

## A learner corpus analysis of problem-solving schemata and move structures in debating discourse

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### ABSTRACT

Problem-solving is essentially a process with schematic, conversational and procedural attributes. This skillset is essential for graduates to enable them to solve problems that they encounter in their social, academic, and professional lives. A huge portion of problem-solving practice may be found in debating. Due to the magnitude of problem-solving skills, this study aimed to investigate the synergetic role of debating practice on problem-solving language development in a corpus-assisted way. This study compiled a learner corpus containing 32,3975 tokens of 28 transcribed debates from the World University Debating Championship on *YouTube* (see Appendix). A corpus-based analysis by AntConc explored the schematic features of problem-solving patterns in terms of type-token ratio, collocation, standardized frequencies, and concordance lines. The findings show that problem-solving representations were outstanding in the debating learner corpus with a high type-token ratio, *Problem* schema, and *Solution* schema. Patterns concerning *problem*, *need*, and *solution(s)* appear with a highly standardized frequency. In addition, a concordance analysis of the most frequent keywords revealed the schematic variations of problem-solving functions employed by debaters. The genre analysis confirms the presence of problem-solving procedures in the sequence of the Situation, the Problem, the Response or Solution, and the Evaluation and its conversational inherency under diverse opinions. These findings provide corpus evidence for the schematic, conversational and procedural representation of problem-solving. Thus, debating practice is a significant vehicle to facilitate students' problem-solving sense development of knowledge schema, conversations, and genre prototypes.

**Keywords:** Debating discourse; learner corpus; move structure; problem-solving schema

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### INTRODUCTION

*All life is problem-solving.* This simple title from Popper (1999) led to the initial inspiration for this study. The title accentuates the importance of and the frequency of problems in our daily lives. How to solve problems has become a core competence of the 21st century (Care et al., 2016; Chang et al., 2017). In today's demanding labour market, success requires an excellent ability to solve complex and multidisciplinary problems under heavy workloads

and stress (Asikainen et al., 2022). If universities can empower students "to develop a problem-solving mindset and global citizenship disposition, and encourage them to take risks and learn to connect theory to real-world problems, then they can produce graduates who will find solutions to the complex problems of our era" (Angouri, 2021, p. 9). However, "problem-solving, critical thinking and intercultural or team communication are consistently at the top of the skills that employers value. They

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are also the skills universities allegedly fail to provide graduates with, preparing them for the job market” (Angouri, 2021, p. 14).

According to Kim and Angouri (2019), problems are socially constructed and emergent in interaction. Thus, problem-solving language has aroused research interest (Care et al., 2016; Handford & Matous, 2015; Wang, 2019; Yee & Lee, 2017). For instance, employees often compete and are conflicted when negotiating team role responsibilities. For expatriates and immigrants, it is more demanding to describe contextual factors of a specific problem and their expectations. As for organizations, problems are usually framed as work-related topics associated with disagreement, confrontation, and potentially harmful consequences raised by employees and ratified as requiring further actions which are different to the current situation. The above findings add strong support to the literature that linguistic representation impact on problem-solving outcomes (e.g., Chang et al., 2017; Cheng et al., 2019; Wang, 2019).

Problem solving is a complex process which requires the problem solver to identify the goal state, the current state, and then to deduce the process for moving from the current state to the goal state. From the research of Jonassen (2010), it appears obvious that the key to learning to solve problems is the problem space construction, because rich linguistic representations of problems most clearly distinguish experts from novices and scaffold working memory. Among different kinds of non-familiar problems, experts are better to identify and to ask significant questions that clarify various points of view and lead to better solutions. Their robust schemata of problem types greatly facilitate their transference of problem-solving skills. So, developing elaborate, multiple representations of problems along with learning to regulate different kinds of problem performance needs to be explicitly taught.

The primary purpose of education should be to engage and support learning to solve problems (Angouri, 2021). However, most instruction in schools and universities teach students about knowledge but seldom teach them how to solve problems cross disciplines. Therefore, problem-solving learning environments (PSLEs) should be built to create a space where learners can engage with problems and attempt to construct schemata of problems, learn about their complexity, and mentally wrestle with alternative solutions. PSLEs should be a support for practicing solving problems in authentic or relevant learning activity that students can engage in. Second, problem solving is a schema-based activity by which knowledge constructed in the context is better comprehended, retained, and therefore more transferable. Third, PSLEs evoke intentional learning of learners to understand the system or context in which problems occur to solve problems effectively. Meaningful

learning cannot occur until and unless learners manifest an intention to learn mindfully. This study introduces debating practice as a powerful activity to create PSLEs and to allow student to feel effective in problem solving practice.

Debates are conflict-resolution strategies by collaboration, synthesis, needs-centeredness, and information exchange (van Laar & Krabbe, 2018a, 2018b). Whether East or West, there is a long tradition of teaching people on how to argue. Academic literature has thoroughly documented the impact of the debate on individual improvement (e.g., Eckstein & Bartanen, 2015; Tian, 2019; Yee & Lee, 2017; Yulia & Aprilita, 2018) in oral proficiency, critical thinking, and self-confidence.

However, the argument culture is initially alien to many of today’s students (Zorwick & Wade, 2016). In the traditional impression of a debate, each side will defend its arguments and will not give up. Nevertheless, the final goal of debate is not simply a matter of zero-sum persuasion, but also a win-win mindset by active conversation to clarify problems emergent in daily life and produce optimal solutions or decision-making (Eckstein & Bartanen, 2015). Debates introduce young people to the habit of participation in public policy discussions, train their minds to consider issues from various perspectives, and help them to develop and respond to arguments. Zorwick and Wade (2016) believe that argumentation and debate across the curriculum can make students better-prepared citizens and enhance civic education because “history is an argument without end; academic culture, in general, is a culture of argumentation, and democracies are societies in which debate is central (p. 434).” Students listen to diverse opinions through classroom interaction and realize that people who disagree can have legitimate concerns that deserve holistic consideration. As people learn to respect each other, they lay the groundwork for community activities, collaborative problem solving, and win-win possibilities (Aubrey et al., 2020; Care et al., 2016).

