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How is regulative discourse recontextualized into instructional discourse in Basil Bernstein's code theory?

A study of the interplay between recognition and realization rules based on primary school teachers' perceptions

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Abstract

Drawing on the code theory of Basil Bernstein, this study set out to explore how the interplay between recognition rules and realization rules associated with framing is constituted, and why, through the issue of teacher-pupil interactions. A large-scale questionnaire survey was conducted of 4,552 primary school teachers in China, with a

response rate of 70.65% (n=3,216). The findings show that recognition rules (teachers' attitudes) stimulate passive realization rules (teachers' ideas), and passive realization rules evoke active realization rules (teachers' actions). As teachers are committed to achieving efficiency, they favor an elaborated coding orientation typical of excellent students because this contributes significantly to ease of teacher-pupil interactions. This intention creates strong hierarchical rules in regulative discourse by which teachers are able to recontextualize regulative discourse into instructional discourse. These correlations establish a legitimate platform for securing the privileged status of middle-class students in teacher-pupil interactions.

Keywords: Basil Bernstein, coding orientation, recognition rules, realization rules, hierarchical rules

1. Introduction

Bernstein adopts a structuralist approach, in which people are viewed as agents, able to exercise agency through linguistic abilities that allow them to negotiate social structure. As a consequence, social structure becomes part of each individual person's experiences. The notion of codes was proposed to portray how social practices are enacted and reproduced. In this respect, Bernstein's Durkheimian approach mixed with Marxism can be invoked to explicate how linguistic codes contribute to cultural reproduction (Best, 2007; Sadovnik, 2001). As the restricted variant is bound with particularistic orders of meaning and the elaborated variant unveils universalistic orders

of meaning (Best, 2007), code refers to the principles regulating meaning systems (Sadovnik, 2001). Whereas codes govern cognitive orientations, dispositions, identities and performance, students' linguistic forms are tacitly acquired through daily life experiences occurring within specific contexts. As speakers need to comply with contextual features in order to make communications workable, their speech reflects the communicative features of the contexts within which they are situated (Bernstein, 1996; Moore, 2010). Because the realization of codes is shaped by context, code is different from competence, an innate ability argued by N. Chomsky. Bernstein rejects the deficit perspective that misinterprets the restricted code characteristic of working-class students as an innate linguistic deficit (Best, 2007; Bolander and Watts, 2009; Jones, 2013; Nash, 2006; Sadovnik, 2001).

Students' primary contextualizing experiences come to affect their responses to the contextualizing practices of the classroom. These responses include their ability to mark contextual features and to produce expected texts, so that codes molded by inter-actional practices carry out the function of rules of recognition and realization. The ability to distinguish specialties between contexts requires students to exercise rules of recognition, while the production of legitimate texts within a context involves performance of rules of realization (Bernstein, 1975, 1990; Fontinhas, Morais and Neves, 1995; Morais, Fontinhas and Neves, 1992). Realization rules are further demarcated into two types – passive and active. The former facilitates the identification of the meaning of a given text while the latter governs the production of correct answers (Morais, 2002). When rules of recognition and realization affect student learning

outcomes, their operations are influenced by regulative and instructional discourses, which compose pedagogic practices (Bernstein, 1990, 1996). Because teachers are able to direct these discourses (Singh, 2001a), their attitudes, values and actions come to sequentially interlink the practice of recognition rules, passive realization rules and active realization rules (Morais and Neves, 2006). In light of these possible correlations, this study set out to examine these potential linkages and their interplay, through a large-scale investigation of teacher-pupil interactions. It is hoped the findings may make a meaningful contribution to code theory by identifying a mutually beneficial relation between theories (internal language of description) and findings (external language of description) (Bernstein and Solomon, 1999; Morais and Neves, 2010).

2. Coding orientation

Bernstein argues that individual coding orientations develop through verbal expressions required by a communicative context, which is constructed by the agent's location in the division of labor. As middle-class parents are situated in a context characterized by high complexity of social interactions and a material base, their coding orientations are uncontext-based, addressing universal and generalized principles that are expressed through abstract terms and logical reasoning. This uncontext-based orientation, termed an elaborated code, allows their children to occupy a privileged position in school because education favors elaborated orientations to meanings. In contrast, working-class parents are bound within fixed locations in the division of labor. Their much simpler social interactions and material base lead to a context-based coding orientation.

The features of this restricted code are particularistic and descriptive, and heavily bound within concrete objects or contexts (Bernstein, 1971, 1981).

The differentiation of these two codes was documented by a study in food categorization, which showed that the classificatory principle employed by working-class students was descriptive, direct and specific. As descriptive language is closely tied with daily life experiences, this context-dependent orientation led them to allocate meanings to specific localities in which practical experiences of objects and social relations were learned and fixed. In contrast, middle-class students adopted properties and rules of food features as rationales for food categorization. This orientation of meaning was context-independent, leading students to seek general principles embedded within the physical character of objects through explanatory language (Holland, 1980). It is argued that either context-based or uncontext-based coding orientation is internalized by children through family structures, by which their perceptions and identities are modified. In this regard, parenting functions as the core element in channeling the forms of verbal expression through which children assimilate and reproduce their parents' coding orientation (Bernstein, 1971). This theory was supported with robust evidence by Hasan (2002), who showed there were marked differences in code-governed selection and organization of meaning in conversations within families from different social backgrounds, the processes of which were mediated and enacted by mothers through their conversations with children. Working-class mothers assumed shared knowledge, experiences and expectations with their children and this 'assumptive' belief functioned as a vehicle, gearing one-way

instructions that transmitted a formative code characterized by predetermined and explicitly worded meanings. Their children were thereby ushered into use of a restricted code. In contrast, middle-class mothers adopted two-way interactions, encouraging their children to probe possible variations of verbal expression through descriptive and evaluative dialogues. This 'prefaced' environment thus underpinned the advancement of an elaborated code in their children. The above findings are consistent with Bernstein's argument that shared perceptions come to forge children's consciousness, sculpting a map of verbal expressions expected in the communicative context through which different coding orientations are formed. In this sense, mothers' mental maps provide their children with a route for exploring and acquiring multiple forms of verbal expression. Unfortunately, such mental maps are conditioned by social class (Bernstein, 1990). As understanding pedagogic practices requires logical reasoning ability, schools attempt to recontextualize students' contextualizing experiences in the family into an elaborated code. This relation accounts for the failure of the majority of working-class students at school (Holland, 1980).

3. Rules of recognition and realization

Bernstein (1981) further points out that codes create rules of recognition and realization, which play a key role in managing students' learning outcomes.

> The difference between the children is therefore not a difference in cognitive facility, but a difference in the recognition and realization rules used by the

children to read the context and to create their texts – a code difference. (Bernstein, 1981: 360).

