Exploring Talk Moves of a Teacher Educator when Triggering, Developing, Elaborating and Finalising Classroom Discourses:

A Vygotskian Perspective

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From the President

The major duty of universities is not only the production of technical and terminological knowledge, but also the perfection, internationalisation and scientificisation of university-based teaching endeavours. A nation's most indispensable intellectual strength is its universities. The standardisation of inter-faculty teaching and the adoption of generic pedagogical principles in all cells of the university can only be attained through focusing on the innovative pedagogical approaches and strategies that are functionalised at the university level. One of the instrumental ways of transferring and sharing the pedagogic-scientific knowledge produced in the university to the interlocutors is through the examination of how these processes take place. Therefore, every effort to improve the higher education of a nation should be regarded as a serious intellectual contribution and value. As adopted in the present study, our basic idea in the context of accelerating various efforts on behalf of the university can be expressed as follows: To understand and move forward the higher education of a nation strictly requires problematizing it. One of the featured ways of taking concrete steps in knowing and solving the problems of teaching in higher education is to make the existing problems visible and examine them in-depth. In this context, this valuable work of our faculty members offers us a new vision to understand and make sense of broader and analytical principles of the effective instruction. I would like to thank our teacher educators and prospective teachers who contributed to the preparation of this work.

Associate Professor Doctor Mustafa AYDIN
Istanbul Aydın University
Chairman of the Board of Trustees

From the Rector

Today, the main purpose of higher education systems is to close the difference between theory and practice in order to enrich cultural, ethical, and aesthetic aspects of social life by producing a whole of theories fed by practice. In the globalizing world, the responsibilities of universities are also expanding. In this context, one of the main goals of the universities is to provide a pedagogical stance to both their educators and student participants who must strive for creating, communicating and sharing knowledge. When the outcomes of this research are evaluated carefully, especially on behalf of education faculties, the necessity of the necessary steps to be taken is once again concretised. In this context, the duty of investigators should be to re-consider the outcomes of the research presented here as an intellectual lens to glorify the place of higher education in Turkey. I would like to thank our teacher educators and prospective teachers who contributed to the preparation of this work.

Professor Doctor Yadigâr İZMİRLİ
Rector of Istanbul Aydın University

CONTENTS

Exploring Talk Moves of a Teacher Educator when Triggering, Developing, Elaborating and Finalising Classroom Discourses: A Vygotskian Perspective

Executive Summary

Introduction: This study explored how a teacher educator staged talk moves to initiate, develop, elaborate, and finalise classroom talks. The teacher educator's talk moves were documented, then, their accumulated distributions were detected to understand how prospective teachers' conceptual acquisitions were fostered.

Methods: An experienced teacher educator employed in the classroom teaching program was the participant. The basic data source was video recording (329 mins) of whole group negotiations and voice records obtained from the small group discussions. Data corpus was analysed through systematic observation.

Results: Communicating and challenging moves showed a descending trendline whereas monitoring, legitimating and knowledge providing and evaluating moves were enacted in an ascending manner from the first (initiate, develop, elaborate) to the last stages (finalise, wrap up, review) of the classroom talks. Different sociolinguistic frameworks were considered to interpret why talk moves showed heterogenous accumulated distributions along the conversational continuum.

Discussion: It is theoretically hypothesised in the current study that initial parts of in-class conversations should be more dialogically-oriented or interactive, in the midst of the discursive sequences, the verbal exchanges could be both dialogically-oriented and monologically-oriented or half-dialogic and half-monologic, and in the latest sections of the in-class talks there should be more authoritative or monologic interactions among the peer community in terms of Vygotskian and Bakhtinian perspectives. This gradual transition from a dialogical to monological discursive sequence may explicate why the teacher educator mainly enacted the challenging and communicating moves at the earlier stages of classroom talks, and monitoring, legitimating and knowledge providing and

evaluating moves were displayed at the later stages. To put it differently, once the discrepancies (challenging moves) pertaining to teaching/learning concepts were injected clearly and comprehensibly (communicating moves) into classroom talks, it was time to legitimate other's propositions (legitimating moves) as this needed to present logical expositions to the students (knowledge providing and evaluating moves) and let the students to check and control their mental model/ scheme alterations metacognitively (monitoring moves) during in-depth and rigorous social negotiations of meanings.

Limitations: This study incorporated some limitations. First, this study should be considered as a prototype naturalistic inquiry where only one teacher educator's talk moves were analysed. More teacher educators or members from different faculties should be involved in further studies to extract more fine-grained patterns regarding the cumulative distributions of the talk moves. In addition, a limited amount of video records was obtained in this study. To construct more generalised arguments for the cumulative distributions of the talk moves within a discursive journey, longitudinal data sets are necessary.

Conclusion: This study concluded that a discursive journey may incorporate heterogeneous accumulations of different typologies of the talk moves in different time intervals from the initial to final stages of the verbal interactions. In the current study, a considerably sophisticated nature and structure of classroom discourse patterns are presented. Thus, it should be asked whether teacher educators or other faculty members hold a conscious awareness regarding multifaceted aspects of classroom conversations deeply patterned in the current study. Thus, university educators' pedagogical-discursive noticing regarding their in-class implementations' sociolinguistic patterns should be available to them through high-quality professional development programs in which self-study methodologies should be used to make educators reflective practitioners.

Keywords: talk moves, social language, classroom discourse, teacher educator, higher education

Introduction

This study investigated how a teacher educator staged her talk moves to initiate, develop, expand, and finalise classroom discourses regarding teaching concepts. The teacher educators' talk (discourse) moves were documented, then, their temporal *or* accumulated distributions were detected to understand how the educator supported the prospective teachers' conceptual acquisitions. In the implementation (discursive journey), the educator enacted different types of talk moves by different frequencies at different times (from beginnings to end: initiate, develop, expand, review, finalise phase). This study is theoretically framed around the Vygotskian sociocultural perspective.

Theoretical Framework

Reconsidering Vygotskian perspective in the context of teaching how to teach

Vygotskian socio-historical-contextual approach to development and learning infers that individuals' activities take place in cultural contexts (John-Steiner & Mahn, 1996). Vygotsky indicated that individuals' activities such as dialoguing, philosophising, meaning-making, thinking, and talking can be best understood when explored in their historical development (John-Steiner & Mahn, 1996). The activities are mediated by different semiotic mechanisms such as language and other forms of communicative tools and sings as social carriers (e.g., formulas, braille, graphs, charts, equations, specific concepts, gestures, mimicking, mnemonics, etc.). When explicating learning-driven development, Vygotsky (1978) stated that transformation of elementary mental functions into higher mental functions are needed social interactions with more knowledgeable/capable others who are the social sources of development. When interacting with others, individuals use various semiotic mechanisms that mediate social and individual functioning. For instance, by engaging in classroom talks, a teacher educator and his/her students conduct

verbal interactions through language that connect the external and internal or the social (intermental plane) and the individual (intramental plane) (John-Steiner & Mahn, 1996).

Vygotsky defined the development as the transformation of socially shared activities into internalised processes (John-Steiner & Mahn, 1996). After rehearsing ideas within the social contexts of the classroom, the process of internalisation is executed by participants. Socially oriented negotiations of meanings are appropriated and privatised for individualised purposes. The products of internalisation will be diverse for different students since the process of internalisation is the transformation of communicative language into individualised inner speech and further into personal verbal thinking (Vygotsky, 1986).

Vygotsky (1987) focused on the intimate relation between *thought* (ways of thinking) and *language* (ways of talking). In this context, Vygotsky defined *spontaneous* and *scientific* concept terms. A spontaneous concept is constructed via everyday experience and communication in a societal context in which the purpose of an individual is not to master concepts (Vygotsky, 1987). A scientific concept, on the other hand, is required to engage in more technical and formalised processes as experts develop and operate.

Based on Vygotskian ideas, Wertsch (1991) proposed *social language* term by also taking the Bakhtinian (1981) perspective into account. A social language is "a discourse peculiar to a specific stratum of society (professional, age group, etc.) within a given system at a given time" (Holquist & Emerson 1981, p. 430). Social languages can differ in terms of professional jargon (Leach & Scott, 2003). A social language may externalise a specific point of view regarding the world. Social language(s) can be considered as specific thinking forms for externalising the world in utterances (Bakhtin, 1981).

Individuals may have specific meanings for different worldviews in terms of social languages (Bakhtin, 1981). In this manner, Vygotsky (1986) indicated that scientific concepts do not have a direct relationship with the objects that they refer to in the world: this relationship is always mediated by *other concept*s (Mortimer & Scott, 2003, p. 18).

Above-located ideas about social languages (thinking and talking systems) can be transferred to university-levelled teaching (e.g., Hjelm, 2013; Taylor, 2003; van der Rijst et al., 2014; van Huizen, van Oers, & Wubbels, 2005). In the context of teaching in higher education, two kinds of social languages can be defined. These are *social languages of (university) science* and *everyday social languages of students* (prospective teachers in the present study). Concepts of teaching can be conceived divergently by teacher educators (producers of knowledge) and prospective teachers who may have *every day* or *alternative* explanations regarding concepts of teaching that are mostly based on their previous schooling experiences within lay culture.

