

Exporting English Pronunciation from China: The Communication Needs of Young Chinese Scientists as Teachers in Higher Education Abroad

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Abstract

China has become an exporter of material goods to the world, particularly to the United States. It is time for the exploration of a mutually beneficial relationship in a strikingly different realm, that of human capital in higher education and its contributions to the quality of university teaching. To faculty members and students at U.S. universities the human face of this relationship is Chinese international teaching assistants (ITAs) who are graduate students in science and math, and who are also being supported as teachers of basic undergraduate courses within their academic disciplines. Chinese ITAs are the largest single group of international graduate students, and they make American undergraduate education possible in chemistry, biology, physics, mathematics, business, and computer science. The quality of the performance of native English speaking and non-native English speaking TAs has an impact on the learning of U.S. undergraduates, and while many in American universities praise Chinese ITAs' high levels of knowledge within their areas of study, less praiseworthy are their English communication skills. For a variety of reasons many young Chinese scholars arrive in the U.S. not able to function as content teachers who have to operate in English, and a salient feature of this inability to use English to communicate is Chinese ITAs' lack of experience with suprasegmental aspects of English pronunciation such as Discourse Intonation (DI), which is used to emphasize and differentiate ideas, begin and end topics, and express social relationships in spoken utterances. Yet English as a Foreign Language education (EFL) in China does not deal with suprasegmental aspects of English pronunciation, nor really with spoken intelligibility at all.

This proposal describes an initial step in a three-year agenda for improving the current exchange of human capital and knowledge in higher education between China and the U.S., and, ostensibly, other countries in which young Chinese scientists seek advanced degrees, and in which English is the medium of instruction and communication. In essence, greater mutual communication and curricular exchange between American and Chinese institutions of higher education is needed. There needs to be a shift in who Chinese universities see as stakeholders for their EFL program outcomes. One possible mechanism would be a mutually developed course, "Using English to Teach Labs and Classes in U.S. Universities," to be developed and taught in China to late-career undergraduates who intend to pursue graduate study in the U.S. Two established research and science institutions will be focused on, one in the U.S. and one in China. As the initial step, one ITA educator and materials development specialist from the U.S. university will visit the Chinese university for a five month period. This report creates a context and outlines the agenda for this working visit, and for the development of the course.

Introduction

China has become a major exporter of material goods to the world, particularly to the United States. Whatever the long term social, cultural, and ecological implications of this relationship, on the face of it both China and the U.S. have benefitted. It is time for the exploration of a mutually beneficial relationship in a strikingly different realm, that of human capital in higher education and its contributions to the quality of university teaching. To faculty members and students at U.S. universities the human face of this relationship is Chinese international teaching assistants (ITAs) who are graduate students in science and math, and who are also being supported as teachers of basic undergraduate courses within their academic disciplines (Griffie Gorsuch Britton and Clardy 2009; see also Ford Gappa Wenddorff and Wright 1991; Smith Byrd Nelson Barrett and Constantinides 1992).

It can be argued that Chinese ITAs, as one of the largest single groups of international graduate students, make American undergraduate education possible in chemistry, biology, physics, mathematics, business, and computer science. In most U.S. universities, ITAs who must teach in their second language (English), make up a substantial proportion of instructional staff for chemistry and other science lab courses (e.g. Gorsuch and Sokolowski 2007; Kaufman and Brownworth 2006a). Needless to say, the quality of the performance of native English speaking and non-native English speaking TAs as teachers has an impact on the learning of U.S. undergraduates (Eble and McKeachie 1985; McKeachie 2004).

While many in American universities praise Chinese ITAs' high levels of knowledge within their areas of study, less praiseworthy are their English communication skills which are needed for the professional activity of teaching U.S. undergraduates (Cardillo 2002; Kaufman and Brownworth 2006a). From the 1980s, concerns about ITAs' English abilities (not just Chinese ITAs) gave rise to ITA education as a field, which might be described as a specialized type of English as a Second Language (ESL)(Bailey 1984; Chiang 2009; Gorsuch 2003; Smith 1994). For a variety of reasons many young Chinese scholars arrive in the U.S. not able to function as content teachers who have to operate in English (Gorsuch 2008; see also Siegel 2003). A salient feature of this inability to use English to communicate is Chinese ITAs' lack of experience with suprasegmental aspects of English pronunciation such as Discourse Intonation (DI), which is used to emphasize and differentiate ideas, begin and end topics, and express social relationships in spoken utterances (Pickering 2001). The ability to use this sound system while teaching difficult content and managing classrooms is likely essential for ITAs' success as college-level instructors (Anderson-Hsieh and Koehler 1988; Gorsuch Meyers Pickering and Griffie 2010; Hahn 2004; Pickering 1999; Wennerstrom 2000).

Yet according to all accounts, English language education in China does not deal with suprasegmental aspects of English pronunciation, nor really with spoken intelligibility at all (Deterding 2010; Robertson 2003). Further, anecdotal evidence suggests there is little awareness on the part of Chinese universities or their English language faculty as to the English communication needs of their graduates who seek further education in the U.S. (S. Zhang personal communication October 29 2010). The negative effects due to this state of affairs are

mostly borne by the Chinese ITAs themselves (at sometimes wrenching financial, mental, and emotional cost), and indirectly by U.S. undergraduates, and the academic departments which admit and employ ITAs. This proposal describes an initial step in a three-year agenda for improving the current exchange of human capital and knowledge in higher education between China and the U.S., and, ostensibly, other countries in which young Chinese scientists seek advanced degrees, and in which English is the medium of instruction and communication. In essence, the agenda calls for greater mutual communication and curricular exchange between American and Chinese institutions of higher education, and U.S.- and China-based English language educators. The mechanism of this will be a mutually developed course, "Using English to Teach Labs and Classes in U.S. Universities," to be developed and taught in China to late-career undergraduates who intend to pursue graduate study in the U.S. Two established research and science institutions will be focused on, one in the U.S. and one in China. As the initial step, one ITA educator and materials development specialist from the U.S. university will visit the Chinese university for a five month period. This report creates a context and outlines the agenda for this working visit, and for the development of the course.

