Nature and Occurrence of Lexical Bundles in Mathematical Lesson Plans as Indicators of Authority Relationships

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Abstract

This study draws on authority structures that were observed in mathematics lesson plans developed by pre-service teachers during their internship period. Language clues, in the form of lexical bundles, were identified and categorised as an indication of authority structures. Four categories of authority structures were found to be present in the mathematics lesson plans, viz., personal authority, discourse as authority, discursive inevitability and personal latitude; among these, personal authority and discourse as authority appeared most pervasive. It was also found that pre-service teachers' beliefs evolved during their internship period. Towards the end of their school experience programme, their beliefs towards authority structures changed as by then they had started sharing authority with their students.

Introduction

Authority is a two-way relationship between two or more people where one acts as an 'In charge' and the other is subjected to following the commands of the former. Amit and Fried (2005) opine, 'A relation of authority exists when a person (or group of people) tends to obey, act on or accept without questioning the statements or commands of another person (or group of people) capable of producing statements or commands'.

This thought also echoes with Weber's (1947) notions which explicate authority or imperative control as, 'the probability that a command with a given specific content will be obeyed by a given group of persons'. Thus, authority holds only when there is someone to obey or accept the commands set in by some other.

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In educational settings, authority serves as one of the many resources that teachers employ to maintain a 'control' over their learners. Pace and Hemmings (2007) consider authority as a social relationship wherein some people, usually more knowledgeable ones, are granted the role to lead; and others, usually the students, agree to follow. Most often, by virtue of an unexpressed common consensus in educational settings, teacher's knowledge is considered superior and they enjoy the position of a leader to which the students tend to abide, thus become the recipients. It is expected to agree to these 'social classroom norms', which are mutually agreed norms for deciding the behavioural and functional expectations between teacher and students (Cobb and Yackel,1996; Cobb and McClain, 2001; Homans,1951).

Authority in classrooms can be centred on an individual or can also be a shared responsibility. Different researchers while analysing the classroom behaviours have documented the ways authority functions in classroom situations. Some researchers connected authority with classroom management techniques while others have looked at authority in knowledge generation spaces (Waller, 1932; Levin and Shanken-Kaye,1996; Amit and Fried, 2005; Bochenski, 1974; Oyler, 1996; Skemp, 1979; Wagner and Eisenmann, 2014). These researchers have claimed that when more knowledgeable persons take control of the classroom, they take control at two levels— (i) control of the content domain, and (ii) control of the domain of discourse. Control of the content domain encapsulates controlling the domain of knowledge. It is mainly about regulating the information considered legitimate, true and relevant. On the other hand, 'Control of the Domain of Discourse' is about managing the flow of talk and ideas, acknowledging some questions as important while dismissing others. At both levels, teachers become an authority due to their having more content knowledge and position.

Till now, most of the studies related to authority have looked at how authority functions in classroom settings. The studies, have, by far, only looked at the notion of authority *in-situ*, but a lot needs to be seen outside the classroom settings. What happens before going to the classroom is still unrepresented. A lot of what happens in a classroom can be attributed to the planning phase, of which the teacher is In charge. If teachers hold a mindset towards authority which they enjoy owing to their position or knowledge, it is bound to be reflected in their classes. Therefore, before we analyse how authority functions in the classroom situations, it is a good idea to see how these are reflected at the planning stage of a teacher.

One of the planned aspects for teachers is their lesson plans. These are teachers' plan of action developed by them before they enter their

classrooms. While writing a plan, a teacher deliberates upon the content to be delivered and the kind of involvement they would expect from the learners. While planning, the teacher knowingly or unknowingly plans authority relations amongst themselves and their learners. For illustration, when they mention in the lesson plan that they will 'explain' the concept, they have self-assigned an authority to themselves of imparting the knowledge. If, on the other hand, a teacher mentions in the lesson plan about the active role of students in building a concept collaboratively, they can be seen sharing the authority with their learners in the classroom situation. Thus, how the teacher positions themselves in classroom and the amount of authority they pass on to their learners does get reflected through the plans. The plans hold the potential of indicating the structure of authority relations and hierarchy that one can expect in the class. In other words, the control that is given to the students during the classroom transactions does get reflected from the planning stage of teachers. Since, lesson plans offer a lot of information about the mindset of teachers, studying them can give a lot of information about how a teacher perceives authority structures in the classrooms. It is hypothesised that analysing lesson plans in terms of authority structures will provide evidences of teachers' beliefs, pedagogy and intended classroom discourse.