Teacher educators elucidate teaching through evidence-based theories that are constructed through data collection, analysis, and interpretation. Teacher educators use specific jargons, models, and analogies to utter their evidence-based reasoning about cognition and teaching (e.g., operant conditioning, reinforcement, scheme theory, curriculum theory, pedagogical content knowledge, etc.). This type of formalised (technical) thinking and talking system may not be visible and valid for prospective teachers who may develop and hold more simplified and intuitive perceptions regarding teaching (e.g., knowledge is transferred from a knowledgeable teacher to students as this warrants learning). This does not mean that prospective teachers have (completely) incorrect concepts of teaching. Alternative social languages of prospective teachers can be totally or partially different from the social languages the teacher educators develop and utter in the university classroom.

The alternative conceptions of prospective teachers are the expected sociolinguistic products of day-to-day experiences and communications about teaching, learning, schooling, etc. and these are mostly constructed within lay culture. Beyond, in the university classroom, we, as teacher educators, mostly present an alternative thinking and talking system to prospective teachers. From the Vygotskian point of view, alternative conceptions of prospective teachers simply represent the ways of communicating in everyday social language. Thus, the vital role of teacher educators is to invite prospective teachers to revise, modify, enriched, or alter their existing mental models regarding teaching concepts. In Vygotskian perspective, the goal of university-based teaching is to introduce new ways of thinking and talking to prospective teachers, illustrating, and modelling how alternating social languages of university science are used appropriately in particular situations to make sense about effective pedagogy.

Segments of classroom discourse and distribution of talk moves

In this study, learning about teaching is conceptualised as acquiring to think and talk in new ways or learning to talk social languages of university-based science. However, in the presence of differentiating social languages, there will be discursive-pedagogical tensions for teacher educators. There may be some communalities and differences between scientifically-oriented social languages of educators and everyday or alternative social languages that prospective teachers bring into the classroom. Beyond, there may be greater communalities or discrepancies between aforesaid social languages. When there are fewer differences and more communalities between different social languages, instruction can be straightforward as direct lecturing. However, this is not the case most of the time in university classrooms when it comes to teaching about how to teach. There may be mutually exclusive social languages in the university classrooms regarding how effective teaching should be conducted for meaningful learning.

When there are heterogenous explanation systems in the university classroom, two decisions can be rendered by educators. Educators may not pay attention to everyday social languages of prospective teachers and put the scientific point of view forward. When this is the case, a more authoritative classroom atmosphere in which prospective teachers' propositions are evaluated based on canonical science knowledge may be created and maintained. On the other hand, educators may attach importance to prospective teachers' personal theories, preconceptions, and alternative explanations about effective teaching. When this is the case, a more argumentative learning environment in which alternative point of views are welcomed and negotiated to get somewhere may be created and sustained. When this is the case, both monologic and dialogic verbal exchanges and interactions would occur. To explicate, educators indeed hold two types of accountabilities. First is to make student-led arguments explicit and consider them to initiate and maintain classroom talks. Prospective teachers' ideas' contents should be used to unfold the classroom discourses since their existing mental models should be determining in reaching an intellectual consensus regarding how-aspects and what-aspects of teaching concepts. The second intellectual accountability of educators is to introduce, stage and model new ways of thinking and talking that mostly favours canonical science knowledge or makes the social languages of university science prominent.

In the beginning episodes of classroom discourses more dialogic verbal interactions are expected. Like a brainstorming activity, educators may gather several responses within a pool. Educators, in brainstorming activities, may not decide whether a provided response is valid, rational, or relevant for the progression of social negotiations of meanings (Chin, 2006; 2007; Mortimer & Scott, 2003). In this phase of classroom discourse, there will be low interanimation of ideas (Mortimer & Scott, 2003) by which variability of student-led responses is checked through capturing various propositions from

them. In this initiating section, educators may use various talk moves. For instance, teacher educators may elicit and probe (Edward & Mercer, 1987; Grinath & Southerland, 2019) prospective teachers' responses to grasp the underlying meaning of the utterances. Educators may reformulate or revoice (Alexander, 2006) ambiguous student-led responses by injecting verbal scaffolding for more healthy and effective communication. Furthermore, educators may summarise key points deduced from student-led utterances and present clusters of alternate meaning positions (Leach & Scott, 2003; Soysal, 2018). During initial discursive cycles, educators may request for clarification (Tytler & Aranda, 2015) from student teachers to make their utterances more intelligible. During initial cycles of classroom talks, there may be less places for the vocabularies of social languages of science. This phase of classroom discourse can be conceived as a *decontextualisation* process (Mortimer & Scott, 2003) in which only student-led ideas are gathered, summarised, and classified for more in-depth social negotiations of meanings.

After gathering and pooling student-led responses, educators and prospective teachers may follow half-dialogic and half-monologic discourse processes. Indeed, not all the assertions of students can be valid, plausible, or *progressive* for an unfolding classroom talk. During the initial social negotiations of meanings, prospective teachers may propose scientifically accepted ideas, but they can be irrelevant for the context of classroom discourse or contents under negotiation. Furthermore, prospective teachers may propose contextually proper ideas, but they may need to be revised, modified, enlarged, or altered for a more in-depth acquisition of concepts of teaching. Thus, educators, in this phase of classroom discourse, should enact half-authoritative and half-dialogic discourse moves to *recontextualise* (Mortimer & Scott, 2003) the content under discussion. In this phase, developing-expanding, educators may use their talk moves to select and make prominent some specific student-led responses while eliminating or ignoring others (Grinath & Southerland, 2018;

Leach & Scott, 2003; Mortimer & Scott, 2003; Soysal, 2018). By selecting-eliminating moves, teacher educators may deliver the meta-message to students that some of the previously clustered responses are more appropriate compared to others to unfold classroom discourse.

In addition, during developing-expanding phase, educators may focus students' attention on responses (van Zee & Minstrell, 1997a, 1997b) that may be more worthwhile for the progression of classroom discourses. For developing and expanding classroom talks, educators may act as debaters, challengers, and negotiators. Discussant educators may perform discrepant questioning by inviting prospective teachers to notice their propositions' deficiencies (Simon, Erduran & Osborne, 2006). By discrepant or challenging moves (Bansal, 2019; Soysal, 2018), educators may try to convince students to adapt and use alternative social languages favouring canonical science knowledge that may be more exploratory and explanatory compared to their everyday social languages in terms of illuminating and resolving an instructional dilemma. In developing, expanding, enriching, and modifying prospective teachers' ideas, educators may invite them to criticise each other's assertions. This requires argumentation by which members of the peer community have chances to evaluate, judge and legitimate others' opinions (Christodoulou & Osborne, 2014; van Zee & Minstrell, 1997a; Soysal, 2018). Thus, there will be both authoritative and dialogic processes since all proposed ideas are challenged and legitimated both by educators and peers. As seen, above-mentioned discourse processes are half-dialogic and half-monologic since prospective teachers are free to utter their ideas, however they may be revised, modified, or completely altered by others' (peer members, educators) more powerful arguments.

In the latest stages of classroom discourse, more monologically-oriented verbal interactions can be observed. To explicate, the group already externalise

and negotiate key points and there should be an intellectual consensus among the peer community. In the latest segments of classroom discourse, some specific conceptual points or social languages should be featured. Thus, more monologic talk moves can be staged by educators since their goal in the latest stages is to wrap up and review key points through confirmatory talks. Educators, in the latest phases of classroom discourse, may inject more formalised and technical thinking and talking systems into talks to close or finalise the discussions. Educators, as aforesaid, hold accountabilities pertaining university science's curricular contents. In finalising-closing phase, educators may stage knowledge providing and evaluating moves. Educators may directly lecture the theories of teaching, or principles, paradigms, and worldviews of teaching. Moreover, after discussing various points, educators may present logical expositions to get somewhere in the discourse (Edwards & Mercer, 1987; Lemke, 1990). There will be therefore more vocabularies of science language in these stages of classroom discourses where more authoritative talk moves may be observed. Educators may ask about mind-change (Van Zee & Minstrell, 1997a; Simon, Erduran & Osborne, 2006) to encourage prospective teachers to monitor their changing, revising, enriching, or modifying assertions during the history of classroom discussions. By asking about the mind-change move, educators may guide students to have a version of teacher noticing regarding mental model modifications, enrichments, or alterations that scaffold students' internalisations.