Literature Review

The numbers of Chinese graduate students and ITAs in the U.S. International Teaching Assistant (ITA) ESL programs in the U.S. deal with young Chinese scholars as the single largest group of international graduate students arriving on university campuses every year. In the 2008-2009 academic year, 98,236 Chinese were engaged in full time graduate study in the U.S., which was 33.9% of all international graduate students in the U.S. (Institute of International Education 2009). There were double digit percentage increases for Chinese graduate students being admitted to American universities from 2006 - 2010 (Council of Graduate Schools 2010). In 2008-2009, international graduate students in general accounted for 48.5% of all engineering students, 45.9% of all math and computer students, and 34.7% of all physical and earth science graduate students in the U.S. (Bell 2010). 152,457 international students of all nationalities (both graduate and undergraduate) were funded by a "U.S. College or University" in 2008-2009 (Institute of International Education 2009). The majority of these were likely in the form of graduate teaching assistantships and research assistantships.

At the U.S. university portrayed in this report, Chinese graduate students are the single largest recognizable group of international students on the campus, which mirrors the national picture given above. In Spring, 2011, of a total of 260 freshman-level classes or labs, 149 were taught by non-native speakers of English (57.31%) of whom 48 were Chinese (18.46% of all classes or labs, and 32.22% of classes or labs taught by non-native speakers of English). These numbers reflect only ITAs who went through specialized ESL courses or state-mandated English screening tests and were approved to teach by ITA program personnel. There are likely three times this number of young Chinese scholars (approximately 144) who are not currently approved to teach, and are either enrolled in specialized ESL courses and/or are being supported as non-teaching graders or research assistants within their departments.

Chinese graduate students upon arrival in the U.S. and why they stand out. At the American institution being highlighted here, many international graduate students' first experience with the university is at the annual Summer ITA Workshop. This is true for Chinese ITAs, who comprised 32.1% (102 out of 318) of all international graduate students coming to the workshop from 2008-2010. The three-week intensive workshop is designed to comprehensively assess ITAs' English communication skills, and to provide instruction and practice with classroom communication and the basic elements of Discourse Intonation (DI) (Gorsuch 2011a; Griffie et al. 2009). The only other nationality groups that are comparable in size are ITAs from India (42 in the past three years, or 13.2% of all international graduate students), South Korea (33 from 2008 - 2010, or 10.4% of all international graduate students), and Turkey (20, or 6.3%). For the purposes of further descriptions and comparisons to be made below, students from Taiwan (who, like the Chinese, have Mandarin as their first language) will also be reported on. From 2008 - 2010, 11 of them (or 3.5% of all international graduate students) attended the Summer ITA Workshop.

SPEAK test scores of incoming Chinese ITAs. All incoming ITAs are evaluated for readiness to teach in English using four measures: an initial oral interview, the SPEAK test, a standardized academic listening test, and a teaching simulation test (the ITA Performance Test). The SPEAK test (Educational Testing Service 1996) is a standardized performance test which captures ITAs' ability to respond extemporaneously to twelve tasks for between 30 - 90 seconds apiece. Scores on the SPEAK test range in increments of five from 20 - 60. An averaged score of 50 across twelve tasks is the generally accepted score to be approved to teach in the ITA education field (e.g., Kaufman and Brownworth 2006b). This score is interpreted as: "Communication generally effective; task performed competently."

Incoming ITAs' SPEAK test scores vary between and within nationality groups, which is a reflection of the priorities of the English language education systems of the countries ITAs come from (Gorsuch 2008; Siegel 2003), and also individual circumstance and personal achievement. See Table 1 below:

Table 1. Incoming ITA SPEAK test scores at Texas Tech University 2008-2010 by selected nationality group

Nationality	SPEAK <i>M, SD</i>	Specific SPEAK score received	Frequency		
China (<i>n</i> = 102)	44.61, 3.961	35	3		
		40	27		
		45	47		
		***** cut point			
India (<i>n</i> = 42)	49.52, 2.662	40	1		
		45	5		
		***** cut point			
		50	33		
Korea (<i>n</i> = 33)	44.39, 4.465	55	3		
		35	2		
		40	9		
		45	13		
***** cut point		50	9		
		Taiwan (<i>n</i> = 11)	47.73, 3.438	40	1
		45		3	
		***** cut point			
50	7				
Turkey (<i>n</i> = 20)	48.25, 2.447	45	7		
		***** cut point			
		50	13		

While SPEAK test scores means are all in the 40s there is a large functional difference between ITAs who earn a 40, 45, or 50 on the SPEAK test. ITAs who score 40 lack the communicative competence to carry out the tasks needed to explain content and manage classrooms. It is hard for most native speakers of English to comprehend them. ITAs who score a 45 have somewhat more control over their spoken fluency and can occasionally communicate "generally effectively" (the level of 50) on tasks that are concrete, such as giving directions based on a map (one task on the SPEAK test). However, ITAs at this level cannot sustain effective communication on more complicated tasks, such as speculating on the implications of population growth in urban areas (another task on the practice SPEAK test). Listeners struggle somewhat to comprehend such speakers. ITAs who score 50 are intelligible much of the time to

listeners (U.S. undergraduates), and have the communicative competence to consistently detect and self-repair communication breakdowns. Realistically, for an ITA candidate to move from a 40 to a 45 to a 50 SPEAK test score after arrival in the U.S. would take one to 1 1/2 years of intensive interaction with other English speakers and ITA course work specializing in developing ITAs's spoken fluency and DI.

Note in Table 1 above that while Chinese and Korean ITAs score as low as each other on the SPEAK test on average (44.61 versus 44.39), there is less individual variation within the Chinese group, evidenced by the more narrow *SD* of 3.961. Perhaps due to individual circumstance (a Korean ITA's family or school stipulating English education from age six as opposed to the typical age of 14, for instance), some Korean ITAs were able to communicate better in English upon arrival in the U.S. A substantial number of Chinese ITAs (77, or 75.4% of all incoming Chinese ITAs) were not likely to be approved to teach on the basis of their SPEAK tests alone (they got scores below 50). Thus the Chinese ITA population is not only large, but is vulnerable on the basis of their ability to extemporaneously communicate in English upon arrival in the U.S. In comparison, only six Indian ITAs (14.3%) would have been excluded from teaching upon arrival in the U.S., while only four Taiwanese ITAs (57.1%) and seven Turkish ITAs (35%) would have been. In some way, the English education systems of India, Taiwan, and Turkey, are succeeding more in preparing their young people to be supported as teaching assistants in American universities.

ITA presentation test results of incoming Chinese ITAs. The ITA Presentation Test (Gorsuch et al. 2010; Griffiee and Gevara In press) is a teaching simulation test in which an ITA speaks for ten minutes on an academic topic they would likely have to teach to U.S. undergraduates. The ITA also fields questions from the audience. Tests of this kind are commonly used in ITA programs across the U.S. to assess ITAs' abilities to communicate in classroom settings (e.g., Kaufman and Brownworth 2006b). With each of ten criteria added up to make a total, ITAs can score from 10 to 50. A score of 39 and above is considered "passing." In Table 2 below are the ITA Performance Test scores for the years 2009-2010.