There are many ways of analysing lesson plans. One of them is studying 'Lexical Bundles' that occur in the lesson plans. The premise lies on the assumption that identifying lexical bundles in the written material would aid in recognising the beliefs related to authority held by the teachers.

This study analyses the perceptions of authority held by pre-service mathematics teachers as reflected in the lesson plans developed by them. The nature and frequency of lexical bundles were analysed to study the most occurring bundles and thereby know the authority relations that are prevalent in the plans and beliefs. Further, changes in teachers' beliefs as they progressed through their internship were looked at. It was questioned if the authority relations changed over a period of time for these pre-service teachers as they engaged more and more with their students.

Understanding Lexical Bundles

Lexical bundles refer to a sequence of two or more words that recur in a written or oral script. The recurrences of group of words indicate to the beliefs that are held by the speaker. One can find such recurring group of words in a person's verbal as well as written language.

Although, the choices of words that people use arise from the current positioning of the speaker in an unintentional, unconscious manner;

they tend to reflect the values, dispositions and ideologies of the speaker (Lemke,1990; Morgan,1996). This group of words communicates personal feelings, attitudes and value-judgments which people may hold. Keeping this in mind, Bochenski (1965) and Morgan (1996) recommended analysing sentences, statements or groups of words that people write or speak as one of the domains to understand how people perceive their position with respect to others. These groups of words help in exploring interpersonal relationships and social structures.

Biber (1999, 2006) took the first significant step in investigating the frequency of word combinations as they appear in the text as indicators of a speaker's belief. Since the language used in a classroom can convey various aspects of the interactions and social structures that exist in the class, lexical bundles can act as hidden curriculum in understanding the authority relationships that prevail between the actors of a classroom, viz., teachers and students.

Wagner and Eisenmann (2014) and Eisenmann et al., (2010), in particular, related these lexical bundles to authority structures that exist in the discourse of Mathematics classrooms. On the basis of the classroom discourses, they concluded four categories of authority relationships that can be seen in the discourses of the mathematics classroom namely—personal authority, discourse as authority, discursive inevitability and personal latitude.

The Study

The objective of this study is to bring out the authority related beliefs of pre-service mathematics teachers as they get reflected through the lexical bundles used in their lesson plans. This study is an endeavour to understand teacher-student authority relationship by studying the nature and occurrence of lexical bundles (recurring group of words) in the Mathematics lesson plans made by pre-service Mathematics teachers. Mathematics lesson plans developed by pre-service teachers were considered to understand how the perception about authority in the Mathematics classroom develops from the training period itself.

Pre-service teachers are required to make countless decisions while planning for their lessons, which at times, reflect their beliefs related to subject discourse or on the strategies they would adopt for teaching-learning process. The recurrence of the words used while making plans for classroom discourse provides relevant data that displays authority structures. To understand the authority relationships among teacher and students, lexical bundles that appeared in the lesson plans were studied. General indicators of each authority relationship as given by Wagner and Eisenmann (2014) framework was used to place

the identified lexical bundles. The study explored if the language used in plans suggested a predominant interest in authority by the teacher. It further looked into the most pervasive authority structure as reflected in the Mathematics lesson plans.

Further, from the study of Tatsis and Tatsis (2018), one realise that pre-service teachers become more authoritative towards the end of their teaching training than their initial phase. Consequently, while looking at the presence of authority structures in pre-service Mathematics lesson plans, one of the objectives was also to see if the intended authority structures changed with the passage of time.