For Bernstein (1981), coding orientations are formed by the division of labor. The development of the division of labor certifies the application of compartmentalized knowledge to different occupations, so that insulated relations between disciplinary knowledge, termed classification, maintain independent operations of individual occupations. The strength of insulation signifies the relation between categories and the specificity of their voices, created by power. The voice further sets limits on what can be a legitimate message:

> If classification regulates the voice of a category, then framing regulates the form of its legitimate message. (Bernstein, 1990: 100)

More specifically, as the class framework distributes the subject to a specific context, positioning composes a specific form of orientations of meanings (codes) familiar with this context. This familiarity has difficulty in being transferred across contexts due to its fixity within a specific context. In this way, classification creates recognition rules, allowing identification of the distinctions between contexts. Recognition rules are a precondition for the production of legitimate texts (the syntax of generation of meaning), by which a subject is able to exercise realization rules (Bernstein, 1981).

> … the classificatory principle at the level of individual creates recognition rules whereby the subject can orientate to the special features which distinguish the context… The recognition rule, essentially, enables appropriate realizations to be

> put together... The realization rule is necessary to produce the legitimate text. Thus, different values of framing act selectively on realization rules and so on the production of different texts. Simply, recognition rules regulate what meanings are relevant and realization rules regulate how the meaning are to be put together to create the legitimate text. (Bernstein, 1996: 32)

In this sense, the classificatory principle administers specific recognition rules which further stipulate the exercise of realization rules. As acquiring coding orientations involves the acquisition of rules of recognition and realization, these rules can explicitly detail how children proceed with learning and why their learning outcomes are varied (Bernstein, 1996). Codes, or orientations of meanings, carry two interrelated and sequential functions – backwards to specialized interactional practices and forward to textual productions. Different codes thus entail differences in rules of recognition and realization associated with relations 'between' contexts and 'within' a context respectively. Relations 'between' and 'within' contexts are related to forms of communication by which the modalities of specialized interactional practices and textual productions are generated (Bernstein, 1981). At the interactional level, which is shaped by the division of labor, social relations stipulate the features of the communicative context, which consequentially rule the transmission/acquisition relation between teacher and taught (Daniels, 1995). As the interactional principle regulates the selection, organization (sequencing), and pacing of communication, it fashions specific realization rules which establish what counts as a legitimate text. In this regard, the communicative context is defined by control over message transmission

regulated by social relations between teachers and students, which is characterized as 'framing'. Therefore, framing describes the social relation between transmitters and acquirers and thus who controls this relation and manages the form of pedagogic practices (Bernstein, 1981; Hoadley, 2006; Ulriksen, Holmegaard and Madsen, 2017). According to the above intra/inter-correlations, power constitutes the relation 'between', referring to the relations between categories, and control constitutes the relation 'within', alluding to the principle of realization of these relations. Furthermore, classification and framing are core elements separately illustrating power and control, which combine to sustain and reproduce class power, mainly through the educational device. That is why the micro level of communicative context operating in framing is able to relay the macro level of class power exercised in classification. When power creates voices, classification carries recognition rules for identifying the specialty of disciplinary boundaries. If students possess recognition rules, they may thereby utilize rules of realization, as manifest in the production of legitimate texts, such as 'right' answers in the communicative context (Bernstein, 1981).

The practice of rules of recognition and realization can be observed in the issue of school choice. Individual schools tend to use displays for advocating their own characteristics. Some schools address performance, labeling students as belonging to different categories through explicit evaluation criteria. This performance-led approach fascinates some students, who are concerned with individual identity via academic achievement. In contrast, other schools are committed to facilitating students to acquire understanding, which attracts those students who are concerned with the social relations

between students. As students are sensitive to the messages transmitted by the displays in schools, school choice guides students to practice rules of recognition and realization (Daniels, 1989). Such diverse school cultures further generate different criteria for communicative competence, thus requiring students to realize these various competences. Unfortunately, students are seldom formally taught rules of recognition and realization in subject specific speech (Daniels, 1995, 2006). In this situation, other children provide them with resources for learning recognition rules. However, not all students are able to produce speech appropriate to the specialized discourses of particular contexts (Daniels, 1995). It was reported that when strong culture of subjects in classification and framing enabled students to recognize the criteria for communicative competence held by their teachers, they were able to identify the differences between subjects. Nevertheless, the recognition rules the students possessed did not lead to the practice of realization rules, the responses of which were mainly modulated by schools (Daniels, 2006). These scenarios foregrounded modalities of rules of recognition and realization, showing that while some of the students possessed both recognition and realization rules, others only acquired recognition rules and some acquired neither (Daniels, 1995).

These findings serve to document the argument of Bernstein (1971), who theorized realization rules into two aspects: selection of meaning and respective textual production (Bernstein, 1971). The former can be termed as passive realization and the latter as active realization because a child needs to understand the meaning of a specific question prior to the production of a correct answer (Morais, 2002). Furthermore,

teachers' specific coding orientation affects the practice of rules of recognition and passive and active realization (Morais and Neves, 2006). These varieties of communicative practice help explain why some students remain silent in the classroom – because their lack of realization rules impede them from producing the expected legitimate speech, even though they are well aware of the presence of dominant and dominated 'voices' in the classroom. This situation indicates that there is a gap between rules of recognition and rules of realization (Arnot and Reay, 2006). A similar picture was portrayed by Donnelly (2018), showing how this gap was formed and narrowed. Because working-class parents in this study were unfamiliar with the contextual features of universities, they were unable to guide their children to identify the social orders and rituals of universities (recognition rules). However, an outreach program provided these students with assistance to become familiar with these contextual features, so that they were able to apply for department programs suitable to their aptitudes (realization rules). This finding denotes that although recognition rules are tacitly acquired through everyday experiences, when criteria or contextual features are explicit, pedagogic practices move from transmission to acquisition.

4. Regulative discourse and instructional discourse

The exercise of rules of recognition and realization is further fabricated by the combination of regulative discourse and instructional discourse. Classroom practices are constituted by educational discourse, which is comprised of regulative discourse (RD) and instructional discourse (ID). The former is concerned with social order,

character, manner and conduct, while the latter involves the arbitrary internal ordering of school knowledge, including selection, sequencing, pacing and criteria of knowledge, which are designed to educate students in skills and competences. In this formulation, RD directs ID through its embeddedness within it. Because RD sets out ideas and values, it creates rules of hierarchy prescribing social relations between teachers and students (Bernstein, 1990, 1996). As a consequence, values of RD specify the types of teacher-pupil relation, which further govern the exercise of rules of recognition and realization. Given that social relations are embedded within regulative discourse, hierarchical rules in framing are established to define what is considered appropriate and to legitimize the authority of the person who controls the knowledge transmission process in pedagogic practices. When such rules are strong, teachers direct this process; otherwise, student-based pedagogy is prominent (Daniels, 1989, 2006; Morais and Neves, 2006; Sadovnik, 1991). This axiom was documented in a study of a computing course. As the arbitrary internal ordering of school knowledge of computing software programs constructed strong classification, students needed to identify the specialty of context in order to produce legitimate texts meeting the evaluation criteria. While female students enacted recognition rules, as evident in their ability to identify the power relations of computing courses, they were unable to perform realization rules due to their limited knowledge of computing, and thus could not produce the correct answers expected by teachers. This structural constraint derived from strong hierarchical rules of RD in framing, which were manipulated by male students whose rich knowledge of computing programs permitted them to negotiate social relations with teachers. When the

regulative patriarchal discourse was legitimately manufactured, female students became the 'others' whose access to computing knowledge was blocked (Singh, 1995).