Another uncertainty about debating practice to enhance problem-solving communication is the issue of assessment. Problem-solving is primarily a cognitive process with two attributes: mental representation of problem schema and manipulation and testing of problem schema to generate a solution. Experienced problem-solvers are sensitive to faster, more accurate diagnoses of problem types because they have richer schematic knowledge of the interconnected problems, more coherent procedural models and skilful conversational representations even in diverse stances (Csapó & Funke, 2017). Jonassen (2010) considered argumentation as a powerful tool in problem-solving assessment because they share three common points of schematic, procedural, and conversational traits.

This idea gives way to uncovering a correlation between debates and problem-solving dialogue.

Mullany (2020) revealed that “various projects in different settings have been unified to resolve particular socio-cultural problems, often around miscommunication and conflict, communication breakdown and issues of professional identity concerning workplace equality and intercultural communicative competence” (p. viii). Expressly, findings and recommendations, including observing how problem types may be identifiable, proposed solutions, and necessary processes, have provided the impetus to explore these issues further.

This study presents a learner corpus analysis of problem-solving schemata and move structures in debating discourse. Problem-solving is a schematic, procedural and conversational process (Csapó & Funke, 2017), so there were two-folded aims of this study. On the one hand, it intended to examine the apparent existence of problem-solving schemata in debating corpus. Standardized frequencies, type-token ratio, collocation, and concordance lines of AntConc are informants to reveal detailed evidence of problem-solving schema. On the other hand, to explore dialogue and procedural attributes of problem-solving, this study identified characteristic moves of problem-solving in debating discourse on the proposition and opposition sides. In a word, this learner corpus analysis helped to recognize problem-solving schemata and move structures of debating discourse.

## **METHOD**

### **Context**

By observing the distribution and frequency of language, corpus linguistics has so far been employed in several linguistic inquiry areas. These areas include dictionary creation, interpretation of literary text, forensic linguistics, language description, language variation studies, language teaching material, multimedia courseware, language learning software and testing tools (Friginal et al., 2017). To obtain a more accurate picture of how arguments are used, by whom, and to what reception, allowing claims on such matters to be evidence-based rather than intuition (Garssen, 2016; Hinton, 2021), this study provides evidence on problem-solving schemata and move structures by a self-compiled debating corpus. The transcribed data came from videos published by the World Universities Debating Championships (WUDC) official account each year on *YouTube* (see Appendix). All speakers in the videos are university students from around the world. The WUDC, following the 2-side 4-team 8-debater format, is the top debating competition with world fame, immense proportions, and demographic diversity (Eckstein & Bartanen, 2015). WUDC motions, from education, culture, and ethics to politics, economics, law, and

human rights, ensure data variation. The external selection criteria secured population representativeness and data variety of a spoken learner corpus.

### **Data collection**

Data were obtained from official accounts of the WUDC of 2017, 2019, and 2020 on *YouTube* (see Appendix), where 224 university students were engaged in debating competitions. The 28 hours of video-based transcriptions provided a learner corpus of 32,3975 lemma tokens, 9630 types and 224 turns. The Corpus was compiled based on the principle of *judgment* and *convenience* in three considerations. On the primary issue of copyright, this study prioritized the public accessibility of video data with “a list of the web addresses to ensure that any findings from such a corpus are open to being checked and replicated.” (McEnery & Hardie, 2012, p. 60). The UK Intellectual Property Office also allowed a copyright exception to non-profit research on data mining with “lawful access to, without obtaining additional permission to make these copies from the rights holder” (2014, p.6, as cited in Baker & McEnery, 2015, p.11). In addition, to ensure quality and clearance consumption, only debates of the top 32 teams broke in the knock-out round precondition in the collection list. The last issue is the dynamic compilation of this Corpus to offer more likeliness of language representation and sufficient sampling across a speech genre (Zhu et al., 2017).

### **Instrument**

This study used AntConc 3.5.8 to analyze patterns and genres of the compiled learner corpus. Firstly, its keyword tool allows researchers to recognize characteristics of lexical patterns in the corpus. In addition, its Wordlist Tool identifies the standardized frequencies and the concordance lines of the target signals. A keyword list of a target corpus produces a comparison with a reference corpus, the British National Corpus which contains 100-million-word samples of written and spoken language of British English from the later part of the 20th century. The keyword list presents the feature content of the target purpose.

### **Data Analysis**

There were four steps to locate linguistic occurrences in the problem-solving patterns in this section. They were pattern collection and classification, standardized frequency identification of patterns, concordance observation, and move location. The first step was to produce the keyword list by AntConc and collect relevant words of problem schema and solution schema, and standardized frequencies of all lexical patterns were calculated with the formula above. Moreover, concordance lines of target lexical items were

conceivable based on extended semantic units and their co-selection, beginning with *collocation*, *colligation*, *semantic preference*, and last *semantic prosody* (Frayne, 2021). The semantic prosodies express attitudinal and pragmatic meaning as an obligatory component of a lexical item, the junction of form and function, decoding why interactants express themselves in one way. The final step is to locate the moves of each text by intensive reading to construct flowcharts.

**FINDINGS**

**The Target Items and Concordance in the Corpus**

This study found a salient picture of problem-solving schemata in the learner corpus. There are 32,3975 lemma tokens and 9630 types in the Corpus; which type-token ratio is 2.97%, much higher than 0.86% of the British National Corpus spoken part. The average speaking speed is high with around 193 words each minute.