Table 2. Incoming ITA Performance Test scores at Texas Tech University 2009-2010 by selected nationality group

<u>Nationality</u>	<u>ITA Performance</u>	
	<u>Test score received</u>	<u>Frequency</u>
China (<i>n</i> = 60)	33	1
	35	2
	36	2
	37	5
	38	12
	***** cut point	
	39	13
	40	19
	41	5
	42	1
India (<i>n</i> = 28)	34	1
	38	1
	***** cut point	
	39	7
	40	17
Korea (<i>n</i> = 23)	31	1
	35	1
	37	1
	38	5
	***** cut point	
	39	6
Taiwan (<i>n</i> = 6)	***** cut point	
	40	4
	41	1
	42	1
Turkey (<i>n</i> = 14)	34	1
	38	1
	***** cut point	
	39	2
	40	7
	41	1
42	2	

The Chinese ITAs again stand out as a group. 22 Chinese ITAs (36.67%) failed the ITA Performance Test, suggesting poor classroom communication skills. The performance of Korean ITAs was slightly better with 8 (or 34.78%) failing the test. However, no Taiwanese ITAs failed the test, while only two ITAs from India failed the ITA Performance test (7.14%). Only two Turkish ITAs failed the test (14.29%).

Prior teaching experience of incoming Chinese ITAs. One final way that Chinese ITAs stand out as a group is their lack of prior teaching experience. It has been speculated that prior teaching experience, even teaching experience in the home country in the first language, may increase ITAs' likelihood of eventually developing the specific English communication skills needed to succeed in U.S. undergraduate classrooms (Gorsuch 2011b). This effect may be due to better-developed procedural knowledge in the first language for explaining content and managing relationships with students (Gholami and Husu 2010). Compared to ITAs earning their bachelor's degrees in India, Korea, Sri Lanka, and Turkey, Chinese ITAs are less likely to have teaching experience. See Table 3 below:

Table 3. Home country teaching experience by nationality group^a

Country of degree	Home country teaching YES	Home country teaching NO
China	22	68
India	19	20
Korea	13	7
Sri Lanka	22	2
Turkey	11	4

^aAdapted from Gorsuch 2011b based on a similar ITA sample.

Only 24.4% of Chinese ITAs (22 out of 90) are likely to arrive in the U.S. with teaching experience of any kind, whereas 48.72% of Indian ITAs are. 65% of Korean ITAs, 91.67% of Sri Lankan ITAs, and 73.33% of Turkish ITAs arrive with teaching experience.

Discourse Intonation (DI) and teaching. It is argued here that certain features of Chinese ITAs' Discourse Intonation (DI), coupled with a lack of formal education on this important English communication skill, likely account for the low ratings Chinese ITAs as a group get upon arrival in the U.S. (see for example Pickering 1999). One can argue that Chinese ITAs simply need to improve their general speaking ability. However, without a specific curricular focus on what to improve in the context of what is needed in U.S. classrooms, young Chinese scholars, and the Chinese universities in which they are prepared, will be hard pressed to allocate the time and resources necessary to bring about sufficient change in the way would-be Chinese

ITAs speak English for professional purposes. The remainder of this section will be used to briefly define and exemplify DI, and outline what has been shown to be problem areas for Chinese ITAs in empirical studies.

Discourse Intonation (DI) is a relatively new area of applied linguistics inquiry with special significance for research and practice in ITA education. DI is the study of how a speaker uses the intonation or prosodic system of a language (rhythm, stress, pitch, pauses, and loudness) for communicative purposes in extended speech (Brazil 1997; Pickering 1999 2001 2010; see also Pennington 1996; Young 1994; Wennerstrom 1998 2001). Using or NOT using DI appropriately has powerful implications for listeners' perceptions of ITAs' communicative competence in teaching settings. Using DI appropriately includes using the voice to mark what a speaker believes is key information in extended talk ("prominence"), using the voice to mark what a speaker intends as the beginnings and ends of topics ("thought groups," "key," and "tone choices"), expressing what the speaker believes to be known and new information to an audience ("tone choices" and "prominence"), and expressing emotional states such as enthusiasm, authority, friendliness, interest, engagement, and disengagement ("tone choices"). A speaker's ability to use DI is also an important basis for listener perceptions of ITAs' verbal fluency, as intonation is "tied to utterances" (Tench 1996 p. 5) the smooth delivery of which in turn comprises discourse.

Hirst and DiCristo (1998 p. 1) describe the irony of intonation systems as being "one of the most universal and [yet] one of the most language-specific features of human language." And while prosody [intonation] is one of the last things stroke patients *lose* when they lose speech, it is conversely one of the last things that is *acquired* in a second language (p. 2). Essentially, not knowing and not using the intonation system of English in culturally expected ways strips non-native English speaking ITAs of an important, much-taken-for-granted linguistic tool to highlight and contrast key information in spoken messages, parse spoken information so U.S. undergraduates can comprehend it, and develop rapport with students.

The rhythm of spoken English: Thought groups. A major element of DI in English is the underlying rhythm of spoken utterances. Utterances are spoken not in single words but as phrases or clauses which are bounded by brief silences (pauses)(Bolinger 1998; Butterworth 1980; Crystal and Davy 1969; Goldman Eisler 1968; Levelt 1989; Pawley and Syder 2000; Pennington 1996). These "thought groups" represent on-line speech planning by a speaker and express a thought which has been encoded into a grammatical chunk such as a clause or series of clauses (Butterworth 1980; Pawley and Syder 2000) as in *can I ask a question // for the lab report // do I use the equation for each piece of data I observe // or do I just solve the equation once // to show I know it* NOT *can I ask a // question for the // lab report do I use the equation for // each piece of data I //observe or do // I just solve // the question once to // show I know it.* Thus this aspect of DI is a significant component of listeners' perceptions of whether a second language speaker (an ITA) is fluent (Butcher 1980; Eijzenberg 2000; Olynak Anglejan and Sankoff 1990; Wennerstrom 2000).

In native speakers' speech, there is systematicity and regularity to the length of pauses which is an important clue to listeners as to whether an utterance or topic is complete. Longer pauses indicate the ends of sentences and/or topics, while medium pauses indicate clause boundaries within sentences (suggesting "I am not finished"). Very brief pauses often indicate a dysfluency, or an unexpected (to the listener) break in the thought or speech process (sometimes intended by the speaker, sometimes not)(Brown and Yule 1983). It would be difficult for anyone listening to the last type of utterance to know whether the speaker was finished speaking, or to predict the content of what might be said in the next utterance.