These correlations suggest that competences perform as a core mediator proxying rules of recognition and realization into the relation between RD and ID. Unfortunately, it has been reported that there is a gap between teachers' recognition and students' competences (Singh, 2001a, 2001b), or teachers' intentions and students' experiences (Arnot and Reay, 2006; Hotam and Hadar, 2013), or their coding orientations (Morais and Neves, 2006). This gap comes to perpetuate the arbitrary internal ordering of curriculum, so that strong classification is able to interlink strong framing. The combination of strong classification and framing constitutes visible pedagogy, which leads to strong sequencing and pacing rules in framing that favor those students who possess expected competences, such as language ability. In this regard, it is very difficult for teachers to close the gap between curriculum knowledge and underachieving students' coding orientation. All these episodes indicate that teachers function as agents, administering the values of hierarchical rules in RD and recontextualizing RD into ID. As their attitudes towards authority function as the core component of this recontextualization, sequentially organizing the modes of teacher-pupil interaction, teachers need to have appropriate recognition rules with regard to students' competences. Otherwise, they cannot enact realization rules associated with the improvement of marginalized students' academic performance (Singh, 2001a). In this sense, explicit pedagogic modes are important for enhancing students' ability to

employ recognition rules because the ‘what’ (knowledge to be transmitted) is affected by the ‘how’ (teacher-pupil relations regulated by rules of hierarchy) (Singh, 2001b).

As strong regulative discourse makes teachers’ expectations explicit to students, clear evaluation criteria assist students to learn recognition rules, as evident in their ability to recognize correct answers in scientific subjects (Morais, 2002; Morais, Neves and Pires, 2004).

> While this is rightly viewed as strong framing of evaluation criteria, there is in this case a simultaneous weakening of framing at the level of hierarchical rules as reasons are explained to students through a personal mode of communication. To give another example, when the teacher conducts a discussion in the classroom in order to lead children to a given concept, the selection is strongly framed at least at the macro level but framing is weak at the level of hierarchical rules in the relations between teacher-student and student-student. (Morais and Neves, 2001: 210-211)

Because weak framing in hierarchical rules and pacing secures efficient teacher-pupil interactions and gives students adequate time for learning (Morais and Neves 2018), the combination of strong regulative discourse and weak hierarchical rules further facilitates students’ ability to select legitimate texts. This is similar to passive realization (Hoadley and Muller, 2010; Morais, 2002; Morais, Neves and Pires, 2004), but most students are unable to produce legitimate texts, which is related to active realization (Morais, 1996; Morais, Neves and Afonso, 2005). It has been disappointing to uncover the fact that although the strength of framing is often governed by teachers’

attitudes towards control over the communicative context, syllabus predetermines the pace of teaching increasing making teachers' epistemological concerns (Ellery, 2017). This setting urges teachers to deliver whole-class stimulus, the features of which are short, rapid, abstract, expository forms of commentary, and condensing of exemplary explanations to the domain of induction in order to pack in theoretical knowledge and promulgate its status (Bourne, 2003). This situation in turn causes strong hierarchical rules in framing, as witnessed by teachers' widespread concern for keeping up with a designated teaching schedule. As a result, strong pacing in framing compels students to comply with teacher authority (Bjarnadóttir and Geirsdóttir, 2018). This serves to suppress students' voices but bolsters middle-class students' chances of higher achievement (Arnot and Reay 2004, 2007).

In sum, code carries rules of recognition and realization, representing the abilities to identify the special features of a context and produce legitimate texts in this context respectively. The practice of such rules is regulated by hierarchical rules embedded in regulative discourse in framing, which stipulate the social relation between a teacher and students. As the social relation is embedded within regulative discourse that sets out ideas and values, hierarchical rules come to prescribe what is considered appropriate and to legitimize the authority of the person who controls the knowledge transmission process in pedagogic practices. As a consequence, the exercise of rules of recognition and realization is influenced by the combination of regulative discourse and instructional discourse. While student competences perform as a core mediator proxying rules of recognition and realization into the relation between regulative

discourse and instructional discourse, teachers function as agents, administering the values of hierarchical rules in regulative discourse and recontextualizing regulative discourse into instructional discourse. According to the teacher-pupil interactive principle, recognition rules can refer to what teachers think to implement pedagogic practices. Therefore, their attitudes towards students' coding orientations are related to recognition rules. Regarding pedagogic practices, there are differences between ideas and actions. Ideas refer to their characteristics, or more specifically, what teachers' ideas can be, such as the selection of the meanings relevant to the context, which is about passive realization. In other words, passive realization is associated with how teachers think they need to do something and why. This aspect involves their own beliefs and values, including 'instrumental rationality'. Active realization denotes that they have accomplished these ideas, so that teacher performance related to pedagogic actions in the classroom context, including selection and sequencing, belongs to the domain of active realization. In this respect, active realization concerns what teachers actually do through teacher-pupil interactions in classrooms.

In short, teachers' attitudes toward students' coding orientations are related to recognition rules, their ideas of pedagogic practices are associated with passive realization rules and their actions are similar to active realization rules. Under this formulation, teachers' attitudes, ideas and actions are the core elements in creating the linkage between 'what' is taught and 'how' it is transmitted in classrooms. As teachers' attitudes are related to recognition rules, a research question arises: What are teachers' attitudes towards students' coding orientations? Because subject syllabi compel

teachers to keep up with a teaching schedule, their ideas, associated with passive realization rules, are likely to be confined within the sphere of instructional rationality addressing teaching efficiency. Two further interrelated research questions emerge from this situation: Do teachers display the features of instrumental rationality? If they do, how are teachers' ideas about the exercise of instrumental rationality through students' competences regulated by their coding orientations? As schools tend to favor an elaborated coding orientation, this influence may be attenuated by teachers' actions, which are similar to active realization rules. This possibility prompts a research focus: How do teachers interact with students with different coding orientations?

5. Research Design

All these research questions seek to examine teachers' recognition rules, passive realization rules and active realization rules through analysis of their attitudes, ideas and actions in the context of teacher-pupil interactions. Fig. 1 details their correlations. In Fig. 1, teachers' attitudes towards students' coding orientations are related to rules of recognition because such attitudes assist teachers to identify the specialty of a given context such as the boundaries of different linguistic codes among students in this study. As teachers' ideas of instrumental rationality are concerned with teaching efficiency regulating the practice of pedagogic practices, such ideas are associated with the exercise of passive realization rules. Their actions in teacher-pupil interactions function as active realization rules. Furthermore, students' competences play a key role in mediating the relation between teachers' attitudes and ideas, which further constitutes

a social relation between teachers and students by which teacher-student interactions are shaped.