As summarised above, a discursive journey from everyday social languages of students to social languages of university science incorporates three related cycles of classroom discourse: initiating, developing-expanding, finalising-closing. University-based teaching sequences can be started with more dialogic interactions, then, both dialogic and monologic exchanges can be observed, and finally more monologic episodes may emerge These segments of discursive journey in the context of university-based teaching

may incorporate specific talk moves. More dialogically-oriented moves can be accumulated in the early stages of classroom talk. Over time, when students hold more experience and conceptual understanding regarding formalised teaching and learning concepts, both dialogic and monologic or half-dialogic and half-monologic interactional talk patterns may emerge. Lastly, after analysing, revising, and critiquing various meaning positions, more credible and/or contextually relevant ones are selected and put forward to get somewhere through classroom discourse (Engle & Conant, 2002). This selection, elimination and agreement on contextually appropriate reasoning require more authoritative interactional patterns in the latest stages of classroom talks. Thus, this study conducted a classroom discourse analysis to test whether some of the specific talk moves of a teacher educator are distributed to the particular segments of discursive journey. The research question addressed in present study is that:

What were the cumulative distributions of talk moves when an experienced teacher educator launched discursive journeys by initially allowing for everyday social languages of prospective teachers and finalised by encouraging them to use and appropriate social languages of university-based science?

Methods

The participant

An experienced teacher educator employed in the classroom teaching program was the participant. The educator held 12 years of university-based experience to teach how to teach to prospective teachers. The educator gained her doctorate degree from educational sciences and held expertise in the field of curriculum theory, teacher training, and theories of teaching and learning. The educator designed and implemented several continuing professional development

programs with in-service teachers in collaboration with various stakeholders. The educator's educational inquiry was more about teachers' epistemological and pedagogical beliefs, teaching competencies of inservice teachers and pedagogical content knowledge. I and the participant had positive civic and social relations. The educator as my colleague was in search of problematising her teaching theories by monitoring, analysing, and modifying her in-class practices. The educator was of the idea that the current study was a chance to take a closer look at her in-class practices as she was frequently filmed during teaching how to teach but her pedagogical actions or talk moves were first analysed and reported.

Thematic content and process of the in-class implementation

S. Lee Shulman's (1986, 1987) original idea (metaphor) about knowledge base for teaching, *pedagogical content knowledge*, was deeply discussed with the prospective teachers through specifically-prepared instructional cases. The basic problem for the prospective teachers was to determine who teaches well compared to other: a teacher with substantial subject matter knowledge or a teacher with a considerably enriched pedagogic and contextual knowledge including, for instance, various teaching strategies, assessment techniques, students' preconceptions and misconceptions, aims of teaching particular subjects, representational strategies, curricular knowledge, school context, classroom climate, etc. As technically known, pedagogical content knowledge, characterising the teaching profession, has been considered as an idiosyncratic amalgamation of content knowledge and knowledge of general pedagogy. Thus, the educator was expected to guide the prospective teachers to interpret and analyse teaching profession's knowledge bases such as content knowledge and instructional knowledge or contextually-oriented pragmatic and systematic combinations of these knowledge bases.

The implementation was conducted based on a planned teaching agenda that was semi-structured and allowed for nuclear educator-led talk initiations and bounded student-led talk initiations. Through specifically prepared and piloted pedagogical cases, the prospective teachers were promoted to problematise key underlying concepts of pedagogical content knowledge. The implementation was conducted within five consecutive sub-cases (initiate, develop, elaborate, review, finalise) and two main (initiate-develop-elaborate sessions, finalise-review sessions) phases.

Initiate-develop-elaborate sessions: In the early phases of the discussions, the educator acted as a persuasive discussant to guide the prospective teachers to notice that their existing social languages could hold less explanatory power compared to alternative thinking and talking systems. During the initial phases of classroom discourses, the prospective teachers tried to offer resolutions for the pedagogical dilemmas injected by the written cases. In the implementation, after an introductory session, the group read and grasped the underlying meaning delivered by pedagogical cases, and extracted the conceptual contradictions embedded in the cases for the fine-grained social negotiations of meanings pertaining the core components of pedagogical content knowledge. The prospective teachers indeed problematised their own theories of teaching and learning while coping with *conceptual* (e.g., who teaches well: a person holding substantial subject matter knowledge or a person knowing the theories of teaching and learning very well?), *ontological* (is there such a thing as pedagogical content knowledge or may teachers have a professional knowledge base or could teaching phenomenon be thought as a profession since everyone may teach something to somebody?) or *epistemological* (how could we depict, define, describe or measure teaching profession's different aspects embedded in the pedagogical content knowledge?) dilemmas embedded in the cases.

In the further stage of discussions, developing and elaborating, the prospective

teachers worked in small groups to address the conceptual and ontological dilemmas in the provided cases. Collaborative reasoning sessions were attained in small group discussions with the aid of the educator. In small group discussions, the prospective teachers carried out discussions about central questions they deduced from the provided cases. The prospective teachers used the prompts in the written texts (cases) to construct big questions and sub-questions regarding the pedagogical issue. The educator visited all small groups and stayed in a neutral position when she was listening to the group members' propositions pertaining to the big questions. The educator did not inject presumable right answers and modelled some specific thinking styles supporting the egalitarian atmosphere of the discussions. The prospective teachers had to use and refer to specific knowledge bases through undertaking computerized searches, asking a classmate, gaining external experts' opinions, and using information from books, thesis, or dissertations. The prospective teachers first handled the tasks individually, then compared their hypothetical propositions within their group members. All proposed ideas were criticised and revised by the group members to present a more concise and illuminating argument for resolving the pedagogical dilemmas.

Finalise-review sessions: In the latest phases of classroom discourses, as finalise-review, the study groups presented and defended their assertions. The prospective teachers were encouraged to explicate and justify their ideas to reach an intellectual consensus. The prospective teachers externalised their solutions, suggestions, and reasoning strategies to the validation of other groups. The educator prompted the students to respond to each other to ensure argument evaluation and revision processes. The major role of the students was to convince other students regarding that their solution suggestions are more instrumental in shedding light on the given instructional dilemmas. The educator monitored all possible explanations and solution suggestions and juxtaposed them for the prospective teachers to come up with more refined ideas.

Data collection processes

Video-based records of the in-class implementations were used to analyse the idea exchanges and ideas. The implementation or the guided in-class inquiry was maintained for two weeks. The basic data source was therefore video recording (329 mins) of whole group negotiations and voice records obtained from the small group discussions. Two cameras were put on the different places of the classroom. One of the teaching assistants was assigned to hold a camera by walking around the classroom in order to capture one-to-one verbal interactions and exchanges for detailed data collection processes. For ethical considerations, university-based ethical committee examined the present study's procedures and decided that the study was not harmful psychologically and incorporated precautions for protecting the confidentiality. The prospective teachers and educators completed the consent form including clear purposes of the present study and were volunteer in involving in the study. There was a possibility of the Hawthorne effect (alerted participants) since the groups had been filmed for the first time. Thus, initial in-class discussion trials were not included in the data gathering and analysis process in avoiding a Hawthorne effect.

Data analysis

Data corpus was analysed in three phases detailed below. In the present study classroom discourse analysis methods were used to analyse the accumulated proportions of the enacted talk moves across the implementations. Both qualitative and quantitative techniques were used to analyse the verbal data corpus. In terms of qualitative techniques, open coding and axial coding were used to explore and extract the educator's talk moves' typologies that were enacted to launch, develop, elaborate, and finalise classroom discussions regarding the how to teach concepts. In terms of quantitative aspects, extracted typologies of the enacted talk moves were counted to define the accumulated distributions of the moves across different time frames of verbal exchanges.

Dividing the whole transcript into more manageable parts: To find out patterns of the accumulated distributions of enacted talk moves in the fragments of the classroom talks, the verbatim transcript was divided in sub-topical episodes. The episodes incorporated less talk turns that were more manageable to demonstrate how the educator used the talk moves cumulatively in different phases of the classroom talks. Micro-changes or turning points in the conversational streaming were considered to locate the sub-topical episodes. In some specific moments of the classroom talks, the educator relatively or sharply altered the conceptual contents' flows by offering to consider an alternative point of view in next sub-topical episodes.

Table 1. Typologies of the talk moves performed by the teacher educator to initiate, develop, and close the social negotiations of meanings

Label	***Code***	***Code description***
Knowledge providing and evaluating	Direct and immediate affirming	The educator acknowledges and welcomes a student-led response.
	Direct and immediate rejecting	The educator negates and disapproves the provided responses.
	Affirmation-cum-direct-instruction	The educator admits the response and transmits further explanations.
	Rejection-cum-direct-instruction	The educator turns down a student-led response and delivers a more feasible or correct account.
	Presenting logical expositions	The educator receives the response, accepts it, and provides further clarifications based on canonical science knowledge.

Communicating	Probing	The educator promotes students to elicit and deepen their statements and expressions.
	Requesting for clarification	The educator guides students to clarify and articulate their utterances.
	Reformulating	The educator revoices a student-led phrase to make it apparent and apprehensible.
Monitoring	Focusing	The educator attracts students' attention to a particular response.
	On moment framing	The educator reminds students what is now talked about or focused on in the conversation.
	Prospective framing	The educator remarks which point(s) will be next talked about or focused on in the conversation.
	Retrospective framing	The educator reminds students which points of views had been talked about and focused on in the close history of the conversation.
	Summarising-selecting-eliminating	The educator summarises the provided responses, puts some of them forward (select), and ignores (eliminate) others.
	Asking about mind-change	The educator orients students to think and talk about whether they have revised, modified, elaborated or shifted their preconception(s) during discussions.

