can go from just imitating the intonation pattern for the assessment to really using it in the real situation. Since these students are usually in an

exam-oriented-curriculum and have limited classroom hours, the pedagogic point should be in “practice guidance”. In other word, is to make a selection and suggest some kind of learning things on the Internet as well as to make short exercises for the after class completion which is within the textbook. Such methods are for getting more applied and functional learning.

In this part, we draw from the phenomenographic analysis of the intonation acquisition of the second year non-English major students, that shows that differences in understanding and experience are coming from how much they practised on their own, not from the academic training or the year they study. We introduce here practical, low resource approaches adapted to the limits of the group: no specific class of phonetics, only 45 minutes of intonation teaching mixed with the other contents of the week and no additional help in pronunciation outside the class. Every proposed way is focused to get the maximum result during the class time and to make the follow up practice as easy as possible, and does not contain intervention that need to divide the students in small group or that need a lot of resources.

4.4 Pedagogical Implications

4.4.1 Optimize Embedded In-class Intonation Instruction for Limited Time Windows

Taking into account that non-English majors are given only 45 minutes of intonation instruction a week in their listening and speaking courses, the aim is to put the basic awareness and rule based instruction in contact with the needs of the examinations and of the real life communication. This way we do not put the knowledge in a compartment.

Integrate “acoustic-perception-to-basic-rule” mini-tasks

Taking into account that non-English majors are given only 45 minutes of intonation instruction a week in their listening and speaking courses, the aim is to put the basic awareness and rule based instruction in contact with the needs of the examinations and of the real life communication. This way we do not put the knowledge in a compartment.

Incorporate “acoustic-perception-to-basic-rule” micro-activities

If the learners do not do the exercises after class (the most of the group here), make 15-minutes, low-cognitive-effort tasks that relate the superficial pitch copying to basic principles. For example, when they do the classroom imitations, mix the recording of the textbook dialogues with the visual representation of the intonation (a rise of a line for a yes/no question). Put little one minutes hints like: What makes the rising intonation in this case seem more friendly? To give an initial grip on the function, not too much technical vocabulary. This is a strategy to answer to their superficial imitative way of learning, and makes a relation of the sound perception to the elementary identification of the rule.

Align in-class drills with CET listening and practical communication goals

Align classroom drills with students’ core learning objectives in both of the assessment and in the context of everyday communication, e.g., by using very short parts of CET listenings to stress some of

the signals (e.g., the key answers usually correspond to stressed words) in the 45-minutes of the lesson and go to the 10-minutes of the simulation of role-plays with some basic intercultural exchanges (e.g., asking for directions) in order to use the intonation for clarity (following the idea of Jenkins 2012 *Lingua Franca Core*). In this way, one is connecting the systematic learning to their aims of learning, instead of a pure theoretical teaching of phonetics.

4.4.2 Simplify Post-class Self-directed Practice Guidance

The results show that the self-directed practice (using the recording of the textbook or other available material on the Internet) is required in order to go beyond the introductory learning. Thus the instructional support should provide easily understandable guidance for the autonomous practice (without relying on the clubs or tutoring):

Design 5-minute textbook-based daily practice templates

As the 60% of the participants use the audio from the book for their exercises, give them every week one page of practice instructions (e.g., Practice the yes/no question intonation patterns from the Unit 2 dialogue in Drill 3; for every pattern, repeat it five times and record with your phone) so that they have the same thing to do for their own study in the independent way. In this way, the informal copying will be done by a more structured, rule-based repetition, helping the learners to go from copying simple things to the very first usage of the basic rules.

Curate free, accessible online resource lists

If the students are interested in supporting their learning with some more resources, give to them a short list of some easy to get on the web tools, with the very short, one sentence instruction. Thus, the difficulty of acting with practical, application practice is gone, no special software, no special platform is needed.

4.4.3 Utilize Low-tech Tools for Simplified Feedback and Self-correction

Do not use complex applications (like Praat) that require much technical skill; rather, rely on nice tools to enable the self-evaluation as well as focused feedback in class:

Mobile recording for peer and self-feedback

Learn to make the learner use his mobile device to record intonation both in class and after class. Leave for the 45' session part of the time (five minutes) to the partner evaluation, where the students will listen to their recording instead of the audio from the textbook and use simple cues (like, "Did their voice go up at the end of the question?") to give a comment. This is to develop basic self-evaluation abilities without special applications, and it fits the phase of learning, which is at the moment rule reinforcement.