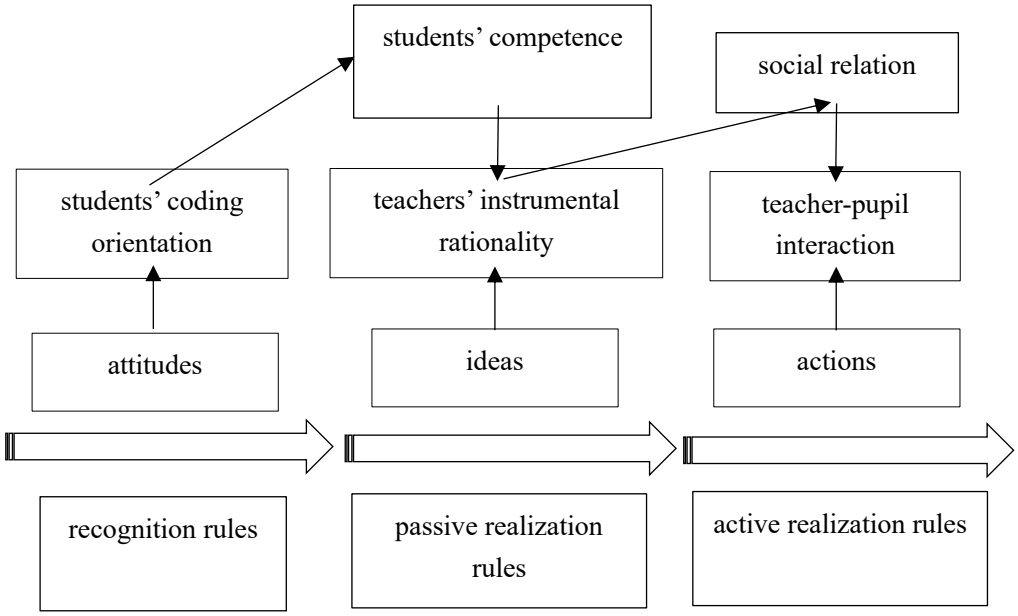

Fig. 1 Theoretical framework of the interplay between recognition and realization rules

Based on these correlations, six interrelated hypotheses are proposed, as shown in Fig. 2.

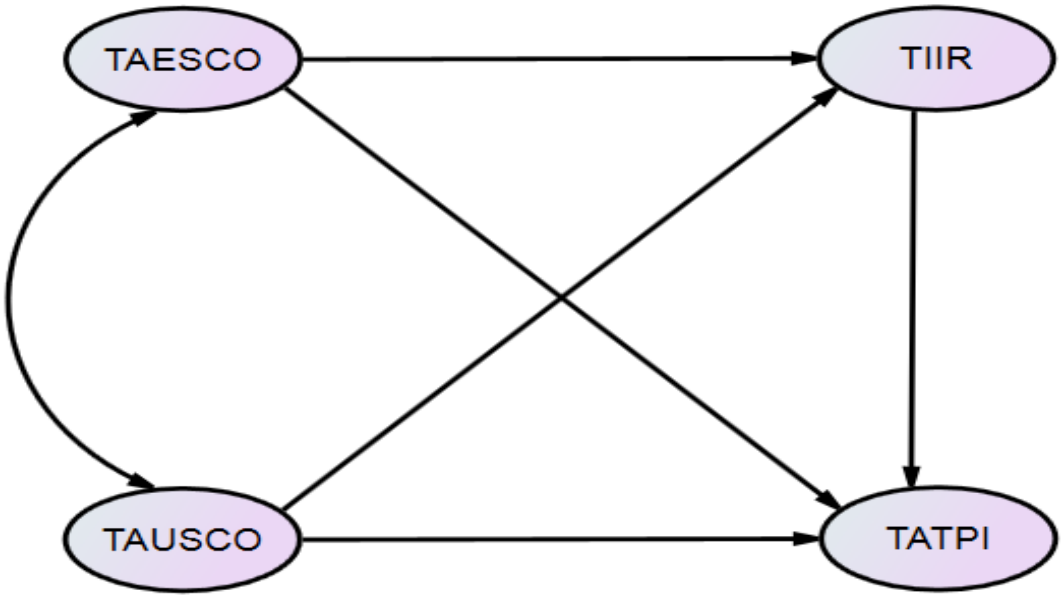

Fig.2 The proposed SEM model

H1. Teachers' attitudes towards excellent students' coding orientation (TAESCO) significantly affect teachers' actions in teacher-pupil interactions (TATPI).

H2. Teachers' attitudes towards underachieving students' coding orientation (TAUSCO) significantly affect teachers' actions in teacher-pupil interactions (TATPI).

H3. Teachers' attitudes towards excellent students' coding orientation (TAESCO) significantly affect teachers' ideas of instrumental rationality (TIIR).

H4. Teachers' attitudes towards underachieving students' coding orientation (TAUSCO) significantly affect teachers' ideas of instrumental rationality (TIIR).

H5. Teachers' ideas of instrumental rationality (TIIR) significantly affect teachers' actions in teacher-pupil interactions (TATPI).

H6. Teachers' attitudes towards excellent students' coding orientation (TAESCO) and teachers' attitudes towards underachieving students' coding orientation (TAUSCO) are significantly correlated.

In order to test these hypotheses, a questionnaire using a five-point Likert scale from strongly agree to strongly disagree was constructed, based on the above theoretical framework. The questionnaire was comprised of two sections, one soliciting demographic information from participants and the other asking questions related to conceptual themes of the theoretical framework. In order to assure its quality, a pilot study was carried out with 84 primary school teachers randomly sampled from 10 primary schools in geographical locations in Henan province, China and the questionnaire was finalized based on feedback from this sample. The final questionnaire had 27 questions consisting of four sub-scales to measure:

1. Similarity of teachers' attitudes towards excellent students' coding orientation (TAESCO) to rules of recognition in an elaborated coding orientation.

2. Similarity of teachers' attitudes towards underachieving students' coding orientation (TAUSCO) to rules of recognition in a restricted coding orientation.

3. Similarity of teachers' ideas of instrumental rationality (TIIR) to rules of passive realization.

4. Similarity of teachers' actions in teacher-pupil interactions (TATPI) to rules of active realization.

6. Sampling Frame and Achieved Sample

Considering the extremely large size of the primary school teacher population (N= 488,600) in Henan province (Education Department of Henan, 2017), stratified random sampling was adopted for this study. The first step was to randomly sample 16 primary schools in each of the five administrative zones in Henan. The second step was to distribute the questionnaire to all primary school teachers (N=4,552) teaching Grades 3, 4, 5 and 6 in the 80 sampled primary schools. This survey had a response rate of 70.65% (n=3,216) and an effective rate of 56.81% (n=2,586). The data were analyzed in SPSS for Windows Release 22 (IBM, Armonk, USA) to generate basic descriptive statistics and conduct factor analysis, and in AMOS 22.0 for analysis of the Structural Equation Model (SEM). Table 1 details the basic demographics of the 2,586 respondents.