Legitimating	Asking for evaluation (student-led)	The educator invites students to interpret, criticise and commentate others' propositions.
	Asking for evaluation (case-based)	The educator presents instructional cases for students' interpretations, criticisms, and judgements.
	Asking for evaluation (teacher-led)	The educator prompts students to determine whether a teacher-led proposition is precious and plausible for the progression of discourse.
Challenging	Counter arguing (playing devil's advocate role)	The educator makes student-led conceptual, ontological, and epistemological cognitive conflictions visible and discussable.
	Sustaining conceptual (internal) consistency	The educator specifies and remarks external and internal logical inconsistencies within classroom talks.

Identifying typologies of the talk moves the educator enacted: Types of talk moves were analysed through systematically observed (Mercer, 2010) the educator's utterances. The purpose was to allocate the individual talk moves to a set of collapsed categories. The major aim of the categorisation was to obtain quantitative proportions of the accumulated distributions of different types of talk moves. To discern discursive purpose of an analytical move, researchers can create their own classification system, or they can borrow an off the shelf system (Mercer 2010, p. 4). In this study, both theory-based and data-driven codes were applied together for specifying the typologies talk moves. In Table 1, the coding catalogue developed for talk move typology

analysis can be seen. 19 sub-talk moves are gathered around five higher-order labels in the catalogue to discern a talk move from others. The catalogue is a fine-grained one to typify varying talk moves.

Two researchers had trained themselves to allocate any piece of educator-led talk move to a category that had been generated for the talk moves. Some pieces of the transcript were analysed together, and other sub-sections were analysed independently. The incongruent code assignments were negotiated and mostly solved. For instance, in several cases, it was compelling to distinguish *on moment framing* (reminding students what is now talked about or focused on in the conversation) moves from *focusing* (attracting students' attention to a particular response) moves. Furthermore, for challenging moves, several detailed negotiations were carried out since in some parts of the transcript, it was observed that the teacher educator acted counter arguing (just presenting an alternative idea or thinking) that could not be accepted as authentic discrepant or challenging questioning.

Representing accumulated distributions of the talk moves: Once all educator-led utterances were labelled, their frequencies were calculated within each sub-topical episode. In sub-topical episodes different types of talk moves were observed by different proportions. To display accumulated distributions of each talk move across the sub-topical episodes, trendlines were patterned through graphical representations. Trendlines were considered and interpreted to represent how and to what extent a type of talk move's uses fluctuated in the history of the classroom conversations.

Results

In this section, accumulated distributions of the enacted talk moves are presented. The educator used five typologies of talk moves.

Knowledge providing and evaluating moves

Knowledge providing and evaluating moves were staged in affirming and rejecting a provided response or presenting logical expositions. Figure 1 displays the accumulated distributions of knowledge providing and evaluating moves. As seen, frequency of the knowledge providing and evaluating moves seemed to be increased from the initiate-develop-elaborate to the finalise-review phases.

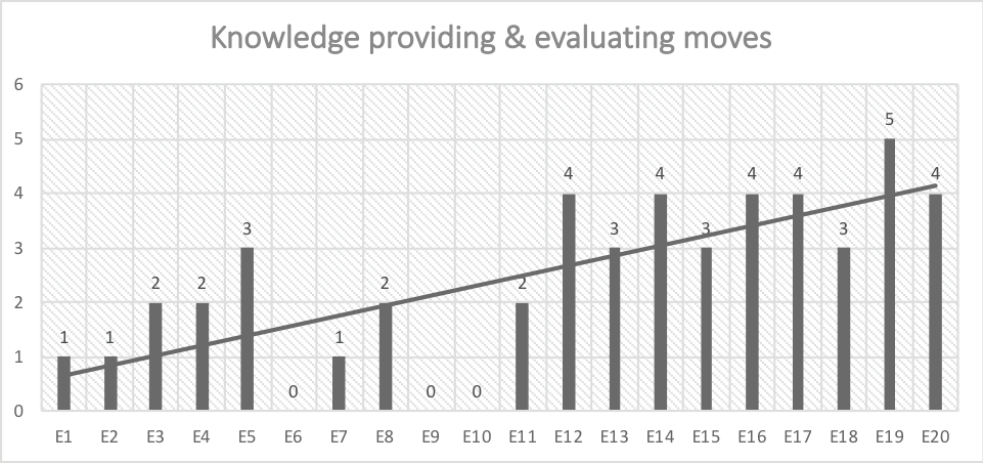

Figure 1. Sub-topical episode-based distributions of knowledge providing and evaluating moves

In the implementation, 20 sub-topical episodes were observed. First 11 sub-topical episodes were devoted to *initiate-develop-elaborate* sessions and remaining nine sub-topical episodes (from episode 12 to episode 20) were dedicated to the *finalise-review* stages. In these two consecutive parts of classroom discussions, each talk move's comparative proportions, represented as frequencies and percentages, can be seen in Table 2. This kind of representation was needed to determine whether there was a *slight* (relatively 1-5% difference), *moderate* (relatively 5-10% difference) or *sharp* (relatively 15% difference or above) increasing or decreasing tendency for a talk move from the initial to latest cycles of classroom discourses.

Table 2. Accumulated distributions of the talk moves across the consecutive stages of classroom conversations

Type of talk move	Episode Interval					Tendency
	E-1 to E-11	E-12 to E-20				
	Initiate-develop-elaborate	***Finalise-review***	**Relative percentage**		**Difference (%)**	
	Frequencies		**1-11**	**12-20**		
KPE*	14	34	9.09	20.6	11.51	Moderately increasing
COM	85	38	55.19	23.03	32.16	Sharply decreasing
MON	19	43	12.33	26.06	13.72	Moderately increasing
CHAL	19	3	12.33	1.81	10.51	Moderately decreasing
LEG	17	47	11.03	28.48	17.44	Sharply increasing
Total	*154*	*165*				

**KPE: knowledge providing and evaluating; COM: communicating; MON: monitoring; LEG: legitimating; CHAL: challenging.*

The educator staged 154 talk moves in the initiate-develop-elaborate phases compared to finalise-review phases where 165 talk moves occurred. For knowledge providing and evaluating moves, a moderate incremental tendency was patterned. The educator seemed to use the knowledge providing and evaluating moves more pervasively in the latest stages of classroom talks (20.6%) compared to initial stages (9.09%). From episode 12 to episode 20, this group of moves was regularly performed by the educator (Figure 1). This implies that in the finalise-review sessions, the educator tended to reject ("*I do not think so… I think you might think differently*.") or affirm ("*I am in favour of*

considering the phenomenon of teaching as a profession like you!") the student-led responses or gave more information about the topics under consideration.

Table 3. The educator performed the knowledge providing and evaluating moves to wrap up the negotiations

Turn	Speaker*	Utterance	Discursive function of talk move
1	S1	I think everyone may have knowledge of everything. But there is no point in that knowledge unless you know who, where and how to tell it. It has no value. That is why the teaching profession comes into play right here.	
2	S2	And a professional profession!	
3	E	Absolutely!	Direct and immediate affirming
4	S2	There are also different situations. Now, we can have problems while a 20-year-old teacher teaches us something. This situation may be related to not being able to keep up with the technology.	
5	E	Technological and pedagogical content knowledge? Or you are talking about something in the literature perhaps without realizing it: technological pedagogical content knowledge.	Affirmation-cum-direct-instruction

**E shows the educator as a speaker and S1 shows a prospective teacher who utters for the first time in the given dialogue.*

The educator acted a more authoritative stance by selecting more relevant student-led responses (Turn-3, Table 3) and providing deeper background knowledge (Turn-5, Table 3). In the latest episodes, the educator seemed to present logical

expositions by leaving her neutral position (Turn-5, Table 3). This infers that the educator seemed to feature a more formalised social language as canonical science knowledge ("…*technological pedagogical content knowledge*") after elaborating and brainstorming many aspects of the pedagogical content knowledge phenomenon in more dialogically-oriented discussion cycles.

Communicating moves

Communicating moves were used to elicit the underlying meaning of the student-led utterances and clarify what meaning the students tried to convey (see also Table 4). The dialogue presented in Table 4 is taken from the very early moments of the in-class discussions.

Table 4. Different uses of the communicating moves

Turn	Speaker*	Utterance	Discursive function of talk move
1	E	What is the main problem in this situation?	Initiated dialogue by an open-ended question
2	S1	Ms. Bahriye, who is illiterate, teaches Fırat that ash is a good thermal insulator.	
3	E	Let's clarify this: Is Ms. Bahriye a teacher or not?	Probing
4	S2	She can be accepted as a teacher.	
5	E	I think you have a good explanation?	Probing
6	S3	Something came to my mind when I read that text. There was a so-called teacher in a school. He was a very good teacher; everyone was talking about that teacher who was very popular. It was later revealed that the teacher was not a real teacher. It appeared in the news. He did not have a diploma.	