In comparison with native English speaking teaching assistants (TAs) in the U.S., Chinese ITAs have more irregularities in the pause structure, and thus the rhythm, of their speech in U.S. classrooms (Anderson-Hsieh and Koehler 1988; Gorsuch 2011; Pickering 1999). In empirical studies, their thought groups were found to be shorter (fewer words), and their pauses appeared in unexpected places, were longer than expected, were irregular, and more often violated clause boundaries: "pauses in the NNS [Chinese ITAs] data were both longer and more erratic...and tended to regularly break up conceptual units" (Pickering 1999 pp. 51-52). Unpredictable pauses which break up expected conceptual structures in extended speech create information processing problems for listeners (undergraduates). Such speech has been termed "language-focused" rather than "listener-focused" in that ITAs are more focused on formulating their ideas in an unwieldy second language than they are on anticipating the information processing needs and expectations of their audience (Wennerstrom 1998). In communicative genres such as academic lectures (e.g. Gunthner 2007) this can contribute to breakdowns in U.S. undergraduates' ability to retain information and learn.

Prominence as a communication tool to index and highlight key information. English is a stress-timed language in which "there tends to be a regular alternation of strong and weak syllables such that a stressed syllable generally recurs every 2-3 syllables" (Pennington 1996 p. 135), as in one example from a biology lab: *so any type of wing for exAMple // INsect wing to a BAT wing to a BIRD wing to a Dinosaur wing // they are SHARE the same FUNCtion // they're all used for FLIGHT.* Key content words which carry lexical meaning are stressed in thought groups with higher pitch, a longer vowel on the stressed syllable of that word, and sometimes louder volume (Pennington 1996; Pickering 2010). The weaker syllables are de-emphasized and spoken with low pitch and unclear vowels (Wennerstrom 1998). These de-emphasized words are often function words such as *as, in, the* which form the grammatical "mortar" of utterances which holds the "bricks" of meaning laden words together (Field 2008). This emphasizing of meaning laden "content" words happens with great regularity in English (both British and American varieties)(Deterding 2010; Pickering 1999) and is called prominence when discussing language in terms of DI (Gorsuch et al. 2010). Within single thought groups there may be one or more prominent words, marked by higher pitch, depending on what the speaker believes to be important, linked information (Tench 1996). One of the more common, "default" patterns is for the last content word of an utterance to be emphasized by the speaker, as in *remember my office hours have CHANGED* (Gilbert 2005; Gorsuch et al. 2010).

In addition to the function of marking content words and basic information structure, prominence is used as a deliberate means of highlighting information the speaker deems important within and between thought groups (Wennerstrom 1998 2001). What the speaker deems important is based on his or her assumptions about what listeners likely know, do not know, and what they might need to know. Prominence is used to mark new information (Pickering 1999 2010; Wennerstrom 1998), as in *we're going to discuss chemical reACtions today // there are different TYPES of reactions*. The speaker in this case believes *reACtions* to be "new" information for listeners in the first utterance but then emphasizes *TYPES* as "new" in the second utterance while de-emphasizing (with low pitch) *reactions* as "given" or "known" information. Prominence is also used to contrast information between utterances (Pickering 1999; Wennerstrom 1998): *in miTOSis cells are simply REplicated // meiOIsis on the other hand // is needed for SExual reproduction*. In this case, the speaker contrasts the biological processes of mitosis and meiosis, and also their general functions. Thus prominence represents "the speaker's assessment of the relative information load carried by the elements in the utterance" (Pickering 2010 p. 284).

Accumulated evidence suggests prominence and thought groups together are used by listeners to parse information and comprehend and predict the content of messages (Pennington 1996; Pickering 1999). Prominence is particularly important for listener comprehension of extended academic talks (Anderson-Hsieh and Koehler 1988; Hahn 2004), and it is likely through prominence that listeners can create a mental index of content information. While a college instructor may have an excellent outline for what he or she wishes to say, it is prominence that is used to clearly mark his or her organization and logic (Pickering 1999).

Prominence is a critical issue for Chinese ITAs. In one study, U.S. undergraduates listened to recordings of Chinese ITAs with varying levels of ability to use prominence appropriately. Undergraduates indicated that the speaker who used prominence in more native-like ways (higher pitch on content words, new topics, and contrasting concepts) was easier to understand. This speaker "rated significantly higher on a measure of communicative effectiveness [and] was more easily processed and understood" (Wennerstrom 2001 p. 242). Speakers who used a monotone or used high pitch on words without regard to their information value were rated lower on their communicative ability. Undergraduates listening to these ITAs also scored lower on comprehension measures based on the talks the ITAs gave (Wennerstrom 2001 p. 242). In a descriptive study, Pickering found that compared to American TAs, Chinese ITAs did not necessarily use higher pitch to mark important words in their speech with "a detrimental effect on...discourse comprehensibility" (1999 p. 107).

Tone choices and key as discourse organizers and as a means of creating rapport with students. A final element of DI in English is tone choices and key, which are choices speakers make about pitch at thought group boundaries (at beginnings and ends of thought groups)(e.g. Wennerstrom 1998). It is tone choices and prominence and thought groups together which give spoken English its "melody" which is generally described by applied linguists as a continuous "tune" which extends over an entire utterance or thought group (Pennington 1996; Pennington

and Ellis 2000; Pickering 2010; Wennerstrom 1998 2001). Tone choices in spoken English appear at the ends of thought groups and are expressed as noticeable and measurable shifts in pitch which are either rising, level, or falling (Gorsuch et al. 2010). Tone choices are used to organize discourse in that tone choices mark the assumptions on the part of speakers as to whether listeners know something already, whether they think information has been repeated or is routine, or whether information is new and listeners need to be "told" the information (Gorsuch et al. 2010). Speakers may use a rising tone to help "remind" listeners in a classroom of a topic brought up previously as in *you reMEMber from Dr. Wilson's lecture that potassium was purple ↗ // gave a purple or Violet flame ↗*. Falling tones may be used when a speaker thinks listeners need to be "told" something that is likely new and perhaps important information as in *I'm just gonna COver the POSitive ions ↘ or you need to close your BOOKS now ↘*. Speakers may use level tones when they are expressing what they believe is routine, or ritualized information (Pickering 2010), as in *the SUM of the hyPOTeneuse → // of a RIGHT angled TRIangle → // is equal to the SUM of the SQUARES → // on the OTHer two SIDES ↘*.