The term *schema* refers to a knowledge cluster that contains information about core concepts, relations between concepts and knowledge about how and when to use these concepts (Jonassen, 2010). As organized knowledge structures, schemata guide information acceptance and subsequent use. Based on the top 200 keyword list, we manually selected words which were semantically closest to “problem” and “solution”, respectively.

Table 1 provides the problem schema and solution schema produced by the learner corpus. Firstly, there are 50 synonyms of “problem” and 30 synonyms of “solution”, signaling a semantic variety of the learner corpus and speakers’ engagement with the problem-solving. Secondly,

much more problem synonyms than solution synonyms (50>30) indicate that problem complex is prominent, and its identification is essential to the efficiency and effectiveness of problem-solving; that is, language users should have a more prosperous semantic network in fault finding or problem sensing. Thirdly, most problem schema contains negative words in prosody while solution schema comprises positive words. Schemata have the characteristics of knowledge generalization, cognitive resources economy, analogical predictiveness and automatic transference (Jonassen, 2010). The more affluent problem schema and solution schema are, the more sensitive to problem-solving language users of the learner corpus are.

In addition to the keyword list, standardized frequency also designates the salience of problem-solving. Salience is the primary contributor to the production and interpretation of lexical units and phrases and conceptual associations, available to all speakers in a language community, and it can be assessed based on frequency, familiarity, conventionality, or prototypicality (Baider, 2019). In the learner corpus, *problem(s)*, *need(ed)*, *issue(s)*, *solution(s)* and *solv\*(e, ed, or ing)* appear 604, 730, 181, 69, and 107 times respectively. Individually they were low-frequency items but noticeable in standardized frequency. The standardized frequency for an item in a one-million-word corpus is 33.07 instances (Gao & Wei, 2019). In this study, the standardized frequencies of *problem\**, *need\**, *issue\**, *solution\**, *solv\** are 1864, 2253, 559, 213, and 330 instances, respectively, which are much higher and significantly salient. It is deductive to confirm that debating discourse is as salient as problem-solving discourse.

**Table 1**  
*Problem Schema and Solution Schema in the Learner Corpus*

Problem Schema			Solution Schema		
Barrier	Difficulty	Mistake	Tragedy	Alternative	Motivation
Blame	Dilemma	Mismatch	Trouble	Answer(s)	Pension
Blockage	Disadvantage	Manipulation	Uncertainty	Approach(es)	Practicality
Bottleneck	Disaster	Obstacle	Unemployment	Benefits	Profit
Bullying	Drawback	Pitfall	Weakness	Communication	Proposal
Caveat	Endemic	Problem		Compensation	Regulation
Challenge	Error	Prosecution		Counterplan	Remedy
Complication	Fault	Quandary		Cure	Scheme
Constraints	Flaw	Riddle		Feasibility	Solution(s)
Contradiction	Fraud	Shortcoming		Idea	Step
Corruptions	Hindrance	Stress		Impetus	Strategy
Counterfeit	Illness	Struggle		Incentive	Suggestion
Conundrum	Impediment	Subproblem		Mitigation	Task
Crises	Issue	Suffers		Method	Technique
Defect	Limitation	Threat		Methodology	Way

Figure 1

The Concordance of Problem(s) in the Corpus

1	, the weapons are a shame politically for this state and that's a	problem. And also, by states, as I've already pointed out, states can represent
2	only able to make money by selling targeted advertising. Why is that a	problem? Because in the status quo, we still preferences of individuals to compani
3	of these companies to earn money on selling that. Why is that a	problem firstly? We point out this, there are a lot of companies that big
4	are cut out. We bring them in and seriously guys have been a	problem with fund raising in the Tech industry, like, you see, Silicon Valley. Now
5	say why this one equality is so strong and there are so many	problems that it only becomes is only preserved by the whole horrible inequality. W
6	<PM> We can only solve our	problems if we know that the information on our day-to-day lives on
7	buse of that power by governments before moving on to that problem. Second	problem extension about companies to account. Firstly, on government use. This deb
8	of why people knowing what people search for online will lead to social	problems being unsolved in a very vague way. Next, the closing government say that
9	on things. But we always stress there's just more information to solve	problems. And secondly, okay so maybe some states will be badly. They will be
10	to note is that they talk about this policy means we can solve	problems right because we all know what people are searching in google like crucial
11	can target them. Why is this? The most important thing is the structural	problem set up by the state, by poor education policy, by not of public
12	, a new level of data which can allow us to tackle the structural	problems society faces and to empower individuals and minority groups to tackle the
13	of large multinational corporations that allows us to solve the structural	problems which people face. Three things in this speech. One, direct responses to o
14	on the abuse of that power by governments before moving on to that	problem. Second problem extension about companies to account. Firstly, on governme
15	le expressing that online in conservative states that no one can deny that	problem, we think the personal nature of matter of data is what is crucial
16	nse failure, even they cost billions of billions of dollars to create. The	problem is we don't have such high profit margins for those companies which
17	out at night to a far lesser extent than men do. But the	problem is a lot of this happens, not just because they fear society but
18	what they know about where people move based on their maps. But the	problem is when only one person can do that tailor, it's all about
19	th Africa. Because they don't believe that they are compensated enough the	problem is not only about give less giving less money and land that opening
20	rity of ministers are today from the minority communities. We say that the	problem of corruptions is presumably for that for that very reason is symmetric on
21	ves an irrefutable depiction of this state of society and particularly the	problems of society. So, if you know that on google Metadata, it is obvious
22	of the case? So firstly, as I point out if you have the	problem of liberal states being able to be labelled a crackdown on people. What
23	state, by poor education policy, by not of public sector provision, by the	problems that individuals face. We expose those. We win over moderates. We call out
24	ok was founded in 2004. It only started making money recently. What is the	problem then? As a result of this policy, you are only able to make
25	massive because people could start to say the issues that they face the	problems with the government. When we started collecting national data, quality was
26	ciety faces and to empower individuals and minority groups to tackle these	problems using information that was never seen before. Ultimately, we believe that

Concordance lines of corpora are the third window to see how words and phrases are commonly used in a corpus of texts. There are 1951 lemma types and 21,896 lemma tokens within the following sub-corpus. More indications of target items come from their concordances. As shown in

Figure 1, *problem(s)* concordances indicate negative meaning in the prosody, namely *companies earning money on selling data, a crackdown on people, corruption, and less compensation in money and land*. They echo the interrogation of problems and their reasons by the linguistic repetition of speakers.