7	E	Then… What do you want to tell us about this? (Or… What did you mean by *this*? (the utterance of the student-2))	Requesting for clarification
8	S2	At that time, Ms. Bahriye can be seen as a teacher.	
9	E	Linda (student-2) has declared that Ms. Bahriye is a teacher (?) (saying suspiciously) who has not received an undergraduate education or is illiterate.	Reformulating

**E shows the educator as a speaker and S1 shows a prospective teacher who utters for the first time in the given dialogue.*

As seen in Figure 2 and Table 2, a different pattern was observed for the communicating moves compared to the knowledge providing and evaluating moves. Figure 2 displays how the frequencies of the communicating moves decreased along time in the implementation. Table 2 shows that the decrease detected for the communicating moves was sharp from the initial to latest cycles of classroom discourses. In initiate-develop-elaborate cycles, more than half of the talk moves (55.19%) were devoted to communicating moves while 23.03% of all the enacted moves in the finalise-review stages were observed as the communicating moves. As represented in Figure 2, especially in episode 1 ($n = 11$), episode 8 ($n = 10$) and episode 10 ($n = 10$), the educator performed communicating moves more intensively. Particularly in the first sub-topical episodes, the educator seemed to capture the background meanings in the student-led utterances by a dialogic manner.

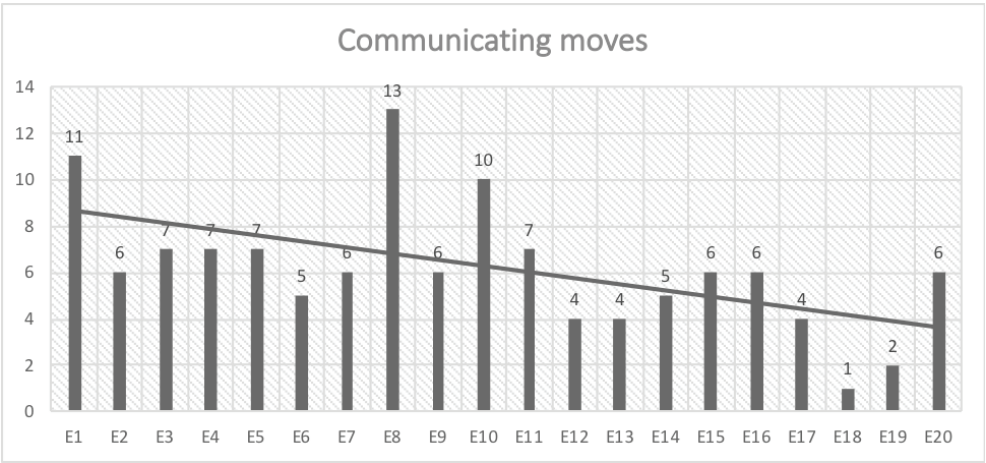

Figure 2. Sub-topical episode-based distributions of communicating moves

Hypothetically, communicating moves were expected to occur in all stages of the classroom talk homogeneously. To justify, by the communicating moves, the educator tried to launch and sustain a healthy communication. However, a moderately heterogeneous distribution was observed. This may imply that as time progressed in the implementation, the educator and students seemed to grasp each other's utterances' intentions in a clearer sense. Thus, the educator might prefer to elicit (Turn-3, Turn-5; Table 4) the students' responses' underlying meanings by a decreasing tendency. In the early stages of classroom discussions, the pervasive occurrence of the communicating moves (see also Figure 2) might deliver a metamessage to the students that they had to elicit and clarify (Turn-3; Table 4) their meaning positions before externalising them.

Monitoring moves

Figure 3 shows the ascending tendency in the uses of the monitoring moves over time in the sub-topical episodes. In the initiate-develop-elaborate stages, the monitoring moves were observed rarely compared to the latest phases

of the classroom conversations. In some sub-topical episodes in the initiate-develop-elaborate sessions (e.g., episode 3 and 9), this group of moves was not enacted. Especially in some sub-topical episodes of the finalise-review phases (e.g., 14, 15, 16 and 17), the educator seemed to stage the monitoring moves more pervasively compared to any other sub-topical episodes (Figure 3). A moderate incremental tendency was observed for the monitoring moves (Table 2). The educator seemed to boost the uses of the monitoring moves from the initiate-develop-elaborate (12.33%) to the latest cycles (26.06%) of classroom discussions.

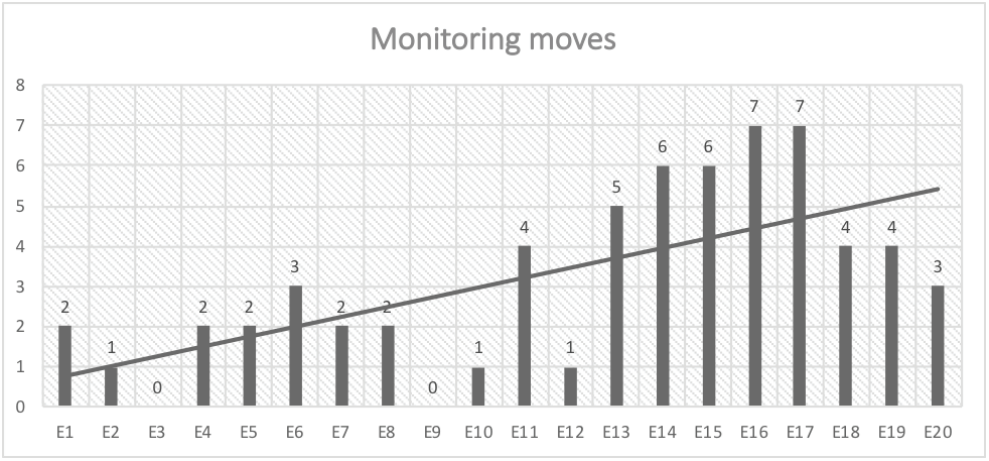

Figure 3. Sub-topical episode-based distributions of monitoring moves

The educator used the monitoring moves to let the students be aware of the classroom happenings throughout the discussions. Particularly for three sub-moves under this category seemed to be increased from the initial to the latest stages of the classroom conversations. As exemplified in Table 5, by *focusing* sub-move, the educator tried to grasp the attention of the students to specific responses that were mostly embedded in the teaching agenda of the teacher. Once the educator made a specific response salient through focusing moves (Turn-4, Turn-6 and Turn-13) the students might think that the point uttered

by one of their classmates may be more progressive and unfolding for the classroom discourses since the teacher tended to canalise their attentions to that focal point. As sampled in Table 5, through summarising-selecting-eliminating moves (Turn-8), the educator intentionally selected some student-led responses and made them salient while ignored some of the student-led responses that were either contextually inappropriate or logically fallacious. Thus, as observed in the latest cycles of classroom talks, the educator had to act more authoritative moves such as selecting or featuring and eliminating or ignoring some of the proposed ideas.

Table 5. Different representations of the monitoring moves

Turn	Speaker*	Utterance	Discursive function of talk move
1	S1	There was a scene in the movie. Three Idiots. I think it was about the machine repair. The professor was trying to use the subject matter in great detail. He made the most difficult, complex definition of the machine. But that definition had no use for the students. Students actually needed to know how the machine works. Likewise, tell and explain mathematical wordings as much as you want to students. We cannot of course teach four operations without knowing division and multiplication. But students should experience them. Here, too, we must create learning environments in which the students will experience to apply them.	
2	E	In short... Which do you think is more important compared to other?	Probing

3	S1	No one. I think the subject matter knowledge of teaching is more important.	
4	E	Look! Your friend is now talking about very interesting concepts like subject matter knowledge of teaching.	Focusing
5	S2	Without the subject matter knowledge, the teacher does not have the subject matter knowledge of teaching.	
6	E	He said something very strange! Let's stop for a minute, please. Can you say what you said once again by shouting?	Focusing
7	S2	Without the subject matter knowledge, the teacher does not have the subject matter knowledge of teaching.	
8	E	Shall we talk about this point a little longer?	Selecting-eliminating
9	S3	So, first, there must be knowledge of the subject, and then the instruction of subject?	
10	S2	No, they must both be together.	
11	E	But how will they be together?	Probing
12	S4	No, I think... Then when a person teaches something, s/he actually improves his/her subject matter knowledge. Then the development of teaching knowledge depends on the development of the content knowledge. But I think the content knowledge gets deeper while teaching it to someone.	
13	E	OK. Let's look at this answer directly and examine it. // He said that while one teaches something to another, s/he develops his/her content knowledge. // I have wanted you to talk exactly that point.	Focusing // Reformulating // Selecting-eliminating

**E shows the educator as a speaker and S1 shows a prospective teacher who utters for the first time in the given dialogue.*

When the educator enacted focusing and selecting-eliminating moves, she permitted the students to juxtapose and compare alternating social languages. When this was the case, the students had chances to comprehend that their social languages may be useful in clarifying some points pertaining pedagogical content knowledge. However, the students also might see that there may be additional points to be considered to come up with a holistic explanation system for the phenomenon under negotiation. However, all above-interpreted discourse processes were mostly actualised in the latest phases of the discussions just after collecting and pooling several student-led responses in a dialogic manner.