Table 1 Demographic information on sampled teachers (n=2,586)

Items	Category	Frequency	Percentage
Gender	Male	372	14.385%
	Female	2153	83.256%
	Missing	61	2.359%
	Total	2586	100%
Qualification	Certificate or below	588	22.738%
	Bachelor's degree	1948	75.329%
	Master's degree or above	41	1.585%
	Missing	9	.348%
	Total	2586	100%
Teaching subject	Major subjects	2129	82.328%
	Minor subjects	454	17.556%
	Missing	3	.116%
	Total	2586	100%
Years of teaching	1-5 years	622	24.053%
	6-10 years	366	14.153%
	11-25 years	1238	47.873%
	Over 25 years	350	13.534%

	Missing	10	.387%
	Total	2586	100%
Post	Subject teacher	1415	54.718%
	Head teacher	725	28.036%
	Teacher with administrative work	437	16.899%
	Missing	9	.348%
	Total	2586	100%
Location	Capital city	956	36.968%
	Urban area	973	37.626%
	Rural area	615	23.782%
	Missing	42	1.624%
	Total	2586	100%
Class size	1-45	364	14.076%
	46-60	1078	41.686%
	61-90	935	36.156%
	Over 90	182	7.038%
	Missing	27	1.044%
	Total	2586	100%

7. Findings

7.1 Descriptive Statistics

With respect to measurements of the interplay between recognition rules and realization rules, Table 2 details the descriptive statistics. The range of means was from 1.96 to 4.16.

Table 2 Descriptive statistics of measurements associated with recognition and realization rules (n=2,586)

Items	Min	Max	Mean	SD
1. Excellent students are good at logical reasoning	1	5	4.12	0.755
2. Excellent students' verbal expression is non-contextually based	1	5	4.04	0.768
3. Excellent students have acquired many abstract terms	1	5	3.91	0.788
4. Excellent students are good at producing elegant texts	1	5	3.90	0.772
5. Excellent students are good at inducing generalized principles	1	5	3.83	0.799
6. Excellent students have strong confidence	1	5	4.09	0.746
7. Excellent students have strong learning motivation	1	5	4.16	0.709
8. Excellent students have clear self-judgement	1	5	3.98	0.762

Items	Min	Max	Mean	SD
9. Excellent students are curious for knowledge	1	5	3.97	0.787
10. Underachieving students' verbal expression is contextually based	1	5	2.40	0.724
11. Underachieving students have strong conformity	1	5	2.31	0.797
12. Underachieving students are not good at logical reasoning	1	5	2.18	0.818
13. Underachieving students have weak confidence	1	5	2.42	0.905
14. Underachieving students have weak learning motivation	1	5	2.40	0.861
15. I often interact with excellent students in class	1	5	3.23	0.987
16. I often interact with average students in class	1	5	3.52	0.829
17. I often interact with underachieving students in class	1	5	3.56	0.842
18. I care for excellent students in class	1	5	3.47	0.832
19. I care for average students in class	1	5	3.79	0.726
20. It is easy for me to teach fluently with average and excellent students	1	5	3.95	0.727
21. Average and excellent students are usually punctual	1	5	3.84	0.790
22. Average and excellent students usually submit homework on time	1	5	4.08	0.708
23. It is much easier for me to mark average and excellent students' homework	1	5	4.10	0.681
24. It is not easy for me to mark underachieving students' homework	1	5	2.13	0.808
25. Average and excellent students usually concentrate in class	1	5	3.92	0.706
26. Underachieving students are often distracted in class	1	5	1.96	0.769
27. I often interact with average students during the break	1	5	3.63	0.742

7.2 Factor Analysis

Concerning factor analysis, the techniques of principal components analysis and varimax rotation were performed. In comparison with several modes, the modes of four factors were extracted in loading value > .50 with the combination of eigenvalue not less than 1.00 and the scree plot. Only item 19 was excluded from the mode of four factors which perfectly corresponds with the theoretical framework in Fig. 1.

Table 3 Factor analysis of measurements associated with recognition and realization rules

	Factor Loadings			
	1	2	3	4

Factor 1: Teachers' attitudes towards excellent students' coding orientation (TAESCO)				
Excellent students are good at logical reasoning (item 1 logical reasoning)	.707			
Excellent students' verbal expression is non-contextually based (item 2 non-contextual expression)	.747			
Excellent students have acquired many abstract terms (item 3 abstract terms)	.802			
Excellent students are good at producing elegant texts (item 4 elegant texts)	.789			
Excellent students are good at inducing generalized principles (item 5 principle induction)	.722			
Excellent students have strong confidence (item 6 strong confidence)	.69			
Excellent students have strong learning motivation (item 7 strong motivation)	.711			
Excellent students have clear self-judgement (item 8 self-judgement)	.741			
Excellent students are curious for knowledge (item 9 knowledge exploration)	.741			
Factor 2: Teachers' attitudes towards underachieving students' coding orientation (TAUSCO)				
Underachieving students' verbal expression is contextually based (item 10 contextual expression)		.504		
Underachieving students have strong conformity (item 11 conformity)		.536		
Underachieving students are not good at logical reasoning (item 12 nonlogical reasoning)		.705		
Underachieving students have weak confidence (item 13 weak confidence)		.739		
Underachieving students have weak learning motivation (item 14 weak motivation)		.736		
It is not easy for me to mark underachieving students' homework (item 24 uneasy marking)		.567		
Underachieving students are often distracted in class (item 26 distraction)		.549		
Factor 3: Teachers' actions in teacher-pupil interaction (TATPI)				
I often interact with excellent students in class (item 15 interaction with ES)			.777	
I often interact with average students in class (item 16 interaction with AS)			.812	
I often interact with underachieving students in class (item 17 interaction with US)			.692	
I care for excellent students in class (item 18 care of ES)			.617	
I often interact with average students during the break (item 27 interactions during breaks)			.615	
Factor 4: Teachers' ideas of instrumental rationality (TIIR)				
It is easy for me to teach fluently with average and excellent students (item 20 fluent teaching)				.707

Average and excellent students are usually punctual (item 21 punctual behavior)				.654
Average and excellent students usually submit homework on time (item 22 homework submission)				.773
It is much easier for me to mark average and excellent students' homework (item 23 easy marking)				.788
Average and excellent students usually concentrate in class (item 25 concentration)				.648
Eigenvalue	7.84	2.727	2.187	1.542
Variable explained (percentage)	30.155	10.489	8.41	5.932
Cumulative variance explained (percentage)	30.155	40.645	49.055	54.987
Cronbach's alpha				.899
Kaiser-Meyer-Olkin Measure of Sample Adequacy				.911
Bartlett's Test of Sphericity significance				p<.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 3 shows that this mode accounted for 54.987% of the total variance with KMO .911 and a Cronbach's alpha of .899. Based on the latent factor between the variables of individual factors:

Factor 1 can be termed as teachers' attitudes towards excellent students' coding orientation (TAESCO) being similar to rules of recognition in an elaborated coding orientation;

Factor 2 can be phrased as teachers' attitudes towards underachieving students' coding orientation (TAUSCO) being similar to rules of recognition in a restricted coding orientation;

Factor 3 points to teachers' actions in teacher-pupil interactions (TATPI) being similar to rules of active realization; and

Factor 4 can be conceptualized as teachers' ideas of instrumental rationality (TIIR) being similar to rules of passive realization.