Hence, in this study lexical bundles that occurred in the lesson plans of pre-service Mathematics teachers, have been studied to fulfil a two-fold objective—

- To know the perception of Mathematics pre-service teachers towards authority structures.
- To analyse if these perceptions change over the period of internship.

Methodology

As a part of teacher-training course, every pre-service teacher is taught to make lesson plans keeping in mind the grade and content specifications. The pre-service teachers develop these lesson plans as a part of their School Experience Programme, also known as School Internship Programme (Arora et al., 2020). Since, in this study, the authority relationships specific to the Mathematics teachers were studied, lesson plans developed by pre-service Mathematics teachers enrolled in B.Ed. programme run by two renowned universities in Delhi region were considered. Twenty lesson plan diaries of Mathematics pre-service teachers were analysed.

It was found that on an average, each intern makes approximately 40–42 lesson plans over their entire internship. The diary of each intern was divided into triads—initial, middle and last triad. Tags were used to distinguish these triads. From each triad, the median plan was picked. For example, if an intern had made a total of 42 lesson plans, the three triads consisted of plans numbered 1–14 in the first triad, 15–28 in the second triad and 29–42 in the third triad. The median lesson plans under each of the triad consisted of lesson plans numbered 7, 21 and 35. These three lesson plans finally made to the analysis phase.

In this manner, approximately 60 lesson plans from 20 Mathematics lesson plan diaries were studied for the occurrence of lexical bundles as an indicator of the authority structures. This spread in the selection of plans was done to see if the beliefs related to authority relationships changed over the period of internship.

Prelude to Analysis

Typically, a lesson plan comprises of sections such as— teaching-learning objectives, previous

knowledge, classroom presentations or teacher-student activity, tasks for assessment, etc. The section titled 'Teacher-students activity' or 'Classroom Presentation' is the part where intended classroom discourses are mentioned by the teachers. The pre-service teachers in this part explicate the processes which would be adopted for the development of concepts, role of students, activities to be performed and anticipated responses of the students. For the purpose of understanding the beliefs of teachers, analysis of lexical bundles found in the classroom presentation section was deemed sufficient, hence only this section was analysed.

Content analysis of 'Classroom Presentation' section of all 60 lesson plans was conducted to identify the recurring groups of words (called lexical bundles). A group of words that often occurred were identified for each plan. These lexical bundles were then studied for their intent. The intent of the pre-service teachers regarding who will take the lead in class, who is expected to follow, and whether the work will be done in collaboration, as reflected through the lexical bundles, were kept in mind. As these lexical bundles accounted for the authority structures, they were studied in depth to be categorised under the four categories listed by Wagner and Eisenmann (2014) and Eisenmann et al., (2010) Colour coding was done for easy identification.

Findings with Discussions

This section shares the analysis of lesson plans for the two stated objectives of the study. The first sub-section elaborates the identification of lexical bundles as indicators of authority structures, and the second sub-section compares the changes in perception of authority relationships of pre-service teachers in course of their internship period.

Identification of Lexical Bundles as Indicators of Authority Relationships

Lexical bundles, like 'I will ask, you may do', were identified. These were then divided into four categories. Frequencies of occurrence of lexical bundles belonging to a category were also taken into account to trace changes in the beliefs of authority relationships over time. Lesson plans were studied in depth and sentences that hinted towards any instruction, laid down by the teacher for the student, were identified.

Personal Authority

Lexical bundles wherein we see the use of personal imperatives, such as 'I' and 'you' in the same sentence, sentences which reflected command (exclusive imperative) and questions wherein single correct responses (closed questions) are expected, were considered to reflect personal authority.

With respect to the lesson plan, lexical bundles, such as— 'I will ask…, I will explain…, I will discuss…,

Pupil teacher will ask..., Pupil teacher selects..., Pupil teacher commands..., Teacher will tell them..., Teacher will brief..., Teacher will make them..., Students will be asked..., Consider you have..., Teacher will instruct..., Teacher will discuss..., Teacher will demonstrate..., Which shape is this..., What is the name of this figure...,' were placed under this category.