Challenging moves

Through the challenging or discrepant talk moves, the educator mainly presented alternative explanation systems to the students to problematise their pre-understanding. The educator used the challenging moves in a contingent manner by which she used the information in the student-led propositions to contradict them. Three challenging initiations of the educator can be seen in Table 6 in Turn-6, Turn-13, and Turn-21. The educator seemed not to falsify or destroy a student-led response, rather, she tried to create a discourse harmony in which alternative points of views were tested, evaluated, or legitimated. The challenging moves were scaffolding for the students to problematise their own preconceptions or perceptions. The educator invited the students to test a proposition by referring to disciplinary ways of reasoning (logical thinking, Turn-21, Table 6).

Table 6. Challenging moves of the educator while discussing pedagogical content knowledge

Turn	Speaker*	Utterance	Discursive function of talk move
1	S1	I think ... Everyone knows the four operations. Everyone who passes through the street knows four operations. But it strictly requires a specific skill to reduce a content to a simple level and teach a street vendor. I think this the pedagogical content knowledge. Teaching knowledge leads us in a practical way how we approach our students, shapes our attitudes in the classroom and determines in what ways we can teach the knowledge we have learned to our students.	
2	E	Good interpretation. // For example, suppose that we will teach students four operations. Who teaches the best?	Direct and immediate affirming // Probing
3	S1	The one who knows the content of the four operations would teach best.	
4	E	Then s/he (the one) may not be a teacher? Did you mean that?	Requesting for clarification
5	S2	There is a situation like this. We have teacher as professors. They are experts for instance in language teaching. But in their lessons, you leave without learning anything from the lessons. Normally I am sure that they are very good teachers, but if you cannot transfer the knowledge you have, it is not important to have that knowledge!	

6	E	Can't anyone who knows a subject very well teach his/her knowledge? Or can't s/he share his/her knowledge effectively? That's the case you have mentioned: "I know the subject very well, but I couldn't teach it." Is that possible? This does not make any sense to me, unfortunately.	Counter arguing (playing devil's advocate role)
7	S3	Then there are problems in his/her knowledge of teaching. Because knowledge of teaching is teaching the internalised knowledge. I must internalize the subject very well so that I can teach it effectively.	
8	E	I think someone who knows the subject very well has internalised it very well. How about that?	Asking for evaluation (case-based)
10	S4	No!	
11	E	If you say "No!" you should explain the "No!".	Probing
12	S5	Just because someone has learned a topic very well does not mean that she will explain it very well.	
13	E	For example, think like this. The subject we are going to learn is the quantum physics. And… Imagine that we are peers. I learned the quantum physics in one way; so, I can teach you with the same method I had learned the subject. Can't it be?	Counter arguing (playing devil's advocate role
14	S6	For example, there is a teacher, he knows very well but he cannot transfer. He speaks very academically so I don't understand. Maybe graduate students can understand, but I cannot understand the teacher. But I know his knowledge is good.	
15	E	What is his knowledge of good?	Probing
16	S6	Subject matter knowledge.	

17	E	Then, is the teacher you mentioned is ignorant in the context of the knowledge of teaching?	Reformulating
18	S7	Yes.	
19	S6	No! I did not want to say that.	
20	S8	For example, if you do not know how to teach a sixth-grade child about pronouns or four operations, what is the point of knowing pronouns or four operations very well?	
21	E	Wouldn't we understand if Einstein told us physics? Wouldn't we understand if Yaşar Kemal (a very famous Turkish novelist) told us about "how to write a novel"? Neither of them is a teacher. They also did not receive a professional training to increase their teaching knowledge. But according to what you say, there is no value to what they know, because they are ignorant of teaching knowledge.	Counter arguing (playing devil's advocate role
22	S8	We are very confused.	

**E shows the educator as a speaker and S1 shows a prospective teacher who utters for the first time in the given dialogue.*

For the challenging moves, a descending tendency was detected. In some specific sub-topical episodes (e.g., Figure 4; episode 3, 4, 5, 6, 7 and 8) in the initiate-develop-elaborate phases, challenging moves were frequently performed. However, in the second phase of the in-class discussions, fewer signs of the challenging moves were observed. For instance, particularly in the last five sub-topical episodes (Figure 4), none of the educator-led talk moves were dedicated to a type of challenging move.

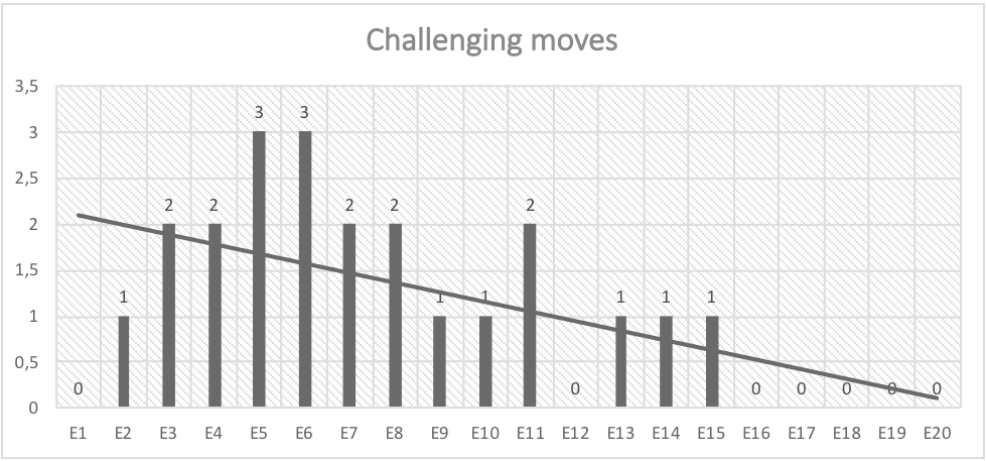

Figure 4. Sub-topical episode-based distributions of challenging moves

As deduced from Table 2, in the initial stages of in-class conversations, the teacher seemed to problematised the contents under negotiation, then, permitted the students to react or respond to the problematics by data collection, analysis and interpretation. The moderate decrease in the occurrences of the challenging moves from initiate-develop-elaborate (12.33%) to the finalise-review sequences (1.81%) may imply that after injecting contradictory, conflicting or alternating points of views into the classroom talks, the educator provided discursive opportunities or dialogic spaces for the students to deal with and solve them by enacting less discrepant questions.

Legitimating moves

Legitimating moves were mainly used to urge the students to constructively criticise, evaluate and judge their classmates' propositions. An incremental tendency in the frequencies of the legitimating moves was detected. In the first six episodes, the educator enacted the legitimating moves rarely (Figure 5). On the other hand, from 12th to 17th sub-topical episode, it was observed that the educator intentionally increased the uses of the legitimating moves (Figure 5). For the legitimating moves' frequencies, the difference between

the earlier and later phases of the classroom talks were substantially sharp. From the initial to latest cycles of classroom talks, the difference was observed as 17.44% (Table 2) confirming a sharp changing in the occurrences of the legitimating moves.

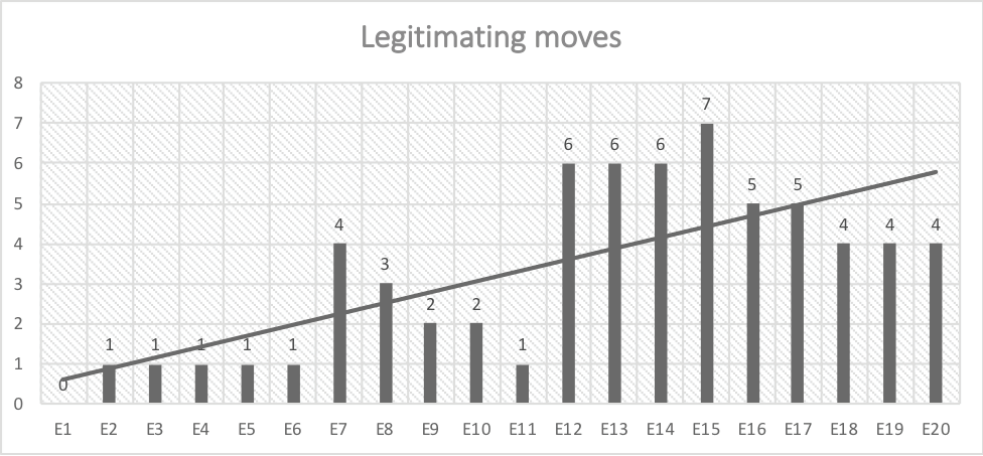

Figure 5. Sub-topical episode-based distributions of legitimating moves

One of the most prominent discursive function of the legitimating moves was to invite the students to criticise and judge their classmates' propositions' validity and reliability. Through the legitimating moves (Turns: 2, 4, 9 and 11; Table 7), the students were promoted to analyse and attend to their classmates' utterances to enlarge, modify, revise, or change them. In the presence of frequently enacted legitimating moves, the students seemed to be assigned as primary knowers or evaluators of knowledge claims of others in terms of their credibility and trustworthiness (e.g., "*Is there anyone who wants to revise or enlarge this claim? It is also so assertive, huh?*").