Tone choices, and also key, "tell" listeners whether a speaker is finished speaking or plans to continue, and when a topic is beginning or ending. Listeners' perceptions of tone choices and key let them follow and predict the "text," or basic discourse shifts of what they are hearing in extended speech. An English speaker uses rising and level tones to indicate they plan to continue speaking, or plan to continue a topic (Wennerstrom 1998 2001). Speakers use falling tones to indicate they are completing a topic or idea, and also that they are finished speaking. Missing cues can result in miscommunications. In one cross-cultural study Young (1994) found that Americans mistakenly interrupted Cantonese-speaking police officers because the officers used familiar (to them) falling tone choices in the middle of utterances and lower volume on a key word just following the falling tone. The Americans, hearing a falling tone and lower volume, assumed the officers had finished speaking. Wennerstrom (1998), investigating Chinese ITAs, found a similar pattern where the ITAs overused falling tones even when they intended to continue a topic.

Key, like tone choices, is expressed as perceptibly higher and lower pitch, but these pitch contours are used at the beginnings and ends of "speech paragraphs," and are thus large units of meaning spanning multiple utterances (Bolinger 1998; Pickering 2010; Wennerstrom 1998). It is common, for example, to hear radio announcers use a sustained high key (high pitch) at the beginning of an utterance when beginning a completely new topic (a robbery), generally mid key (middle pitch) while developing the details of the topic, and then a sustained low key at the end of a sentence (as in a very low tone choice) when ending a topic (Gorsuch et al. 2010; Pickering 1999). This very low key at the end of the "speech paragraph" (or topic) indicates to listeners that a topic is ending. This expectation is useful to listeners in academic settings in that they perceive beginnings, middles, and ends of major topics, and can make global predictions about what concepts may be mentioned, and knowing that there may be some points which develop it.

A final and third major function of tone choices has to do with instructors developing rapport with students. In spoken English, tone choices are used by interactants to establish

solidarity and negotiate social roles (Pickering 1999 2010). When speakers use a variety of rising and falling tones they convey a sense of sharing information and being less distant. A "variety in pitch...signals interest or excitement in the topic" (Pennington 1996 p. 160). Compare *about the exPERiment*↗ // *your SETup*↗ // *really simple*↘ with *about the exPERiment*↘ // *your SETup*↘ // *really simple*↘. A speaker who uses only level or falling tones risks sounding unfriendly, bored, or even angry. In contrast, a speaker who uses only rising tones sounds uncertain, as *ok everyONE*↗ // *last week we took SAMples*↗ // *and now we're going to ANalyze them*↗ [long pause as students continue looking at teacher] // *ok everyone let's get GOing*↗. In either case, the speaker may be inadvertently inviting judgments from listeners that they are angry or distant (overuse of level and falling tones) or not very knowledgeable (overuse of rising tones).

There is robust empirical evidence that native English speaking TAs and high proficiency-rated ITAs use tone choices and key to organize their discourse and express intended meanings in extended academic talks (e.g. Pickering 1999). In contrast, ITAs who are unfamiliar with DI do not, which leads to frustration on the part of listeners (U.S. undergraduates) because they cannot comprehend their ITAs, nor predict what might be said in the immediate future. ITAs also have problems using tone choices to establishing rapport with U.S. undergraduates, and perceiving emotional overtones in conversations with the students. Wennerstrom (1998) found that Chinese ITAs used mainly falling tones when native English speaking TAs would have used a variety of tone choices. Pickering, in reviewing her own data on Chinese ITAs, notes: "if we do not address prosodic structure in ITA discourse, we are essentially disregarding...access to a tool used consistently by native speakers to build positive rapport with other participants in the discourse" (1999 p. 15).

It will be useful to briefly reiterate and underscore the DI features that apply to Chinese ITAs in the U.S. See Table 4 below:

Table 4. Features of Chinese ITAs' Discourse Intonation that reduce communication in U.S. university classrooms

Discourse Intonation feature	Specific features
Thought groups	<ol style="list-style-type: none"> 1. Short thought groups 2. Pauses violate clause and phrase boundaries, breaking up conceptual units 3. Pause length unrelated to discourse function
Prominence	<ol style="list-style-type: none"> 4. Failure to use higher pitch to mark content words or words with high information value 5. High pitch used on words with little information value
Tone choices	<ol style="list-style-type: none"> 6. Using level or falling tones regardless of whether information is assumed to be shared or new 7. Using falling tones regardless of whether ITA intends to continue or finish topic 8. Failure to use a variety of rising, level, and falling tones for the purpose of establishing friendly rapport with students
Key	<ol style="list-style-type: none"> 9. Failure to use higher pitch to mark beginning of new topics at the global level 10. Failure to use low pitch to mark the ends of topics at the global level

What happens when Chinese ITAs fail to improve their spoken English communication skills after arrival in the U.S. Practitioners and researchers in the thirty-year-old ITA education field are employed by (largely) U.S. universities to assess and develop the English communication skills of ITA candidates from multiple countries in response to complaints about ITAs' lack of intelligibility to U.S. undergraduates (Bailey 1984; Chiang 2009; Ford et al. 1991; Gorsuch 2003 In press; Hinofotis Bailey and Stern 1981; Hoekje and Linnell 1994; Shaw 1994; Smith 1994; Smith Byrd Nelson and Barrett 1992; Thomas and Monoson 1991). On the basis of multiple assessments done during a three-week summer workshop at the U.S. institution being focused on in this proposal, all ITA candidates are approved or not approved to teach prior to the beginning of the Fall semester. This workshop is funded by the university and is currently free of

charge to ITAs. ITAs who are not approved to teach have additional credit-bearing courses they can take during the Fall and Spring semesters, whereupon they are assessed again and either approved or not approved to teach. The cost of additional course work is borne by the ITA candidates themselves, although the courses can ostensibly be counted toward their degree plans. One three-credit ITA course costs \$660 (Texas Tech University 2011). For ITAs who have not been approved to teach, their departments may "carry" them as non-teaching graders or lab prep technicians for some period of time. This means ITAs continue on the TA tuition rate and receive a stipend. Due to budget cuts and other financial pressures, however, some departments at the university have begun to stipulate time limits. In one department, ITAs are given nine months after their arrival to be approved to teach. Once ITAs go past this limit, their academic career at the university is essentially over, as their tuition payments increase to the full out-of-state rate. In contrast, one three-credit course costs \$2121 if an international student does not have a TAship.