7.3 Structural Equation Modeling (SEM)

This study analyzed several important goodness-of-fit measures prior to the analysis of SEM. The measurement model has $\chi 2=2627.653$, df=293, $p<.001$. However, the Chi-square statistic is proportional to sample size with a sample of 2,586, so rejection of the null hypothesis of perfect fit is almost certain. While goodness of fit indices that do not depend on sample size were used to evaluate the model, this sample size (N=2,586) was much bigger than N=1,038 calculated in a model constituting an effect size of .3 at 95% power and $p<.05$. Other goodness of fit indices, itemized in Table 4, indicated a good fit between the model and the observed data.

Table 4 Fit indices, acceptable values and values of the model

Fit index	Acceptable Value	Value	Results
GFI	>.9	0.922	Accepted
AGFI	>.9	0.906	Accepted
RMR	<.05	0.040	Accepted
RMSEA	<.08	0.069	Accepted
PGFI	>.05	0.769	Accepted

After the exploratory specification search, the best-fit model and the results (standardized estimates) are demonstrated in Fig. 3. In Fig. 3, e indicates standardized residuals, the numbering of which is automatically produced by AMOS 22.0. Abbreviations refer to the measurement questions that are reported in Table 2. TAESCO, for instance, representing Factor 1 (teachers' attitudes towards excellent students' coding orientation), consists of measurement items 1, 2, 3, 4, 5, 6, 7, 8 and 9. In this way, .76 is the correlation efficient between TAESCO (Factor 1) and measurement item

9 (knowledge exploration: excellent students are curious for knowledge). The coefficients between factors are βs. For example, the correlation between Factor 3 (TATPI: teachers' actions in teacher-pupil interactions) and Factor 4 (TIIR: teachers' ideas of instrumental rationality) is β = .37. At any rate, all β coefficients are listed in Fig. 3.

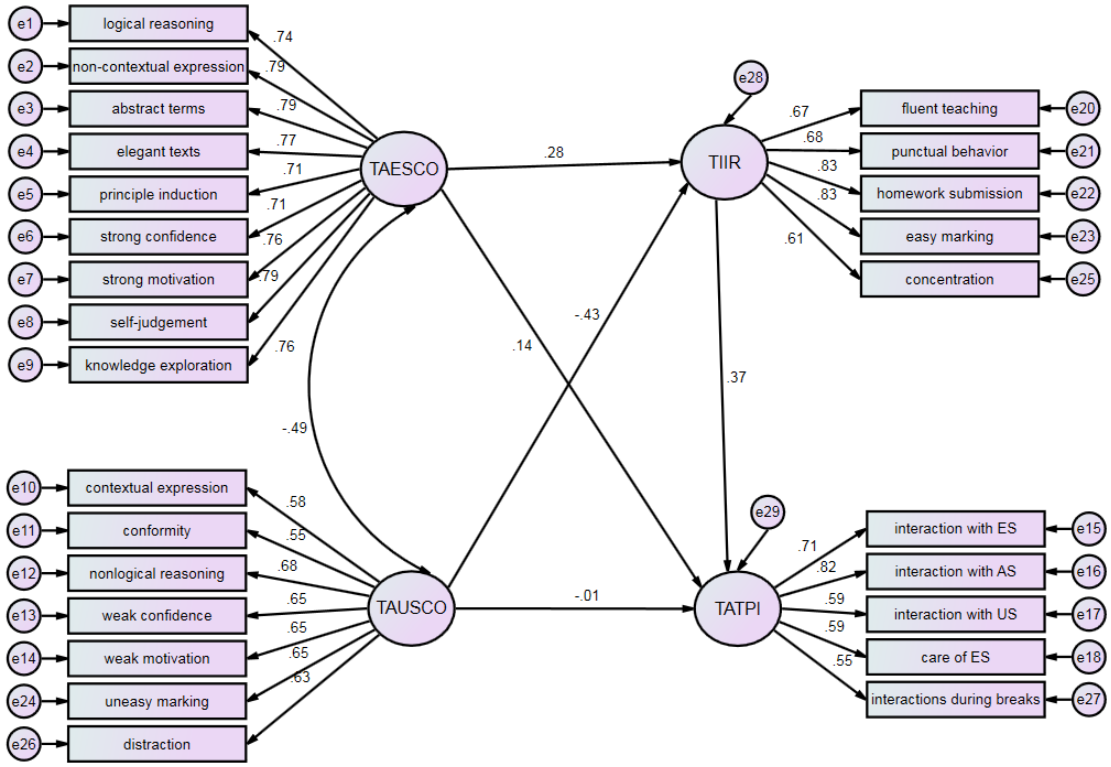

Fig. 3 Standardized estimates of SEM(n=2586)

Table 5 displays the results of the hypotheses. Apart from Hypothesis 2, all the hypotheses were accepted. Rejecting Hypothesis 2 means that TAUSCO (teachers' attitudes towards underachieving students' coding orientation) does not significantly influence TATPI (teachers' actions in teacher-pupil interactions) (β =-.012, p=.707).

This correlation indicates that teachers' recognition rules in a restricted coding orientation don't substantially constrain their interactions with students.

Table 5 Standardized Regression Weights

Research Hypothesis				Estimate (β)	P	Results
H1. Teachers' attitudes towards excellent students' coding orientation (TAESCO) significantly affects teachers' actions in teacher-pupil interactions (TATPI).	TATPI	←	TAESCO	.136	***	Accepted
H2. Teachers' attitudes towards underachieving students' coding orientation (TAUSCO) significantly affects teachers' actions in teacher-pupil interactions (TATPI).	TATPI	←	TAUSCO	-.012	.707	Rejected
H3. Teachers' attitudes towards excellent students' coding orientation (TAESCO) significantly affects teachers' ideas of instrumental rationality (TIIR).	TIIR	←	TAESCO	.279	***	Accepted
H4. Teachers' attitudes towards underachieving students' coding orientation (TAUSCO) significantly affects teachers' ideas of instrumental rationality (TIIR).	TIIR	←	TAUSCO	-.431	***	Accepted
H5. Teachers' ideas of instrumental rationality (TIIR) significantly affects teachers' actions in teacher-pupil interactions (TATPI).	TATPI	←	TIIR	.367	***	Accepted
H6. Teachers' attitudes towards excellent students' coding orientation (TAESCO) and teachers' attitudes towards underachieving students' coding orientation	TAESCO	↔	TAUSCO	-.489	***	Accepted

(TAUSCO) are significantly correlated.

Note: * indicates p <.05, ** indicates p <.01, *** indicates p <.001
Indirect effects from F1 to F3 is .111；Indirect effects from F2 to F3 is .163.