Figure 2

The Concordance of issue(s) in the Corpus

1	he day would presumably make land appropriation. For example, the central	issue of that negotiations at that point which means that people would be afraid
2	te data that pose a direct security threat or otherwise critical sensitive	issue, it will be subject to standard governmental checks when it does so will
3	justice was better. Firstly, I disagree that TRC's don't solve structural	issues why the first is that TRC's often times a lot of victims
4	is that she told you a few important reasons and this is the	issue about what happen in the future. The first is that often times they
5	e start circulating that was massive because people could start to say the	issues that they face the problems with the government. When we started collecti
6	individuals face. We expose those. We win over moderates. We call out the	issues to win them over to vote on these issues using this information which
7	. We call out the issues to win them over to vote on these	issues using this information which wasn't for access. We empower engineers to go
8	consent, this would be a policy enacted by the government not a thorough	issue one within this wholly is under consent, but you have to work with

As the synonym of *problem(s)*, *the issue* shares the same negative prosody (see figure 2), which is co-occurred by the words or phrases, e.g., *sensitive*

and *under consent*. Meanwhile, they revealed the content by *security threat* and *information access*.

Figure 3

The Concordance of need(ed) in the Corpus

1	quo, they are defending what we describe. When they say you first	need power to implement the change. We say but change has not been
2	of the things we need the least barriers to entry. You just	need a really really clever computer scientists who can come up with somet
3	when they have enough money to enough white people they don't	need to blab the head of state. Because they can bribe just they
4	portantly, this data allows us to identify and target exactly what we	need to change. It allows activists to know for instance if there is
5	said look how much the poor getting poorer. That's why we	need to change things as key part of Bernie's campaign. Or we
6	to get new business models coding is one of the things we	need the least barriers to entry. You just need a really really clever
7	our thought process is an enormous liability for any democracy and we	need to be able to hold a companies to account crucially the only
8	is the thing which tips you into feeling haunted by this we	need to hold companies to account and for that we need transparency very
9	this we need to hold companies to account and for that we	need transparency very proud to prose. That speak for their fine speech
10	threat and people would be afraid and they would say oh we	need to back down we say that's a good thing. They would
11	se the microphones for point formation wherever possible, because you	need to come here and with that in mind. I want to call
12	exactly. Because some not to just promise an end goal but you	need to promise the means to achieve it. The ANC haven't done
13	ation system. there are sophisticated organizational things which you	need to know in order to run farms efficiently. They would drive them
1	naccessible to the Africa. Right? You didn't have social workers that	needed to be trained for the black Africans. You didn't have the
2	have the resources to actually take care of citizens. We say they	needed to redistribute this to take land and body from the Africans in
3	wealthy and that is why they could have like buy whatever they	needed to continue this war. Secondly, they have control over army. Thirdly



In Figure 3, there are 16 tokens for need(ed) in the Corpus, of which all are related to verbality and causation. There is explicit co-occurrence in realizing causation, e.g., *to identify and target when we need to change, the poorer, the minor barriers to entry*. The other words or phrases employ an implicit noun signalling partial resolution of a problem, e.g., *power to implement the change, the promise of the means to achieve it, and transparency*. Another indication is outstanding verbality with pronouns *we, you, and they*. In parliamentary debates, GOVERNMENT and OPPOSITION stand for two disputable parties. Each side has two teams, the upper and the lower house, stance-consistent and competitive. All debaters with assigned roles and burden fulfilment should state 7

minutes in the order of Prime Minister, Leader of Opposition, Deputy Prime Minister, Deputy Leader of Opposition, Member of the Government, Member of the Opposition, Government Whip, and Opposition Whip. Speakers show their own opinions by *we*, make rebuttals by *you* and transfer the persuasion subjects to adjudicators by *they*.

When going to *solve(d)* and *solution(s)*, they show positive results after problem identification and analysis. As shown in Figure 4 below, there are only five cases of *solve*, but large multinational corporations have signified *the problem agents*, and the object of solving is *reconciling* in the line of *solved*. *Solution(s)* appear together with adjectives in negative meaning, e.g., *apocalyptic*, or positive prosodies with *best* and *different*.

Figure 4

The Concordance of Solve(d) and Solution(s) in the Corpus

1 ore about why civil war is unlikely because they had this like **apocalyptic solution** under their spoil the reason that this is true is because white people  
 2 reconciliation committee is pushing this narrative of sort of things **being solved** the reconciling even if you don't respect. They assume they would work  
 3 for really what members of the apartheid regime would not be the **best solution** for South Africa and did advocate for something more significant. We think  
 4 thing to note is that they talk about this policy means we **can solve** problems right because we all know what people are searching in google lik  
 5 means that it would have been better had in 1994. We pursued a **different solution**. I'm going to talk about three things in my speech. Firstly, what  
 6 Steve biko and Robert sub-aqua did come up with these kinds of **solutions**. They said that complete forgiveness for really what members of the apart  
 7 to grant them. In the first place right because of the kind of **solutions** that like you know so if they could not have engaged in civil  
 8 <PM> We can **only solve** our problems if we know that the information on our day-to-day  
 9 more difficult to have a political discourse. Today lives and the **smaller solutions** why is this all of this important, because we say that this combine  
 10 TRCA not justice was better. Firstly, I disagree that TRC's don't **solve** structural issues why the first is that TRC's often times a lot  
 11 ve been that much significant opposition to the ANC regime. We think **their solution** doesn't really matter. We think also that opening opposition said we could  
 12 e you didn't radicalized to the extent that opening opposition wanted **this solution** could have been come to right. so secondly me let's open it  
 13 the property rights of large multinational corporations that allows us **to solve** the structural problems which people face. Three things in this speech. On  
 14 down on things. But we always stress there's just more information **to solve** problems. And secondly, okay so maybe some states will be badly. They will