Young Chinese scholars seeking graduate degrees in the U.S. cannot count on their English improving simply by being in the U.S. One concern among ITA educators is the extent to which ITAs create first language enclaves, resulting in limited contact with other English speakers (Gorsuch 2008; Petro 2006). Many ITAs feel English classes are not their top priority, and unless their academic advisors make an issue of it, ITAs may not put much energy into improving their English beyond what they need functionally to survive (Gorsuch 2008). Chinese ITAs cannot count on ITA education courses to quickly improve their English communication ability, either. While ITA education is mostly successful, most programs are designed to work with ITAs for a maximum of two consecutive semesters for only three hours per week (Gorsuch In press). Second language acquisition processes are slow (Teacher of English to Speakers of Other Languages 2010), particularly for spoken fluency and DI (Hirst and DiCristo 1998; Pawley and Syder 1983). If Chinese ITAs come to the U.S. with low English communication ability (see Table 3 above), two semesters of ITA course study may not be enough (Griffie et al. 2009; see also Constantinides 1987; Smith Byrd Constantinides and Barrett 1991).

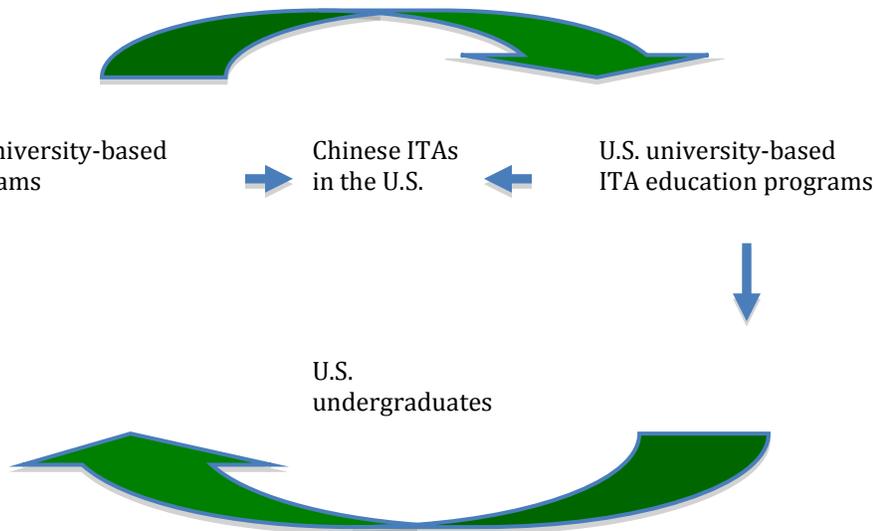
What can be Done to Improve Chinese ITAs' Spoken English Communication?

The thesis of this proposal is that Chinese ITAs are more likely to succeed if their English communication abilities are good upon arrival in the U.S. As has been described above, Chinese ITAs who use prosody (DI) in ways familiar to English speakers in the U.S. are rated as more intelligible by U.S. undergraduates. Chinese ITA candidates who can use Discourse Intonation and have reasonable speaking fluency may be approved to teach at higher rates than they are now. They may also require only one specialized ESL course after arrival in the U.S., instead of two or more, and they may be more free of the threat of "running out of time" and ingloriously losing financial support from their departments. What may be needed now is a change in *whether* and *how* young Chinese scholars are prepared for graduate education in English speaking countries. Part of this preparation must take into account the likelihood that Chinese graduate students coming to the U.S. will be teaching assistants and must therefore learn to communicate

in English for a specific professional purpose—that of teaching content to U.S. undergraduates. What is being done now in China is not sufficient for the majority of Chinese ITAs arriving at the host U.S. institution.

Whatever the richness of its insights on Chinese ITAs' English language use needs, ITA education has developed in largely institution-specific contexts with limited national or international presence (Gorsuch In press). It is unlikely that English teachers and universities in China are familiar with the field, or use its literature for curriculum development. The goals of ITA programs in the U.S. are likely not shared by English as a foreign language (EFL) programs in China. It is time to begin disseminating the findings from ITA education to educators and universities in China who have an interest in the outcomes of their own EFL programs as they relate to the ultimate success of their graduates. In turn ITA education in the U.S. will benefit from direct knowledge of EFL education in China (and in other countries where ITAs come from), particularly as it relates to the language education goals held by universities and the EFL professionals within them, and what resources are available to them to meet those goals. A model for the proposed relationship can be seen in Figure 1 below:

Figure 1. Existing and proposed relationships between ITA programs, Chinese universities, Chinese ITAs, and U.S. undergraduates



Relationships which are generally acknowledged are shown by blue arrows. It is generally accepted that the EFL learning backgrounds of Chinese ITAs contribute to their ability to communicate in English in U.S. classrooms. And it is accepted that ITA programs in the U.S. also contribute to the communication ability of ITAs. Finally, it is accepted that the

communication ability of ITAs contributes to the learning of U.S. undergraduates in science and math labs and classes. In contrast, the green arrows show relationships which are not necessarily accepted, or discussed. There are no obvious ways ITA programs in the U.S. communicate with Chinese universities, and no obvious ways Chinese universities and their EFL faculty members communicate with ITA programs in the U.S. This proposal aims to establish mutual communication about ITA needs, and cultivate curriculum and materials development resources in both China and the U.S.

While many working in ITA education concede that Chinese ITAs' discourse intonation (DI) and other features of speaking are due to first language (Mandarin) transfer, many theorists and practitioners believe DI and speaking fluency are developmental, and can be acquired (e.g. Gorsuch 2011a; Wennerstrom 1998). ITA education has developed working practices which have been shown to be effective in improving ITAs' classroom communication abilities. Some of these can be adapted to a course (Working title: "Using English to Teach Labs and Classes in U.S. Universities," or ELCUS) that can be developed and taught in China to late-career undergraduates who intend to pursue graduate studies in the U.S. Key elements of such a course are shown in Table 5 below. The elements of the proposed course will bring about improvement on known problem areas of Chinese ITAs' Discourse Intonation (DI)(see Table 4 above).

Table 5. Key elements of an international teaching assistant (ITA) preparation course based in China

1. Intensive and extensive input from authentic sources highlighting elements of DI^a.
2. Awareness building tasks of the role DI plays in communicating content.
3. Focused listening and speaking individual, pair, and group tasks using DI.
4. Video-recorded teaching simulation tasks.
5. Intensive feedback based on video-recorded teaching simulation tasks.
6. Assessment using instruments and procedures used in an ITA program in the U.S.