In respect to Hypothesis 1, the results show that TAESCO (teachers' attitudes towards excellent students' coding orientation) significantly affects TATPI (teachers' actions in teacher-pupil interactions) (β =.136, p <.001). Although this effect is moderate, it verifies the tenet that from the viewpoints of sampled teachers, students' possession of an elaborated coding orientation facilitates teachers to engage in teacher-pupil interactions. This relationship confirms that teachers appreciate an elaborated coding orientation due to its positive contribution to teacher-pupil interactions. Whatever the difference between Hypotheses 1 and 2 was, sampled teachers could recognize the different contributions of different coding orientations, suggesting that teachers' attitudes function as recognition rules in the context of teacher-pupil interactions.

Theoretically, recognition rules (attitudes) govern passive realization rules, which stimulate active realization rules. The results of Hypotheses 3 and 4 provide solid testimony to these relationships. Regarding Hypothesis 3, TAESCO (teachers' attitudes towards excellent students' coding orientation) significantly contribute to TIIR (teachers' ideas in instrumental rationality) (β =.279, p <.001). This finding supports a conclusion that recognition rules (teachers' attitudes) significantly administer passive realization rules (teachers' ideas). In other words, students, who possess an elaborated

coding orientation, help teachers smoothly implement their pedagogic practices. When the sampled teachers faced students with a restricted coding orientation, this positive correlation was reversed, as exemplified by the result of Hypothesis 4, the negative correlation between TAUSCO (teachers' attitudes towards underachieving students' coding orientation) and TIIR (teachers' ideas in instrumental rationality) (β =-.431, p <.001). This finding suggests that a restricted coding orientation significantly impedes teachers from fluently implementing their pedagogic practices. The results of Hypotheses 3 and 4 together point to an axiom that the relation between teachers' recognition rules and passive realization rules is regulated by students' coding orientations. This relation is further mediated by teachers' attitudes towards students' coding orientations, as evidenced by the result of Hypothesis 6, showing a negative relation between TAUSCO (teachers' attitudes towards underachieving students' coding orientation) and TAESCO (teachers' attitudes towards excellent students' coding orientation) (β =-.489, p <.001). This relation implies that the sampled teachers favored an elaborated coding orientation rather than a restricted coding orientation. This inclination can also be observed in the result of Hypothesis 5, which demonstrates that TIIR (teachers' ideas in instrumental rationality) significantly contribute to TATPI (teachers' actions in teacher-pupil interactions) (β =.367, p <.001). This result suggests that passive realization rules (teachers' ideas) induce active realization rules (teachers' actions). Combining the results of Hypotheses 5 and 6, the linkage between passive realization rules and active realization rules is regulated by recognition rules (teachers' attitudes).

8. Discussion

8.1 Teachers' attitudes towards students' coding orientations function as recognition rules

The results of the above six hypotheses demonstrate how the interplay between recognition rules and realization rules is mediated by teachers. In Hypothesis 1, TAESCO (teachers' attitudes towards excellent students' coding orientation) significantly affects TATPI (teachers' actions in teacher-pupil interactions) (β =.136, p <.001). This implies that as excellent students assist teachers to initiate interactions with students, teachers favor an elaborated coding orientation. Although this finding confirms the argument of Bernstein (1981, 1990, 1996), who theorized that the privileged status of middle-class students was sustained by a close relation between their coding orientation and schools, it further explicates that this relation is constructed through teacher-pupil interactions, which are managed by teachers' attitudes towards students' coding orientations. According to the formations of Factors 1 and 2, teachers are able to identify the features and outcomes of students' different coding orientations. As this discrimination is based on detection of the specialty of contexts (coding orientations), teachers perform rules of recognition. This evidence thus verifies the argument of Morais and her associate (Morais, 2002; Morais and Neves, 2006), defining teachers' attitudes as recognition rules.

8.2 Teachers' passive realization rules are confined within the domain of instrumental

rationality

The measurement items of Factors 1 and 2 further project that teaching efficiency is the core focus of teachers' attitudes. This intention manufactures their ideas of instrumental rationality, as evident in the formation of Factor 4 (TIIR: teachers' ideas in instrumental rationality), showing that teachers tend to appreciate excellent students because they make a positive contribution to fluent pedagogic practices. This inclination can be observed again in the result of Hypothesis 6, which found a negative relation between TAUSCO (teachers' attitudes towards underachieving students' coding orientation) and TAESCO (teachers' attitudes towards excellent students' coding orientation) (β =-.489 (p <.001). All these results contribute to a doctrine that for teachers, teacher-pupil interactions are mainly accomplished through students who possess an elaborated coding orientation. While this finding resonates with the results of Hypotheses 1 and 6, which suggested teachers favor an elaborated coding in order to have easier teacher-pupil interactions, teachers' attitudes are different from their ideas, because attitudes create the foundation of ideas, which evoke actions. This difference appears in the result of Hypothesis 3, in which TAESCO (teachers' attitudes towards excellent students' coding orientation) were found to significantly contribute to TIIR (teachers' ideas in instrumental rationality) (β =.279, p <.001). This finding reveals that the concept of teaching efficiency is boosted by an elaborated coding orientation, so that teachers' ideas are confined within the domain of instrumental rationality. This efficiency-led approach can be further scrutinized by the result of Hypothesis 4, which found a negative correlation between TAUSCO (teachers' attitudes towards

underachieving students' coding orientation) and TIIR (teachers' ideas in instrumental rationality) (β =-.431, p <.001). This negative coefficient foregrounds a principle that a restricted coding orientation impedes teachers from fulfilling their pursuit of instrumental rationality, and thus restricts teaching efficiency. In short, the results of Hypotheses 3 and 4 converge to support a tenet that teachers' ideas are concerned with instrumental rationality. These findings not only verify the influence of syllabus on pedagogic practices (Bjarnadóttir and Geirsdóttir, 2018), but also explain how this influence is interceded by TIIR (teachers' ideas in instrumental rationality). This relation implies that attitudes organize ideas, so that recognition rules (teachers' attitudes) stimulate passive realization rules (teachers' ideas). This connection thus supports the argument of Morais and her associate (Morais, 2002; Morais and Neves, 2006), who interpret teachers' ideas as passive realization rules evoked by recognition rules (teachers' attitudes).