Table 7. The teacher used the legitimating moves to trigger student-student verbal interactions

Turn	Speaker*	Utterance	Discursive function of talk move
1	S1	I want to say something similar. Suppose I will teach my students about adjectives. I know what the adjectives are. Two cases: I will teach my friend (peer) or my students. My friend understands anyway. But if my content knowledge is good, I will make teaching easier for my students by trying different ways of teaching.	
2	E	"If the subject matter knowledge is good, teaching becomes easier" he asserted. He implied that "I will diversify my teaching if I have sufficient content knowledge." // What are your comments regarding that?	Reformulating // Asking for evaluation (student-led)
3	S2	These are already interconnected. Without knowledge, of course, there is no powerful knowledge of teaching.	
4	E	Agreeing or disagreeing? Let's see your comments, please?	Asking for evaluation (student-led)
5	S3	I think the knowledge of teaching is more important than any other aspects of in-class teaching. When some university teachers talk about something, I suppose that I do know nothing about teaching. Or I mean I feel like an ignorant.	
6	S4	S/he doesn't know how to teach.	
7	S5	Because s/he can't transfer the knowledge. There are deficiencies at that point. S/he knows the knowledge, but s/he cannot convey it. They swallow knowledge. They don't give the knowledge to us.	

8	S6	There are two thoughts in the classroom right now. The reason for this is to keep knowledge separate from skill. So, both are equal. One is not more important than the other.	
9	E	Is there anyone who wants to revise or enlarge this claim? It is also so assertive, huh?	Asking for evaluation (student-led)
10	S6	The one who has well-structured knowledge of teaching holds deeper subject matter knowledge. That's the issue!	
11	E	He made a great generalisation. // Agreeing or disagreeing? Do you want to comment on that? Is it valid under all instructional or pedagogical circumstances?	On moment framing // Asking for evaluation (student-led)

**E shows educator as a speaker and S1 shows a prospective teacher who utters for the first time in the given dialogue.*

The educator seemed to perform the legitimating moves more frequently during the latest cycles of the discussions compared to initial ones since the main discursive orientation of the whole group negotiations was to maintain dialogic interactions through understanding, analysing, criticising and eventually legitimating relatively contradicting meaning positions. By the legitimating moves, the educator continued a specific classroom harmony in which alternating or conflicting student-led points of views were contrasted (see also Table 7, Turns: 5, 6, 7 and 8). Alternating or contradictory ideas clashed with each other for idea purification. Thus, on one hand, the legitimating moves conveyed a dialogical orientation; on the other hand, this group of moves incorporated monologic/authoritative aspects by which some of the student-led ideas were turned down by other students once the educator prompted the students to examine, explore and criticise each other's propositions (e.g., "*He made a great generalisation. Agreeing or disagreeing? Do you want to comment on that? Is it valid under all instructional or pedagogical circumstances?*").

Discussion

As presented in the above sections, communicating and challenging moves showed a descending trendline whereas monitoring, legitimating and knowledge providing and evaluating moves were enacted in an ascending manner from the first to the last stages of the classroom talks.

In the latest phases of the discussions, challenging moves were enacted considerably rarely (Figure 4). As hypothesized, initial parts of in-class dialoguing could be more dialogic and interactive, in the midst of the discursive sequence, the conversations could be both dialogic and monologic or half-dialogic and half-monologic, and in the latest sections of the negotiations there would be more authoritative or monologic interactions. As seen in Figure 4, challenging moves were not performed in the last five episodes. It can be inferred that challenging moves serviced both dialogic and monologic instructional purposes. On one hand, through challenging moves, the educator invited the students to notice that there may be alternative reasoning perspectives to solve a pedagogical dilemma (see also Table 6, Turn-13). As Bakhtin (1981) contended that a dialogue between two persons may be *internally persuasive* in which alternating propositions are considered. In this study, by staging the challenging moves, the educator's purpose was not to focus the students' full attention on just *one* meaning. By the challenging moves, the educator seemed to guide the students to recognise others' differentiating points of view. Through the challenging moves, the educator seemed to create a specific classroom atmosphere where all members had to be open to different points of view. However, there was a different character of the challenging moves by which the educator had to convince the students that their existing social languages as explanation systems could be less instrumental in elucidating the presented pedagogical dilemmas. Challenging moves that throw students off balance intellectually might force them to recognise their less explanatory thinking and talking systems that were relatively intuitive or naïve conceptualisations (Gibson & Rea-Ramirez,

2002; Rea-Ramirez & Nunez-Oviedo, 2002) pertaining pedagogical content knowledge concept. In some specific moments of classroom discourse, the teacher played devil's advocate role by treading on students' corns (e.g., Table 6, Turn-21). The educator pressed the students to come up with more elaborated ideas by playing the roles such as debater, discussant, or negotiator. The educator enacted the challenging moves to delay intellectual consensus among the peer community in which the students tried to convince the educator who mostly found out a deficit aspect of the presented ideas (e.g., Table 6, Turns: 6, 13 and 21). The educator acted as a rigid discussant who had to be persuaded by the students pertaining explicative power of the presented propositions. These two characters (dialogic and monologic) of the challenging moves may explicate why the educator used them in a descending manner from the earlier to later moments of the classroom talks.

Similarly, the communicating moves were enacted in a descending manner. Even though the educator enacted the communicating moves within all sub-topical episodes (Figure 2), the accumulated distribution of these group of moves was not homogenous along the conversational continuum. The educator used this group moves to probe and clarify the student-led responses as these functions were also observed previously (e.g., Golding, 2011). However, the present study highlighted an additional point that in the initial cycles of conversations, the communicating moves were used more intensively compared to the latest stages.

This heterogeneous distribution of the communicating moves can be due to two reasons. First, for an authentically productive classroom dialogue, contents under consideration should be *discussable* (Van der Veen et al., 2015; Vygotsky, 1987). This implies in the context of the current study that speaker-led externalisations should be intelligible, in turn, discussable for the peer community and educator. This study deduced that if the educator wanted to use the student-led information in progressing the scope of the dialoguing, all members had to apprehend the underlying meanings embedded in the speakers'

verbal articulations. The implementation also required student-student interactions. Thus, the educator made the background messages of the students apparent and transparent to others to maintain communicatively healthier student-student verbal exchanges.

Second, especially probing and clarifying moves seemed to be instrumental in ascertaining the students' conceptual conflictions. This implies that for contradicting a student-led claim by the challenging moves, the educator or other members had to first understand what a speaker tried to convey by his/her *word*s. "Two people must first contradict each other if they really wish to understand each other. Truth is the child of argument, not of fond affinity" (Bachelard, 1968; p. 114). This statement of Bachelard intends that communicative and challenging harmony of a conversation is needed to get somewhere as an intellectual consensus in the discourse. This study also infers that for contradicting a meaning, first, the underlying conceptual, ontological, or epistemological aspect(s) of the utterances should be captured. Thus, in the discursive journey, the educator had to use the communicating moves more intensively in the initial stages to understand the students' social languages' characteristics to introduce alternative explanation systems to them through the challenging moves that were mostly observed in the earlier phases.

For the monitoring moves, an incremental tendency was detected. The distribution of the monitoring moves was not homogeneous and accumulated in the finalise-review stage. The educator particularly staged summarising-selecting-eliminating and focusing sub-moves in addition to framing and asking for mind-change sub-moves under this category.

When the educator performed the summarising-selecting-eliminating and focusing moves, as Mercer (2008) stressed, she provided a re-constructive thinking for the students to rewrite the *history* of the discussions. Through the low interanimation of ideas (Mortimer & Scott, 2003), the educator gathered

and pooled the differentiating student-led ideas by not deeply worked on them in the initial discussion sessions. With the high interanimation of ideas (Mortimer & Scott, 2003), the educator seemed to deeply explore and work on the more temporally or contextually appropriate and useful ideas for her instructional concerns or accountabilities in the latest discussion cycles (e.g., "*He said something very strange! Let's stop for a minute, please. Can you say what you said once again by shouting?*"). As exemplified in Table 5, the educator either focused or selected-eliminated particular student-led responses. It can be therefore asserted that the monitoring moves have an authoritative character in featuring a point of view while ignoring others. By the monitoring moves, the educator seemed to mark more contextually significant responses by creating *we*-voices or *we*-statements (Edwards & Mercer, 1987) (e.g., "*Shall we talk about this point a little longer?*"). To do this, the educator seemed to create a shared, cumulative, and progressive understanding regarding the pedagogical content knowledge phenomenon especially in the latest discussion cycles.