^aDI means Discourse Intonation.

These practices are based on second language learning theories (e.g. Abe 2009; Ard 1987; Doughty 2003; Gorsuch 2006 2011a; Krashen 1985; Pennington and Ellis 2000; Sajavaara 1987; Schmidt 1993) and likely develop all aspects of communicative competence (Savignon 1997). Because these practices are in essence classroom processes designed to improve skills and knowledge, they are in contrast with typical foreign language education programs which tend to specify limited aspects of grammatical competence (knowledge of vocabulary and grammar at the sentence level) as their curricular goals (see commentary by Amer 1997; Bernhardt 2011; Carr and Pauwels 2006; Chen 2006; Swaffar and Arens 2005).

The goals of such a course would be focused not only on the learners but also on the university structures in the hosting Chinese university that support the learning and achievement of the soon-to-graduate Chinese students. Course goals are given in Table 6 below:

Table 6. ITA preparation course goals

Goals focused on learners

1. Improve young Chinese scientists' English listening and speaking skills for professional purposes.
2. Increase learners' awareness of the task demands of ITAs teaching labs and classes in U.S. universities.
3. Inculcate in learners the ability to self-assess English communication abilities relevant to task demands, and self-regulate efforts to improve.

Goals focused on Chinese university administrators and EFL professionals based at the university

1. Increase institutional awareness of the task demands of young Chinese ITAs teaching labs and classes in U.S. universities.
2. Improve institutional resources for developing materials and teaching courses which meet the needs of young Chinese scientists needing to use English to teach content in U.S. universities.

Proposal Aim and Timeline

The aim of this proposal is to initiate a long-term relationship with at least one institution in China which is known to send ITAs to the institution of the author in the U.S. The short-term mechanism of this relationship will be the development of a course and materials by the author, while in China, and with direct involvement of two or more English teaching professionals at the host institution. The working title of the course is "Using English to Teach Labs and Classes in U.S. Universities," or ELCUS. The aim of the course will be to improve critical areas of late-career Chinese undergraduates' spoken English, specifically Discourse Intonation (DI)(Table 4 above) and fluency. The timeline appears in Figure 2 below:

Figure 2. Timeline for proposal

March, 2011 - March, 2013	March, 2013 - July, 2013	July, 2013 - February, 2014	March, 2014 - July, 2014	September, 2014
<ul style="list-style-type: none"> • Write proposal (long and short forms) • Present at conferences, get feedback on plausibility and politics • Develop relationship with host Chinese university • Secure funding • Prepare resources for ELCUS course materials (audio and video files, textbooks, tests) 	<ul style="list-style-type: none"> • In China at host university • Information meetings on proposal with administration, EFL faculty • Present elements of Discourse Intonation (DI) to two participating EFL faculty members • Collaborative development of two-month pilot course and five-month long semester ELCUS course • Team teach two-month pilot ELCUS course with 15 selected late-career science undergraduates • Maintain course evaluation/revision needs log 	<ul style="list-style-type: none"> • ELCUS course evaluation, revision in collaboration with participating EFL faculty members • Update/replace ELCUS materials, put in final form 	<ul style="list-style-type: none"> • Five-month long semester ELCUS course taught by participating EFL faculty member • Maintain course evaluation log 	<ul style="list-style-type: none"> • Outcomes evaluation of any learner in the ELCUS course who has been accepted at a U.S. university • Final report to host university in China

As can be seen in Figure 2 above, a longer-term relationship with the host institution in China is stipulated through course evaluation and revision, and also through follow-up outcomes evaluation of any ELCUS long-semester course participants who are accepted for graduate study by any U.S. university. The relationship will result in a course packet of mutually developed materials for use by EFL professionals at the university, including texts and authentic audio files for in-class use, and a teacher's manual.

Anticipated Challenges and Remedies

In this final section, two anticipated challenges will be outlined, that of 1. teacher-based difficulties learning and teaching Discourse Intonation, and 2. curricular exchange issues. These will be discussed briefly below, both from the point of view of accepted literature on these challenges, and the point of view of the author's relevant experience with writing DI materials and with international curricular exchanges. Remedies for these challenges will be offered.

Teacher-based difficulties learning and teaching Discourse Intonation. Of major concern is the difficulty the China-based EFL professionals may experience not only teaching Discourse Intonation (DI) but also learning it. This may have negative impact on the proposed mutual ELCUS course design process and implementation. Whether an English as a foreign language (EFL) teacher is a native- or non-native speaker of English, teaching pronunciation (including DI) is a challenge (Chapman 2007). A major source of this challenge is many language teachers' lack of training on English pronunciation (Breitkreutz Derwing and Rossiter 2002; MacDonald 2002). There are only limited materials on DI (Pickering 1999). For native speakers of English who are learning how to teach English to speakers of other languages, one challenge is transforming implicit knowledge about English into explicit knowledge. In other words, while many such teachers can use DI in culturally appropriate ways, this does not mean they are aware of what they are doing or why they are doing it. Explicit knowledge about the *what* and *why* of DI would need to be cultivated in order for native-English speaking teachers to learn how to teach DI.

EFL teachers who are non-native English speakers may actually have more explicit knowledge about English pronunciation. However, DI is not likely to have been included in their formal education about the English language. Single sounds or words (segmental aspects of pronunciation) are more likely to have been focused on, due to a traditional focus on phonetic description (e.g., Gao 2005; Luchini 2005). Further, non-native English speaking EFL teachers may have a strong grasp of the visual representation of pronunciation of phonemes and words through use of phonetic alphabetic transcriptions, which is one means of formal instruction in language (see for example Zhao and Wang 2010). However, these same teachers may not have confidence producing the sounds for the purposes of instruction (Golombek and Jordan 2005; Robertson 2003).

The literature is replete with commentary on the fragmented nature of training in pronunciation teaching in most language teacher preparation programs (Breitkreutz Derwing and Rossiter 2002; Derwing and Munro 2005; Robertson 2003). One author working with explicit DI instruction for advanced English learners in Japan noted that a major stumbling block to his efforts was EFL teachers' uncertainty as to what DI actually was, and how they ought to teach it (Chapman 2007). EFL professionals based at the host university in China may experience similar discomfort, which might threaten the longevity of the proposed ELCUS course once the author returns to the U.S.