On analysing the Mathematics lesson plans of the prospective teachers, usage of the following lexical bundles emphasised the personal authority relationship:

(i) Usage of exclusive imperative such as, 'Teacher will ask students to open their textbook exercises, Teacher will demonstrate the procedure, Teacher will ask them to arrange packets, Teacher will explain the concept of lattice algorithm, Teacher will ask them to turn clockwise to east, PIT commands them to start solving those questions'. The usage of such lexical bundles indicated that instruction process was teacher-centric, where teachers believed their role as decision makers, who were supposed to give commands to their students.

(ii) Usage of closed questions such as, 'Pupil teacher will draw a rectangle on the board and will ask— What is this? Now tell me the sum of angles of a quadrilateral. Now count every blood group and write their frequency along with tally. Pupil teacher will ask the students about the characteristics of angle, pupil teacher will ask which of the two line segments is larger, what do we call the boundary of rectangle, what is the vertically opposite angle of angle AOD?'. Usage of such lexical bundles indicated that a single response was considered as correct and expected from the students.

(iii) Use of 'I' and 'you' (children) in the same sentence such as, 'I will ask children to look around them, I will discuss some situations, and the students will act on these situations, I will read the section 'TUNTUN missed the train'. Lexical Bundles exemplified above indicated that students were expected to listen carefully and follow the commands of the teacher.

(iv) Use of words such as, 'student teacher or pupil teacher' instead of 'I' suggested that pre-service teachers considered themselves as authority positions due to their role as a teacher.

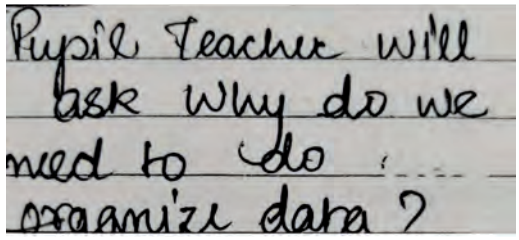

Fig. 1: Sample from a plan showing lexical bundles belonging to personal authority

On further tabulation of the frequency of usage of lexical bundles, it was found that among the large corpus of lexical bundles (1185) identified under each authority structure, nearly 45 per cent (533) belonged to personal authority. This suggested that personal authority was most pervasive in the lesson plans of Mathematics pre-service teachers. The teachers believed to have a major part of authority in teaching the subject of Mathematics.

In fact, amongst all the lexical bundles that were identified demonstrating personal authority relations, the lexical bundles that appeared maximum were— 'I will ask..., Teacher will ask..., Pupil-teacher will..., I will explain..., I will demonstrate..., I will discuss...'. Use of lexical bundles such as 'Student teacher will..., Pupil-teacher will...' suggested that the pre-service teachers considered themselves as authority by virtue of their position as a teacher.

The results shared here throw light on the way we perceive the teaching and learning of Mathematics. From the study of lexical bundles in the lesson plans, it was obvious that teachers believed that in Mathematics classes, teachers are supposed to 'explain' the concepts to their students. Since a majority of lexical bundles reflect personal authority structures, it can be said that Mathematics' teachers believe that while doing Mathematics, students would need a lot of hand-holding from a more experienced person. They believe it is a discipline of rules, procedures and skills that need to be taught. Repeated use of exclusive imperatives, such as 'I' and 'you', reflected that the teachers held that it was their responsibility to transmit these rules, procedures and skills being the more knowledgeable ones. They considered themselves as knowledge generators, keeping the authority to teach on to themselves giving low or no autonomy to the students. Thus, they believe in giving direct instructions considering students as passive receivers. To some extent, it can be said that the pre-service teachers believed themselves as leaders of the group. Summarising, one can say that pre-service teachers held a traditional mindset on orchestrating their Mathematics classrooms.