Those concordances suggest the semantic prosody of target items, i.e., the connotations and underlying assumptions of particular language-in-use. Prosody can indicate a particular discourse (Baker & McEnery, 2015) with a unique viewing and acting in the world, whether positive or negative. Parliamentary debaters assume the roles of problem-solvers. Verbal expressions with negative prosody show implicit discrimination on the problem specification. Moreover, positive signals usually co-occurred with solution(s). A skilful learner typically experiences a flow of novice, advanced beginner, competence, proficiency, and expert, with characteristic knowledge representation and application patterns at each stage. As these individuals get upgraded, their behaviour will become more nuanced, more contextualized, and more responsive to flexibility and cultural appropriateness, esp. flexible expression of nuanced cultural knowledge and ideas in goal-oriented intercultural interactions (Chiu & Shi, 2019). The data has shown parliamentary debaters' flexibility and cultural appropriateness with nuanced cultural knowledge and expression.

The Keyword List of the Corpus

The keywords found in this study contain notional words and functional words that reveal the content or stylish features of the compiled Corpus. In corpus linguistics, aboutness and keyness are two indexes to uncover a corpus's stylistic features or genre characteristics (Flowerdew, 2008). The former reveals text content by perceiving and decoding readers/listeners. The latter refers to a word with unusually high or low frequency in a text, helping to locate the gist of a text and internal signalling (Friginal et al., 2017).

In this study, most genre-specific, for example, opposition, opening, government, POI, speech, state, closing, debate, and rights, are conventional parliamentary address terms. The British Parliamentary Debate Government and the opposition stand for two sides, whereas the Opening and closing feature roles of speakers, the upper house and the lower house. POI refers to the Point of Information, indicating questions raised during the speech. Therefore, their occurrence reveals the interaction of the British parliamentary.

In a situation, content words are significant indicators of conceptual schema by the word itself and its synonyms (McEnery & Hardie, 2012). The

problem does not appear in the keyword list but has synonyms (e.g., harms) and words with negative prosody (e.g., apartheid, inequality, violence, war, afraid, monopoly, tensions, and sanctions). Their recognition is expecting to come out with a solution. These solutions can be actual, attempted, or proposed, predictable as things or actions that innovation and concession(s) lead to practical results with such words as peaceful and essential.

Figure 5 and 6 show concordance lines of people. These concordance lines function as visualizing devices to display the shared associations (collocations) of key words, providing a statistical picture of meaning network (McEnery et al., 2019). The salient keyword with 253 instances, people co-occur 23 times with black and 29 with white. The concordance of black people reveals a series of negative messages, e.g., to steal, more violence, terrible judicial system, die in masses, riots, discriminatory sentiment, structurally marginalized, structurally oppress, systematically disenfranchised, and apartheid. These signals have pictured problems that black people are facing. Meanwhile, the proposed solutions have been mentionable, e.g., getting land back and getting money, voting, and promising to stop being poor.

Semantic prosody is a pointer to reveal the attitude of speakers, commendatory or derogatory, positive or negative, critical or supportive (Gao & Wei, 2019). In figure 6, white people are worthy of observation with more frequencies. There is less unemployment within its 29 instances, with 6% white people than 30% black people. Furthermore, the rest lines go on with the negative prosodies of white people, e.g., to decrease the concession, drive out, apartheid, outnumbered, the source of all the money, being hated, not contribute to the foundation

of political institution, the past atrocities, to repel against, less attachment and less sense of guilt, anti-sentiment, conflict domination, and dispossession jail time.

The concordances illustrate that white people are in a contradictory situation. For example, continue to hate (line 14) resulted from the perceived culprit of the suffering of black people, which presents the social image of white people community by the problems they are facing and proposes a solution by the opposite. Additionally, lexical abundance is accessible by two terms in the motion of file one. The ANC refers to the African National Congress founded in 1912. In the Republic of South Africa, it has been the consecutive governing party of post-apartheid since the election of Nelson Mandela in 1994. Its mission was to unite all Africans as one people in defending rights (e.g., full voting) and freedoms (e.g., to end the system of apartheid).

Furthermore, the TRC stands for the Truth and Reconciliation Commission, a court of justice after apartheid. The practice within such specific cultural background is challenging to all debaters. In corpus linguistics, the type-token ratio is “a measure of vocabulary diversity in a corpus, equal to the number of types divided by the total number of tokens. The closer the ratio is 1 (or 100 per cent), the more varied the vocabulary is” (McEnery & Hardie, 2012, p. 253). Significant variation and more samples are the preconditions of a larger corpus. The Corpus has satisfied its representativeness and validity based on the type-token ratio and motion variety.