8.3 As teachers' ideas stimulate actions, passive realization rules evoke active realization rules

Attitudes lead to expectations that attenuate the values of hierarchical rules in regulative discourse in framing. Because the sampled teachers' attitudes showed preference for an elaborated coding orientation, this environment produced strong hierarchical rules. Teacher-based authority creates a strong relation in a communicative context in which students with an elaborated coding orientation can easily participate in teacher-pupil interactions, as witnessed by the result of Hypothesis 1 (β =.136, p

<.001). The relation can be found in the composition of Factor 3, which suggests that even though teachers interact with all types of students, they care about excellent students more. As regulative discourse implicitly steers instructional discourse, strong hierarchical rules come to refabricate the communicative context, leading it to shift from the mode of acquisition to the mode of transmission, as claimed by Daniels (1995). This strong social relation thus benefits those students with an elaborated coding orientation, in terms of teacher-pupil interactions. In contrast, it is difficult for other students to have regular interactions with teachers, as evidenced by the result of Hypothesis 2, which found TAUSCO (teachers' attitudes towards underachieving students' coding orientation) does not significantly influence TATPI (teachers' actions in teacher-pupil interactions) (β =-.012, p=.707). In this case, teacher-pupil interactions are mainly accomplished through those students with an elaborated coding orientation rather than with a restricted coding orientation. This rule resembles the findings of related studies which discovered that marginalized students are treated as 'others' (Singh, 1995). When an elaborated coding orientation is viewed as a legitimate competence by teachers, this strong hierarchical rule in regulative discourse leads to a specific form of instructional discourse, which can be seen in the realm of teacher-pupil interactions. More specifically, when teachers' attitudes indicate approval of an elaborated coding orientation, this environment establishes strong hierarchical rules in regulative discourse by which students acquiring an elaborated coding orientation can have active interactions with teachers. Therefore, strong hierarchical rules create strong social relations in the communicative context, which predetermine a specific form of

teacher-pupil interaction associated with instructional discourse. This finding illustrates why students' competences bridge regulative discourse and instructional discourse (Arnot and Reay, 2006; Hotam and Hadar, 2013; Singh, 2001a, 2001b). Our evidence also suggests that teachers' recognition rules (attitudes) in students' coding orientations lead to their passive realization rules (ideas), which stimulate active realization rules (actions). The results of Hypotheses 3 and 4 (see above) further denote that the linkage between teachers' recognition rules and passive realization rules are regulated by students' coding orientations. This coding orientation principle accounts for the result of Hypothesis 5, which exhibited a significant relation between TIIR (teachers' ideas in instrumental rationality) and TATPI (teachers' actions in teacher-pupil interactions) (β =.367, $p < .001$). Although the results of Hypotheses 3 and 4 are consistent with the result of Hypothesis 5, there are also sequential relations between them, because ideas stimulate and regulate actions. As active realization rules refer to the production of legitimate texts within the context, teachers need to conduct legitimate actions in order to perform interactions with students. In this respect, instrumental rationality legitimizes their actions because fluent pedagogic practices ensure teaching efficiency, as expected by the majority of social members. According to these results, teachers' ideas of instrumental rationality induce their actions in teacher-pupil interactions, so that a principle can be concluded that passive realization rules (teachers' ideas) provoke active realization rules (teachers' actions). The serial relation from passive realization rules (ideas) to active realization rules (actions) is consistent with the argument of Bernstein (1971, 1981) demarcating two steps of realization rules, from selection of

meaning to respective textual production. This order corresponds with other related studies documenting these two steps, such as by identifying the specialty of the context and in turn making an appropriate decision in the context (Donnelly, 2018), or understanding the specific meaning of a question first and then producing correct answers (Arnot and Reay, 2006; Bernstein, 1975, 1990; Fontinhas, Morais and Neves, 1995; Morais, 2002; Morais, Fontinhas and Neves, 1992; Morais and Neves, 2006). As students are seldom formally taught the rules of recognition and realization stipulated by school cultures (Daniels, 1995, 1989, 2006), we can infer from the above findings that teachers play a crucial role in teacher-pupil interactions in framing through the formulation that recognition rules (teachers' attitudes) administer passive realization rules (teachers' ideas) and passive realization rules invoke active realization rules (teachers' actions). This formulation can portray how teacher-pupil interactions in framing are constituted, and why teachers function as the main agents for administering the values of hierarchical rules in regulative discourse and recontextualizing regulative discourse into instructional discourse.

9. Conclusion

For Bernstein, students' learning outcomes are directed by the interplay between recognition rules and realization rules, referring to the identification of the specialty of contexts and the production of legitimate texts in the context respectively. As these rules are governed by reasoning ability operated in linguistic forms, inequity in education results is rooted in students' coding orientation, and incarnated in their competences,

the legitimacy of which are validated by the educational device. When schools transmit a certain form of knowledge as legitimate, a specific fashion of coding orientation is required in order to recognize the special meanings of pedagogical contexts (recognition rules) and then to generate correct answers (realization rules). As a consequence, students are situated within a communicative context, the feature of which is governed by a social relation that transmits expected order, conduct and manners associated with regulative discourse. Teachers thereby play a key role in setting the values of hierarchical rules in regulative discourse, thus gearing instructional discourse. This theoretical lens suggests that teachers are the main agents administering the interplay between recognition rules and realization rules. Bernsteinian scholars further discriminate two types of realization rules: passive and active. In this regard, teachers' attitudes, ideas and actions can be interpreted as recognition rules, passive realization rules and active realization rules, in sequence. In light of this theoretical assumption, this study set out to explore the interplay between rules of recognition and realization through the issue of teacher-pupil interactions.

The robust evidence of this research has well documented the above assumptions by supporting a tenet that this interplay is arbitrated by teachers. More precisely, teachers' attitudes serve as recognition rules because they are able to recognize the features and outcomes of different coding orientations. As excellent students facilitate ease of interaction between teachers and students, teachers prefer an elaborated coding orientation. This inclination provides a convincing explication of why the privileged status of middle-class students is shielded by schools. As this intention is underpinned

by teaching efficiency, which is predetermined by the syllabus, teachers' ideas are confined within the sphere of instrumental rationality, as evident in their appreciation of excellent students' contribution to fluent pedagogic practices. The above correlations thus articulate a rule that attitudes manufacture the ground of ideas, so that recognition rules lead to passive realization rules. Teachers' ideas in instrumental rationality further contribute significantly to teacher-pupil interactions. This phenomenon reveals a principle that when ideas guide actions, passive realization rules evoke active realization rules. A formulation therewith can be concluded, detailing that recognition rules (teachers' attitudes) administer passive realization rules (teachers' ideas) and passive realization rules invoke active realization rules (teachers' actions). As attitudes construct expectations that adjust the values of hierarchical rules in regulative discourse, which predetermine expected morals, conduct and manners, teachers' ideas in instrumental rationality, which are shaped by their inclination toward an elaborated coding orientation, create strong hierarchical rules that certify teacher-based authority in a social relation embedded within teacher-pupil interactions. As a consequence, the pedagogic context shifts from the mode of acquisition to the mode of transmission, which is mainly controlled by teachers, and this environment in turn benefits those students with an elaborated coding orientation by facilitating frequent interactions with teachers. That is why the teachers in this study relied on excellent students to achieve ease of teacher-pupil interaction. This phenomenon also illustrates why the privileged status of middle-class students in schools is secured, and further reveals that by virtue of coding orientation, there is a harmonious relation between teachers and middle-class

students. This consistent combination makes hierarchical rules in regulative discourse operate invisibly, and enables teachers to recontextualize regulative discourse into instructional discourse. Furthermore, from the perspective of teachers, this constitution contributes to teaching efficiency, ensuring fluent pedagogic practices.

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