The in-class implementation was planned and conducted as a discursive journey where the educator had two accountabilities: considering everyday social languages of the students and build the discussions on them and introducing scientific story as an alternative thinking and talking system on the intermental plane of the in-class discussions. The educator, therefore, had to deliver specific metamessages to the students regarding alternative worlds of understanding. Vygotsky (1986) stressed that for concept formation, conscious awareness is needed. Conscious awareness is required *voluntary attention* (Fox & Riconscente, 2008) on the side of learners. In the present study, the educator staged the monitoring moves to lend a conscious awareness to the students especially by focusing and selecting-eliminating moves. As seen in Table 5, within talk turns from 9 to 12, three students uttered their claims. However, the educator appeared as selecting S4's articulation to examine it ("*OK. Let's look at this answer directly and examine it…*"). When these type

of moves were pervasive in the latest discussion cycles, in the background, the students might ask some specific questions to themselves:

- Why is the teacher ignoring or excluding some of the uttered ideas?
- Why is the teacher selecting or making prominent some of the uttered ideas?
- Why are we talking about the point X rather than the point Y?

Thus, by the monitoring moves, the students had opportunities to track the selection of specific ideas over others. The students had chances to look over the history of the conversations, progression of ideas over time, and modifications regarding the understanding of the content under discussion or alterations in the individual meaning positions during time. These therefore might provide a metacognitive monitoring mechanism for the students to notice that they were in a discursive journey where they discovered or were introduced new ways of conceiving a pedagogic phenomenon. All these seemed to be attainable when the educator increased the occurrences of the monitoring moves in the latest talk sessions.

The other talk move showing an incremental trendline was the legitimating category. Most of the occurrences of the legitimating moves accumulated in the finalise-review phase where the educator wrapped up the generalised conclusions or intellectual consensus of the students. In the second part of the classroom talks, whole group negotiations where frequent student-student verbal exchanges observed were carried out. After collecting and pooling varying answers from the students, in the whole group negotiations, the purpose was to legitimate the responses. In selecting, featuring, and eliminating student-led responses, the educator seemed to functionalise the peer-led evaluations and criticisms. Thus, the legitimating moves might be seen in the latest episodes of the discussions.

The teacher educator seemed to create a series of *accountable dialogue*s (Michaels et al., 2008) among the peer community through the legitimating moves. The legitimating moves incorporated a duality in terms of discursive orientations: dialogicness and monologicness. Once the educator enacted the

legitimating moves, the students were evoked to explore and evaluate their classmates' ideas. The students acted as co-determiners by indicating whether a peer-led idea was credible and acceptable for the sake of the classroom talks. Alternative points of views were both proposed (dialogicness) and judged and criticised (monologicness) by the students to crystallise the common or shared knowledge (Wegerif, 2008) by virtue of the legitimating moves.

Michaels et al. (2008) identified three types of the accountability: accountability to the learning community, accountability to accepted standards of reasoning, and accountability to knowledge. Over the progression of the talks, the educator seemed to feature more instrumental ideas through promoting the students to socially validate them. However, to socially validate the plausibility of the proposed ideas, the students particularly had to be accountable to the learning community. To refine the ideas of the students, the educator explicitly invited the students to work on them (e.g., "*If the subject matter knowledge is good, teaching becomes easier" he asserted. He implied that "I will diversify my teaching if I have sufficient content knowledge." What are your comments regarding that?*"). The educator also guided the students to be accountable to the accepted standards of logical thinking (e.g., "*He made a great generalisation. Agreeing or disagreeing? Do you want to comment on that? Is it valid under all instructional or pedagogical circumstances?*").

The legitimating moves therefore occurred in the final discussion stages. By the legitimating moves, the students tended to take the other's ideas seriously by not featuring their own ideas or by not underestimating other's meaning positions (Boyd & Rubin, 2006). The legitimating moves seemed to scaffold inter-thinking or joint-thinking (Mercer & Littleton, 2007), however, at the outset, various student-led ideas had to be knowable by the community's members in the initial discussion cycles. Then, in the later discussion stages, more progressive, unfolding, and serviceable ideas were chosen and purified by the students through the legitimating moves.

Final Comments

This study concluded that a discursive journey may incorporate heterogeneous accumulations of different typologies of the talk moves in different time intervals from the initial to final stages of the verbal interactions. The accumulated distributions of the talk moves can be best interpreted by taking some specific sociolinguistic and complementary theoretical frameworks into account. Mortimer and Scott (2003) proposed three sub-divisions to compartmentalise an in-class conversational flow. In *explore* phase, an educator may open up the problem, then, explore and work on student-led social languages. As evidently shown in this study, the explore phase is equivalent to initiate-develop-elaborate phases where communicating and challenging moves were mostly used. In *work on* and *review* phases, proposed as the remaining two segments of classroom discourse (Mortimer & Scott, 20003), an educator may develop the scientific story, guide students to work with social languages of science and support internalisation of newly introduced ideas. It is deduced in the current study that in work on and review phases or finalise-review stage, the educator seemed to use the knowledge providing and evaluating, legitimating, and monitoring moves more intensively compared to initial discussion cycles.

Engle and Conant (2002) also suggested three sequences of classroom discourse where students make a journey from a familiar social language system to a novel and unfamiliar thinking and talking system. From the lens of Engle and Conant (2002), first, an educator must *problematise* content under consideration by promoting students to take on intellectual problems. As detected in the current study, problematizing phase was more viable through intensively use of the communicating and challenging moves that were used in the initial talk stages. Then, in the *authorising* phase, an educator should give authority to students in addressing such problems emerged in previous discussion sessions. This seemed to be more plausible by the legitimating moves by which the educator assigned the students as primary knowers and

evaluators of the proposed arguments. In addition, Engle and Conant (2002) emphasized *accountability* by which students' intellectual work should be made accountable to others and to disciplinary norms as this process was more realistic when the educator staged the legitimating and knowledge providing and evaluating moves more frequently in the latest discussion cycles.

Finally, Bakhtin (1934, 1981) proposed three stages of *appropriation* of a novel idea that can be applied to fragment classroom interactions in the context of teaching at higher education level (e.g., Taylor, 2003). As Bakhtin (1934, 1981) highlighted, appropriation is the representation of the moment in which a thinking and talking style is accepted as *one's own* or, in Vygotskian terms, a novel idea is internalised or privatised for individual uses and purposes by appropriated it. In *stage-1 appropriation* (dialogical interactions), students consider new idea (other social languages) as belonging to others (scientists, teachers, experts). In this study, this was more visible in the initial discussion stages where the communicating and challenging moves were mostly used. In *stage-2 appropriation* (dialogical and monological interactions), students consider new idea as half their own and half belonging to others. In *stage-3 appropriation* (monologic interactions), students consider new idea as completely their own (Bakhtin, 1934; 1981). In this study, there were dialogic (stage-1 appropriation; communicating and challenging moves), half-dialogic and half-monologic and monologic discursive processes (stage-2 and stage-3 appropriation; monitoring, legitimating and knowledge providing and evaluating) in which different types of the talk moves were accumulated or distributed differently. It is therefore concluded that the students welcomed and acknowledged or appropriated novel ideas from more dialogically-oriented to more monologically-oriented teaching sequences in which specific types of the talk moves of the educator were observed *or* required as the main contribution of the current study to the related literature. For instance, the legitimating moves seemed to increase the student-student interactions and they began to make summaries of the ideas or

generalisations by using their own vocabularies (e.g., "*There are two thoughts in the classroom right now. The reason for this is to keep knowledge (subject matter knowledge) separate from skill (in-class teaching strategies). So, both are equal. One is not more important than the other.*"). In the latest talk processes, the educator seemed to wrap up the discussions and try to get somewhere by using the student-led inductive reasoning through the legitimating moves. (e.g., "*The one who has well-structured knowledge of teaching holds deeper subject matter knowledge. That's the issue!*")

Educational Recommendations

Many teacher educators (e.g., Barnhart & Van Es, 2015) have refined a specific concept as *teacher noticing* as a core pedagogical ability of a teacher in attending, analysing, and responding to their own in-class teaching practices. The idea of teacher noticing incorporates that teachers have abilities to improve a unique way of seeing relevant to their profession and pedagogically influential teachers should be able to clarify prominent classroom interactions within the visually complex classroom harmony (Barnhart & Van Es, 2015). This study therefore suggests *teacher educator noticing* since most of teacher educators may not hold comprehension regarding relationships between segments of classroom discourse, differentiating social languages and accompanying talk moves. Thus, it must be questioned whether teacher educators hold a conscious awareness regarding multifaceted aspects of classroom conversations deeply patterned in the current study. Having a sophisticated educator noticing the abstracted linguistic patterns obtained in the current study cannot be conceived as an automated process. There should be an intentionality on the side of teacher educators to attend and analyse their own teaching practices (Murray, 2005). One of the instrumental approaches to make teacher educators reflective practitioners (Schon, 1983; 1987) is to design and implement high quality and longitudinal professional development programs by which they may monitor, analyse and make inferences regarding multi-layered dimensions of classroom talk depicted in the present study.

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