**Figure 5**

*The Concordance of “black people” in the Corpus*

1 may have pardoned what white people donna and apartheid. But all the black people. For example, that had to steal because they had no other  
 2 because exactly they have ever seen and willing to do anything for black people. We're saying once they have committed to black not just  
 3 for many years. And it also will lead to more violence from black people. Why is that the case because they will feel that white  
 4 more we say for example the judicial system has been terrible to black people after it because they all the TLC may have pardoned what  
 5 actually means. But oftentimes those white people did not concede to black people and ANC not because they thought that it was their duty  
 6 y perpetrated these as apartheid and harm right. We think furthermore black people are also less likely to be able to forgive. Because they  
 7 have better future. But now we're not satisfied right now in black people are not satisfied at all that was just one moment of  
 8 the reason that this is true is because white people are outnumbered black people by 20% to 80%. Therefore, we don't think it's likely that  
 9 a bloodless revolution. We say bloodless for the white people because black people died in masses in that emergence since 1994. They died because th  
 10 would be even more terrible than that okay. What would happen for black people for basically that me off Raqqah, firstly economically, we say econo  
 11 the seat in the United Nations and also they saw riots by black people getting bigger and bigger. They got afraid of that's exactly  
 12 believe that it was the case they wouldn't actually think that black people have a right to principle right to get all the people  
 13 What people are still having some sort of discriminatory sentiment to black people right now at the moment to. and secondly don't told  
 14 the second point about what is the cost today. we think that black people right now at the moment still are being structurally marginalized. TI  
 15 white people believe that they still continue to structurally oppress black people right now. At the moment the reason why this is far  
 16 by just giving away. Some of the lens and the money to black people so for all those reasons a civil war incredibly unlikely but  
 17 people have died and the struggle was almost full nothing given what black people suffer in South Africa today. and they have never explained how  
 18 we kind of moved forward so that's okay considerable current context black people systematically disenfranchised right now at the moment too. They c  
 19 <PM> Since 1994, we say the ANC policy has been to give black people their rights and you kind of try to restart the state.  
 20 letting things slide in that sense have a big to ensure the black people to get their land back, get money, get it at the  
 21 people. So again, the kind of information that is useful for the black people to vote and Ronnie's government efficiently. Don't walk falsely.  
 22 ve a real democracy. They hate apartheid because apartheid meant that black people won't giving the rights we say this is exactly the  
 23 important the ANC made the promise Mandela made the promise that black people would stop being poor. The reason that there is a huge

Figure 6

The Concordance of “white people” in the Corpus

1 ch now has 30 percent unemployment overall but only six about the white people. And we say that by the way is to both of  
 2 uld not be blamed much further. They decrease the concession from white people. And lastly, we believe that generations have passed since the time  
 3 they don't the media wants to sell advertises and sell to white people. So, the media disseminates information that is useful to white peopl  
 4 hite people. So, the media disseminates information that is useful to white people. So again, the kind of information that is useful for the  
 5 political reasons to go to support that. Secondly, you drive out most white people. Why is it problematic not see we're not seeing the  
 6 for its doings then when all the texture when you come from white people. You never want to harm the white people because they are  
 7 a state that is guild only to do what's best for white people and that we say essentially is apartheid. But we have more  
 8 black people. Why is that the case because they will feel that white people are refused to give something that belongs them like rightfully and  
 9 solution under their spoil the reason that this is true is because white people are outnumbered black people by 20% to 80%. Therefore, we don't h  
 10 closing opposition said firstly like we can't find out truth because white people are defensive. But the thing is we don't understand think  
 11 what we had was a bloodless revolution. We say bloodless for the white people because black people died in masses in that emergence since 1994. TI  
 12 when you come from white people. You never want to harm the white people because they are the source of all the money all that  
 13 you have kept it. Mostly the same a system that is benefited white people before I move on let's say first. (why all the  
 14 tension those people are satisfied that's why they continue to hate white people believe that they still continue to structurally oppress black people  
 15 understand what that concept actually means. But oftentimes those white people did not concede to black people and ANC not because they  
 16 cal institution it's something important. When we think about it like white people did not contribute to the foundation of these political institution a  
 17 people after it because they all the TLC may have pardoned what white people donna and apartheid. But all the black people. For example, that  
 18 viduals of the apartheid this directly engages with the argument that white people forget about the past atrocities and don't take responsibilities beca  
 19 e dramatic from that side but mostly analyzed they say that basically white people have retain all the power know the vast majority of ministers  
 20 a little longer to come to an end to apartheid. Even if white people left South Africa the consequences that are occurring right now. and  
 21 not do anything in 1994. Right now, they're still afraid that the white people might repel against them but get angry might revolt against them  
 22 have passed since the time of apartheid meaning the fact that people white people now have less attachment and less sense of guilt compared to  
 23 might head of state but when they have enough money to enough white people they don't need to blab the head of state. Because  
 24 because we think that right now it's actually more likely for white people to believe that they did not have anything directly to do  
 25 too. They quite have so much amount of like anti sentiment to white people we don't see not only racial inequality but racial tension.  
 26 ould expand economic and political concession day to demand from white people, which means the day would presumably make land appropriation. Fc  
 27 for murder Mr. Tuerck Wetsy, it would be for actually putting people white people who had actually killed and attacked members of the ANC and  
 28 ards. Presumably the conflict and hopefully not by the domination of white people would be even more terrible than that okay. What would happen  
 29 xamine the point about other things basically opening in your world white people would be afraid of dispossession jail time. There even if they

motion that the ANC policy in South Africa should have demanded further concessions even at the expense of prolonging the conflict.

Moves and Steps of the Problem-Solution Pattern

The next step is a move analysis of problem-solution in the Corpus by context inference and linguistic clues. The case below is a debate on the

Table 2

The Move Structure of Government (Proposition) in the Learner Corpus Four Moves of Hoey (1983)

Move 1 Situation	Sample Sentences
Step 1 Provide a debatable case	Since 1994, we say the ANC policy has been to give black people the rights and kind of try to restart the state.
<b>Move 2 Problem</b>	
Step 1 Identify there is a significant problem	We say they gave the Africans the rights but not the dignity from access to those rights or stay unable to take care of them and ensure that they have the rights.
Step 2 Explain team line	We're going to explain in two points. First, why redistribution was necessary for the dismantling of inequality and why it couldn't happen otherwise. And second, such inequality will last?
Step 3 Provide the problem inherency	Africans were at the end of the rope. They were a pariah state. The recovery was going down. They didn't have the resources to give them reparations.
<b>Move 3 Solution/Response</b>	
Identify the cure of proposed policy	We say the ANC started with an armed conflict and they were willing to give concessions.... afraid of more armed conflict and more damage coming to them and would have given significantly greater concessions.
<b>Move 4 Evaluation</b>	
Confirm benefits of this policy	... done this to enable them to create a better country, to enable Africans to access their rights, to have some more meaningful change to the life of the Africans into the future of South Africa as a whole. Will propose.