Multi-sensory instructor feedback

While listening to the student's recording, replace the complex terminology with signals that are easy for the student to understand. For example, use hand movements to show the ascending and descending pitch pattern or the related situation (e.g., Your level tone in this part is more like a command than a

request—imagine you ask a fellow student for a pen) to explain the mistake. This helps the students that have almost no knowledge about formal rules and reduces the confusion caused by technical phonetic language.

4.4.4 Link Intonation Learning to Core Academic/Workplace Needs

In order to increase the engagement in practice activities (an area of concern for the non English majors who think that intonation is “unrelated to the testing”) make the classroom and follow up activities to the practice as much as possible related to their scholastic and prospective career:

Embed intonation in academic presentation mini-tasks

Work out 10-minute exercises to do in the classroom where the learners will practice how to stress the necessary technical vocabulary (e.g., “chemical reaction” for engineering students) for short presentations. This links intonation with the communication needs of their occupation and it is presented as a kind of competence instead of just something to do for the course.

Highlight intonation’s role in CET listening performance

Add to the lessons the weekly 5 minutes “listening-intonation” focus, in which the teachers look at CET listening excerpts and shows how the stress and intonation patterns show which correct answer is important. This links the training of intonation to the main exam purpose of intonation, so that more students will be motivated to do even a short practice in after class.

5. Conclusion

In this study, we have used a phenomenographic way to investigate the variety of experiences of 18 second year non-English majors at an engineering focused university in the northwest of China about intonation acquisition. The learning context was one of little instructive support, just 45 minutes of integrated teaching per week and no other phonetic material at all. The results show a practice-oriented structured way that links three aspects: the learners’ concept of intonation, their learnt strategies and the skills they gain by this way.

At the very bottom of the ladder, the learners who stay at the study of only in the formal classroom situation only had a superficial experience on hearing. They were only able to imitate the tonal contours but did not understand the systematic principles behind. On the other hand, a separate category of the participants, who did the independent practice with the audio material from the textbook, came already towards the conceptual, rule oriented understanding. These persons were able to recognize and produce pitch patterns at the level of the sentence and to do self-correction by comparing the output with the audio models. The most complex understanding came from the learners who enriched the study with the online materials; for these learners intonation became also an instrument in practice for the improvement of listening comprehension and for acquisition of clarity in the authentic communicative situations. This strata of the progression was also reflected in the aspects of the learning strategy and self-assessed competencies, in the sense that each tier of the practice engagement corresponded to a

quite different qualitative experience. It seems that this stratified structure works on its own. Looking at the students' academic transcript or disciplinary field it appears that there is no significant difference, which means that the differences between the learners come not from being more clever, but from the quality and degree of the independent participation of the learner in the learning activities. These results have different educational uses, in particular for the academic field, where students outside the English disciplines get very little training in the patterns of intonation. First, the classroom part, even if very short, should be designed such as to connect the awareness to the recognition of basic patterns and, if possible, to uses, associated to some exams as the CET listening part. Second, the guidance to the after classes exercises should be set up and easily available, with simple daily routines for the exercise to be done on the base of the course material and on a choice of compiles of user friendly digital materials for the learner which wants to extend the study. Basic technological aids such as the audio recording on the smartphone could be used for the mutual evaluation and the personal improvement, without the use of complicated programs that could discourage or marginalize most students.

On the other hand, we also must be honest about the limits of this investigation. The research participants were taken only from one of the institutions involved in science and engineering, so the extent to which the results can be generalised to other is limited. The use of a cross-sectional approach gives a view of what the students perceive at a certain moment, in a static view of their experiences in a long period of time. Also, the study did not include a structured analysis of several variable that can be of influence, such as transfer effects from the prosodic patterns of the first language of the participants, their level of English ability at the beginning, or the role of the in the educator input. The next studies can build on this in different ways: with participants from non-specialised in English programs from a variety of types of university and geographical areas; using mixed-methodologies or a longitudinal framework to understand how attitudes and experiences develop in time; to see the interplay between the autonomous learning activities and elements such as the L1 prosodic transfer and the role of the ; and to widen the prosodic analysis used in the study to other features like rhythm and word stress in addition to the intonation patterns, expanding the theoretical foundation for prosodic acquisition within this specific learner group.

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