Discourse as Authority

Discourse as authority relationship is associated to reestablishing the rules that are already a part of the discipline of Mathematics during classroom discussions. It means that the teachers create situations such that their students can deduce the mathematical principles. Evidences that edified certain things have to be done as per the demand of discipline such as making rules, algorithms, facts and definitions.

Lexical bundles wherein definitions, rules, algorithms were being discussed or stated, qualified under this category of authority relationship. The categorisation also included modal verbs which

suggested the necessity of doing an action, for example, 'We have to do..., You have to choose..., You need to..., You don't have to...' were identified as indicators of discourse as authority relation.

The following lexical bundles were enlisted from the lesson plans that reflected on discourse as authority:

- 'The method in which first we find the value of one unit and then the value of required units in the unitary method. If we have to write integers greater than negative integers, then we will write its opposite, we will have to add 7–8 times; we have to change denominator as a multiple of 10 and accordingly the numerator will also change; we do not have to do it one by one (standard way) and the answer will be same in both the cases; a triangle should satisfy the Pythagoras property to be a right angled triangle; the line which equally divides circle into two parts is diameter'.

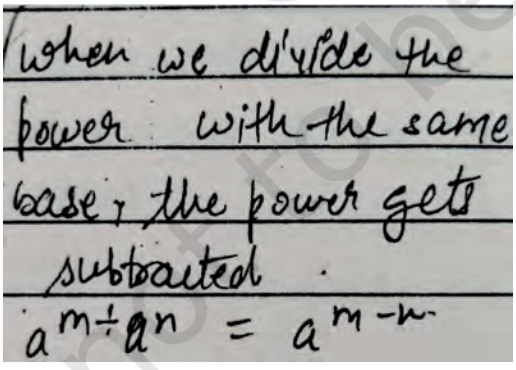

Fig. 2: Sample from a plan showing lexical bundles belonging to Discourse as Authority

In all, nearly 25 per cent (293 out of 1185) lexical bundles belonged to discourse as authority. It was evident from the frequency that lexical bundles which were most frequently used within discourse as authority were: 'We have to..., We do not have to..., We will have to...'.

From the findings quoted above, one can conclude that in all the above lexical bundles, students were expected to accept something as a protocol of the discipline of mathematics which cannot be questioned. This observation suggests that for pre-service Mathematics teachers, following discipline protocols was the second most important thing.

Mathematics as a discipline is well known for its deductive nature. School level Mathematics is determined by rules specified by a group of people who made decisions about mathematical content and pedagogy. This ideology also got reflected in the lesson plans made by teachers. Planning of pre-service teachers reflected that they also believed these rules as absolute and have to be followed mandatorily. It also reflected that they considered these rules as structures on which Mathematics is built and so one cannot make any changes in it. They held that procedures and methods given by the disciplinary structures ensure correct answers and hence must be accepted as stated. Discourse was seen as authority wherein the rules and procedures had to be accepted

without any questioning. Further, the presence of discourse as authority in the lesson plans of the pre-service teachers confirms the assertion that teachers believe that Mathematics is abstract in nature.

Discursive Inevitability

Authority structure related to discursive inevitability refers to actions or events that are verbally presented as unavoidable. There is no explicit reference to compulsion, rather a sense of decision prevailed. Cases where students are expected to do something but the source of expectation is not clear, are termed as establishing authority relationship in a discursive inevitability format.

On studying the lesson plans, all lexical bundles that echoed a feeling whereby students had to perform a task without knowing the reason, were included in this category. Lexical bundles for this category included— 'You are going to..., We are going to..., Students will find..., Students will cut..., Students will be given...'.