As table 2 shows, the propositional argumentation is typical in the flow of Situation, Problem, Solution/Response, and Evaluation. The sample debate began with a case of ANC policy and then identified the rationale of why this early policy in the current situation failed to remove the inequality problem. The speaker proceeded to convince us that the proposal of more significant concessions, e.g., removing the amnesty provision

in the TRC and more fabulous land and economic rights, were helpful to secure the rights of Africans. Finally, further evaluation pointed to the favourable consequences of implementing the legislation.

According to Baker and McEnergy (2015), corpus-based move analysis is a useful top-down text-focused approach with four added advantages: the ease of identifying the linguistic characteristics of the moves, their frequencies and lengths, the



mapping of their use and location in the overall discourse structure of texts, and the development of genre prototypes. Table 3 above presents the oppositional move structure of problem-solving argumentation. Speakers are the same to sequence their framework from the Situation and the Problem to Solution/Response and Evaluation. However, they value the refutation and comparative response shown by optional steps. In oppositional argumentation of sample debate, it is clear from the outset that there is a common goal on the rights of stakeholders but points out that the government model cannot be feasible for many reasons. The opponent denying the existential presupposition states that the negative consequences of the problematic situation will not occur because of current reform implementation incentives of alternative solutions. In this case, it is presumed in

the initial argumentation that the government scenario is not the best case, and the counter-model will be closer to the intended results.

Debaters must outline the problem ground, provide a model that describes the resolution contours, offer a scope or case, impose restrictions on the controversy and construct enough debatable space for both sides (Eckstein & Bartanen, 2015). Debating prototypes bring language learners close to better understanding of procedural variation that occurs while solving actual problems. It expects to reveal that the problem-solving mindset is the product of debating practice. All in all, move identification of problem-solution discourse can be helpful for learners to develop a mindset of prompt, effective, and appropriate tacking in the face of disagreement, especially in intercultural contact.

**Table 3**

*The Move Structure of Opposition in the Learner Corpus (Four Moves of Hoey (1983))*

<b>Move 1 Situation</b>	<b>Sample Sentences</b>
Step 1 Provide a debatable case;	Honorable panel, we agree on a principled level that African people deserve more. They deserve more power and more economic rights.
<b>Move 2 Problem</b>	
Step 1 Refute the government case;	However, we think that the model that is provided by the government here would not work.
Step 2 Explain team line	So, two points on my speech. Firstly, why civil war will be likely to be a full-scale war and why it's dangerous for the African state? And secondly, why more radical leaders within ANC would emerge and why it will prevent the existence of South African democracy?
Step 3 Provide reasons to oppose the policy	We think that some reforms are implemented now. And we have even more incentives to implement them in the future.
<b>Move 3 Solution/Response</b>	
Identify a counterplan	... compensation for people whose lands would be taken away. ... punishment for murderers who had killed and attacked members of the ANC and the black community.... and making sure they got the punishment. This would not harm white individuals who excluded.
<b>Move 4 Evaluation</b>	
Option 1 Confirm the future benefits of the current policy	It will lead to a less democratic South African state in the future, and lead to a much worse future for all the people of South Africa for all these reasons. Very proud to oppose.
Option 2 Confirm the infeasibility of the current policy	So, at that point, we believe that change is possible for South Africa. But unfortunately, in their best-case scenario that would not happen. For these reasons, beg you to oppose.

**DISCUSSION**

This study investigated the problem-solving representation in debating discourse based on a learner corpus. Problem-solving is a schematic, procedural and conversational process (Csapó & Funke, 2017). This section contains three parts: the implication of debating Corpus related to problem-solving patterns, the implication of students' problem-solving prototype through debating teaching, and the limitations and recommendations of future research.

**Debating Corpus implication**

The first research question asked whether problem-solving patterns are apparent in the debating discourse. The answer was affirmative. The results revealed that the problem-solving schema is significant with a high standardized frequency in the debating discourse. This finding is congruent with previous research that has found debating practice beneficial for generating and organizing ideas on solving problems (Eckstein & Bartanen, 2015; Ma, 2017; Walton et al., 2019; Yulia & Aprilita, 2018). Additionally, the type-token ratio in the compiled

learner corpus is much higher than in the British National Corpus. This ratio is the best predictor of debaters with more variation of expressions than average speakers. The explicitness of the problem-solving schema confirms debating as problem-solving discourse membership (Garssen, 2016). These results support previous claims that debating is a valuable and facilitating cognitive tool because problem-solving skills depend on a schema resulting from the extraction, reasoning, and application of domain knowledge. Experts are better problem solvers because they assess a complete schema based on previous experiences, recognize different problem states that invoke specific solutions, construct the problem representation, and proceed directly to the implementation stage of problem-solving (Karatepe, 2021).

In the concordance examined above, white people and black people are controversial in social identity. As Figures 5 and 6 illustrate, speakers expend considerable effort on the prosodic distinction between these two stakeholders. Such diverse identification of critical items allowed learners to conceptualize and formulate their messages by collaboratively negotiating language. This apprehension of problem-solving stages ensures a complete understanding of the contrasted goal state through problem-solving steps (Jonassen, 2010). No matter what professional context, a transferrable possibility enables learners to describe a situation, ratify issues, evaluate solutions, and orient towards future actions.