International curricular exchanges. Curricular innovations and "new" movements in teaching methodology have a long history in second language education. Some innovations, such

as task-based listening in India (Prabhu 1987) or book floods in Fiji (Mangubhai 2001), have attracted lasting international attention because of their implications for language learning theory. Other innovations, just as theoretically sound or boldly conceived, have not fared as well for a variety of reasons. Two of the more relevant reasons are proposed here: 1. The innovations did not include materials teachers could use, or felt comfortable using; and 2. The innovations did not accord with the prevailing "ecology" of the education system.

In his classic article, "The secret life of methods," Richards (1984) noted that teaching methods that came with materials based on a clearly defined syllabus "which embodies the principles of selection, organization, and presentation of content that the method follows" had distinct advantages over methods which "are dependent solely upon the teacher's skill and ingenuity" (pp. 13-14). Well-written textbooks and accompanying audio CDs or web-support can save language teachers a lot of time, provide learners with second language input, and create a basis for classroom processes that encourage second language learning. This can be especially true for non-native English speaking EFL teachers who may rely on available audio recordings if they are not confident in their own speaking abilities. Nonetheless, teachers may not be comfortable with the materials because they deal with content that seems complicated, or not aligned with what they think learners need.

A related concern has to do with whether a curricular innovation accords with the prevailing educational culture, or "ecology" of the education system at the national and local levels. One prevailing strand in the literature has to do with "Western" curricular and teaching methodology innovations being unsuccessfully imposed on foreign language education systems elsewhere in the world (e.g., Gu 2010; Holliday 1994). EFL educators in countries outside the U.S., England, or Australia have, for example, commented on why communicative language teaching methodology innovations have been so difficult to transplant in education systems which have wholly different goals and traditions, and also a lack of resources with which to implement the innovations on a large scale (Gu 2010; Hu 2005; Wang and Cheng 2005). EFL educators at the host university in China, for instance, may disagree with the entire premise that Discourse Intonation needs to be taught, or that DI is the answer to improving students' speaking skills, or that linking DI to intended meaning using an inductive process would be an effective way for Chinese university students to learn pronunciation. Might not memorization of "rules" be more effective?

Yet another strand of the literature proposes that any curricular innovation: 1. will be difficult to enact; 2. will have unpredictable results; and 3. can be managed using basic principles (Markee 1997). Two of Markee's principles will be focused on here as remedies for the issues described above: 1. There needs to be "good communication among project participants" (Markee 1997 p. 174) and 2. Implementers need "to have a stake in the innovations" (p. 178). See Table 7:

Table 7. Challenges for implementing ELCUS course and remedies

Curricular innovation challenges	Remedies
EFL teachers' training in pronunciation focused on segmental aspects of pronunciation (individual sounds and words), not on suprasegmental aspects (utterances and DI).	<ul style="list-style-type: none"> • Obtain equivalent of two course releases for two participating EFL faculty members from March, 2013 - July, 2013 (time period of PI's stay in China). • Present elements of Discourse Intonation (DI) to two participating EFL faculty members (Table 5). • Maintain good communication with participating EFL faculty members.
EFL teachers' training in pronunciation focused on description rather than use of knowledge of English pronunciation for teaching.	<ul style="list-style-type: none"> • Present elements of Discourse Intonation (DI) to two participating EFL faculty members (Table 5). • Participating EFL faculty members gain a stake in ELCUS in the form of paid professional development.
EFL teachers' training in suprasegmentals focused on description rather than on linkages of DI with discourse level meaning.	<ul style="list-style-type: none"> • Present elements of Discourse Intonation (DI) to two participating EFL faculty members (Table 5). • Participating EFL faculty members gain a stake in ELCUS in the form of paid professional development.
Native English speaker teachers' knowledge of DI is implicit, not explicit.	<ul style="list-style-type: none"> • Present elements of Discourse Intonation (DI) to two participating EFL faculty members (Table 5). • Participating faculty members gain a stake in ELCUS through collaborative materials development (task writing <i>and</i> evaluation of audio files on which to base the tasks).
Non-native English speaker teachers are more comfortable using visual representations of pronunciation but less comfortable hearing and making the sounds of DI.	<ul style="list-style-type: none"> • Present elements of Discourse Intonation (DI) to two participating EFL faculty members (Table 5). • Participating faculty members gain a stake in ELCUS through collaborative materials development (task writing <i>and</i> evaluation of audio files on which to base the tasks).
Curricular innovations need support from materials (texts and CDs, etc.).	<ul style="list-style-type: none"> • Collaborative development of two-month pilot course and five- month long semester ELCUS course plus materials. • Maintain good communication with participating EFL faculty members.

<p>ELCUS materials may seem complicated.</p>	<ul style="list-style-type: none"> • Collaborative development of two-month pilot course and five- month long semester ELCUS course plus materials. • Maintain good communication with participating EFL faculty members.
<p>EFL teachers may not see ELCUS materials as aligned with learners' needs.</p>	<ul style="list-style-type: none"> • Collaborative development of two-month pilot course and five- month long semester ELCUS course plus materials. • Maintain good communication with participating EFL faculty members. • ELCUS course evaluation, revision in collaboration with participating EFL faculty members
<p>ELCUS as a curricular innovation may not fit the educational culture of the host institution in China.</p>	<ul style="list-style-type: none"> • Information meetings on proposal with administration, EFL faculty. • Participating institution and EFL faculty members gain a stake in ELCUS by offering unique, mutually developed, marketable course to soon-to-graduate Chinese scientists.

An important aspect of this proposal is the PI's assumption that what she envisages as the eventual form of the course "Using English to Teach Labs and Classes in U.S. Universities," may not be the form which actually results from the collaborate efforts with EFL professionals at the host institution in China. The PI herself will learn how the essential classroom processes that need to take place for students to learn Discourse Intonation (Table 5) might be negotiated and perhaps strengthened by the local educational culture. In other words, the potential relationship depicted in Figure 1 above between U.S.-based ITA programs and EFL programs in China (currently seen as mediated by Chinese ITAs in the U.S.) will be more fully realized.

Conclusion

All education programs have stakeholders, or those who are potentially affected by the outcomes of that program. Clearly, U.S. university undergraduate education is a stakeholder in Chinese university EFL programs, even though this relationship has yet to be acknowledged. Given the current context of exchange of human capital between higher education systems in the two countries, it seems fitting to increase active, specific, and practical exchanges of information and expertise, and thereby add to significant, generalizable knowledge about processes within curricular and cultural exchanges concerning second language learning. By mutually developing a course for third and fourth year Chinese science undergraduates which will better prepare them for their teaching duties in the U.S. as graduate students, not only the Chinese ITAs but U.S. undergraduates will benefit.

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