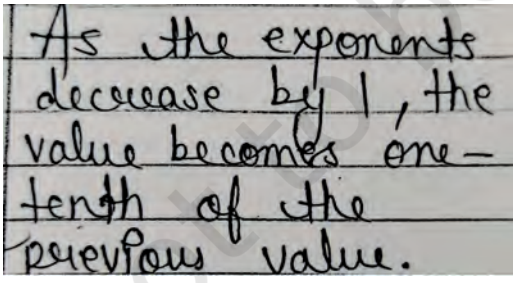

Fig. 3: Sample from a plan showing lexical bundles belonging to Discursive Inevitability

Some of the evidences of presence of authority structures belonging to Discursive Inevitability in the plans were— 'You are going to learn about perpendicular lines today; Students will cut quadrilaterals from a sheet of paper; Students will find the median weight; You have to arrange collected data in ascending order; Learners are going to count the total number of matchsticks'. These suggested that students were expected to perform a task without knowing the reason why, hence the source of authority was unclear.

Out of a total of 1185 lexical bundles identified in all lesson plans, 213 (18 per cent) were found to fall under the category of discursive inevitability authority relationship. Further, among these 213 lexical bundles, the most occurring ones included— 'Student will cut..., Students will find..., You are going to...'.

This implies that although the share of discursive inevitability was quite small as compared to other authority relationships, a notion related to pre-determined authority with unclear source existed in the lesson plans of the prospective teachers. Although there is no obligation to act by any specific authority, the actions in the tasks were considered conceivable. This authority was most indirect as the commanding authority remains unknown yet the students have to abide by certain norms while doing Mathematics.

This implied that pre-service teachers believed in giving up their own authority but continued to hold a hidden authority figure that generally offers a feeling of security in getting correct solutions. An implicit obligation for students to follow the instructions and accept what was said was visible in the lesson plans made by Mathematics teachers. Pre-service teachers, by using such models, reflected that they believed mathematical conventions are passed through people even if the source is unknown. It even suggested that pre-service teachers agreed that there is only one way of carrying out a mathematical task.

Personal Latitude

Authority relations in terms of personal latitude relates to students making their own decisions during the interactions, thus exercising their own authority. Evidences of lexical bundles that show students have a scope to make choices and that the teachers include students' voices while building a concept, are general indicators of this category.

Lexical bundles that were found in the lesson plans of the pre-service mathematics teachers, which contributed to the authority relationship of personal latitude, were of the following types:

(i) Usage of open questions such as— 'Tell me how will you get a circle; Try to look at objects through different views'. Usage of these groups of words reflected an initiation of discussion in the classes thereby creating space for developing students' thoughts.

(ii) Usage of inclusive imperative such as, 'Let us perform an activity to show that vertically opposite angles are equal, Let us take an example of mathematical expression, Let us represent 0.6 on a number line, Let us find out how fractions can be converted to per cent'. These suggested that the pre-service teachers tend to include themselves in the completion of the task instead of merely giving commands.

(iii) Scope of making choices such as— 'Students can make 2–3 different shapes like this, Students may push along length and breadth to obtain a quadrilateral, You may multiply both the numerator and the denominator of fraction by the same number

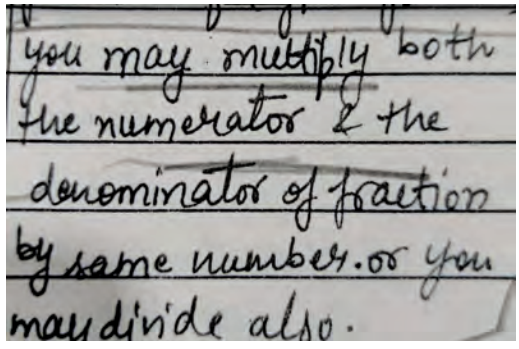

Fig. 4: Sample from a plan showing lexical bundles belonging to Personal Latitude

or you may divide also'. The presence of lexical bundles like these echoed that authority was passed to students with a scope for them to make their choices.

Further, it was found that nearly 12 per cent of word groups identified among 1185 lexical bundles belonged to personal latitude authority relationship. The low frequency of this structure suggested that pre-service teachers intended to give least authority to the students while doing Mathematics.

Findings also suggested that very few pre-service teachers intended to open opportunities for students to explore mathematical ideas and take decisions regarding the same. However, the control to take decision was thought for simpler mathematical tasks such as doing trivial multiplication or construction. This reflected the low confidence that teachers hold on the abilities of their students of doing mathematics. They believe that simpler tasks can be initiated by the students but when it comes to doing complex tasks, the authority must rest with the teacher. They can perform complex tasks only with the support of instructions. There were no instances in the plans where students were involved in developing formula, which confirms the pre-service teachers' beliefs of Mathematics being an accumulation of facts, skills and rules which can be imparted to students by direct instruction.

Change in Perception of Authority

As mentioned earlier, the second objective of the study was to find if the authority structures changed towards the end of planning. This section discusses the findings related to the changes in pre-service mathematics teachers' beliefs related to authority relationships as reflected through the analysis of the lexical bundles present in the lesson plans.

To do this, the nature of lexical bundles present in the first triad cluster of a lesson plan was compared to the nature of lexical bundles that appeared in the third triad cluster of the respective lesson plan diary.

It was found that the lexical bundles related to personal authority and discourse as authority were evident in the first triad cluster of most of the lesson plans. Presence of lexical bundles like, 'Teacher will tell..., Teacher will explain..., Teacher will show..., We have to change..., We need to add..., You need to choose...', were found in the first triad. There were hardly any lexical bundles that reflected personal latitude authority structure in the plans developed during the initial stages of internship. However, in the lesson plan selected from third triad cluster of the same intern developed during the final stages of internship included lexical bundles like, 'Students may..., You may do...'. This indicated that the pre-service teachers had started delegating authority to their students by the end of their internship period.

In the lesson plan diaries where personal latitude was completely missing in the initial plans, evidences of their appearance could be seen in the latter plans. This indicated that by the end of their internship, the pre-service teachers had started to build a belief on giving more authority to the students for building mathematical concepts. They believed that mathematics can be built in a dialogical way.

There could be many factors that led to the shift in the authority relationship between the interns and the students. One of them can be attributed to the rapport that pre-service teachers built during the course of internship. It takes time for a teacher to build a shared relationship with the students. At the beginning stages, the pre-service teachers are testing their own skills of being a teacher, therefore, resorting to personal authority relationships which would help them in managing the class. Delegation of authority towards the end of internship suggests that by the end of the internship period, the pre-service teachers start gaining more confidence in handling content as well as class management. They become more comfortable in sharing their position with their students.

Although lexical bundles to all the four authority structures were found in the lesson plans of the interns, authority relationships related to personal authority and discourse as authority were most pervasive. Evidence of authority relationships belonging to personal latitude and discursive inevitability were hardly present in the plans. This observation suggests that even while planning, pre-service teachers give most of the authority share to themselves and to the way Mathematics functions as a discipline.

Conclusions

The presence of authority structures reflected through Mathematics lesson plans suggested that varied authority relationships exist among teachers and learners, personal authority being the most dominant. This reflected that pre-service teachers believed in direct instruction and expected the students to follow what was instructed in the class. Another structure that emerged as important was 'discourse as authority', suggesting that mathematics as a discipline has immense authority due to its nature and being governed by rules and formulae. Pre-service teachers accepted this authority of mathematics, which was reflected through their plans. They further believed that the rules and procedures of Mathematics are fixed, which lead to certainty and hence should be followed as laid down. Evidences of discursive inevitability proposed the obligation of performing task with an obscure authority source. This implied that pre-service teachers believed in unknown sources of authority that was external yet important in

mathematics classrooms. Evidences of personal latitude suggested sharing of authority with the students. Low frequency of this authority structure and students' autonomy in taking decisions for simpler mathematical tasks implied that pre-service teachers lacked confidence in students. Change in the perception of authority leading to appearance of personal latitude relationship towards the end of internship reflects that teachers tend to share authority with students once they feel confident about them handling the given task well.

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