These findings add weight to ESL/EFL learners that reality-originated motions and assigned stances in simulated roles, goals, and social identities, no matter of professions or institutions, may often be far more discursively relevant (Funke et al., 2018). Second language learning is highly contextual, beginning at the micro-level of social activities. It is demanding for learners to cognize the input properties in interaction and form their language resource base. The distribution and frequency of specific symbol resources are critical indicators of the input diagram. The more symbolic variations appear, the more cognitive representation of linguistic knowledge (Xu & Long, 2020). Salience is the essential sponsor of conceptual connotations and lexical unit elucidation about how expectations, judgments, and attitudes are built.

This is the value of exploiting corpora for educational purposes. Linguists use corpora to answer questions and solve problems (McEnegy et al., 2019; Zhu, 2020). With the tools of frequency, standardized frequency, type-token ratio, and concordances of specific patterns produced automatically, it is easy for teachers to use corpus data from the socio-cultural environment. Creating authentic contextual schemata is helpful for classroom use to fit learners' realities. Another way forward in this area is the compilation of learner

corpora and the exploration of learner data, motivating more reflections on language use and thus fostering their foreign language awareness (Flowerdew, 2008; Friginal, 2018). This linguistic evidence drawn from the debate corpus may lead apprentices to become experienced problem-solvers.

### **Problem-solving move implication**

The second aim is to uncover characteristic moves of problem-solving using a debating corpus. Past corpus-assisted studies spared little searching on the genre typicality of problem-solution. Flowerdew (2008) explored the lexico-grammatical patterning of the Problem-Solution pattern in corpora of professional and apprentice, but her data stemmed from the written form. Garssen (2016) described the argumentative patterns that come into being in legislative debate in the European Parliament in supportive or attacking respects. However, his data is limited in the opening speech by the rapporteur of the parliamentary committee report. Handford and Matous (2015) analyzed the discursive realization of on-site problem-solving encounters in a large international construction project in Hong Kong. Their results shed light on the pedagogical need for problem-solving interlocutions with diverse stakeholders involved.

This study successfully reveals two problem-solving move structures: propositional and oppositional (see Tables 2 and 3). They are conversational in the flow of the Situation, the Problem, the Response/Solution, and the Evaluation, in turn of speaker roles (opening or closing) and benches (government or opposition). Collaborative dialogue and procedures are two attributes of problem-solving (Csapó & Funke, 2017). By such collaborative output, "speakers are engaged in joint problem solving and knowledge building" (Swain, 2000, p. 102; as cited in Friginal et al., 2017, p. 200). Output serves a cognitive function and mediates language learners' understanding of how lexical and syntactic systems function in problem-solving.

This adds evidence to the prototypical advantages of corpus-based move analyses. Identifying linguistic characteristics of discourse moves is particularly valuable to develop a sense of genre prototypes. As Tables 2 and 3 illustrate, there were two problem-solving models. PROMBLEM or NEED (ill) is the initial issue of a debate. The affirmative must interpret a real problem context, establishing that there is a problem which needs to be solved. Such a problem can be in existence or likely to develop in the future (Garssen, 2016). Case building is necessary to create a situational space for discussion to explain it better. Then, INHRENENCY (blame) focus on whether the problem or the cause of the problem is an inherent part of the status quo. The affirmative must prove the significant harm of the current regulations or

system and that without adopting the proposed policy, the problem will continue to exist in the future. During the stage of solution or response, two questions must be justifiable: “Would the action suggested by the resolution eliminate the inherent problem?” and “Is it reasonable to assume that the plan implied by the resolution could be workable if found desirable?”. The first question is about PLAN (cure) and the other is about PRACTICALITY. Finally, COST and COUNTERPLAN should be in consideration. The proposition is free from detrimental side effects, and it is the best way to eliminate the problem. Probably, opponents use the following prototypical arguments for the standpoint that the proposed policy should not be adopted: there is no serious problem; the proposed legislation does not solve the problem; the proposal is not feasible; there are considerable disadvantages (the proposal has negative side-effects); and there are better means to solve the problem (Garssen, 2016). In other words, speakers would feel obliged to fulfil their roles and socialize with all benches for a final win-win by rapport. They must outline the problem ground, provide a model that describes the resolution contours, offer a scope or case, impose restrictions on the controversy and construct enough debatable space for both sides (Eckstein & Bartanen, 2015).

These efforts have brought students closer to a better understanding of problem-solving and decision-making. In such a classroom community of conversation, students would feel safe interpreting background, verifying assumptions, approaching other cultural patterns, and clarifying moral visions beyond ideological, political, and cultural borders. They learn to differentiate the gap between the goal and reality based on their diverse stances, refute disagreement, shield their testimony, manage power relationships, and finally get ready to tackle actual problems. It is essentially practical in intercultural networks because of cultural- and context-specific knowledge (Shi & Cheng, 2019).

#### **Limitations of the Study and Recommendations for Future Research**

This study is exploratory and contributes to a body of knowledge. However, several limitations in this study should be noticeable. First, the size of 32,3975 words is not significant to an ideal corpus. A longitudinal study of language development may be more practical. Further, one must be mindful that the Corpus may contain a culture-specific intellectual style which might have a bearing on the problem-solving discourse functions and the genre moves identified above.

Moreover, the context-specific demands of the problem-solving genre may also suggest the formulation of move structure on the diverse subjects. Finally, the corpus analysis focused on merely five keywords. A broader analysis might

have revealed additional discourse functions. Future research might consider this and other issues such as whether and to what extent there would be differences in results using the same task over time in studies investigating language development.

#### **CONCLUSION**

This article has reported on a problem-solving representation of learners through debating, highlighting the value of exploring learner corpora for the development of problem-solving language. The corpus way is practical to observe the relationship between debating discourse and problem-solving schema based on many observations. It was evident that problem-solving patterns concerning problem, need(ed), solution(s) occurred with high standardized frequencies in the debates. Secondly, there is considerable variability in problem-solving expressions with a high type-token ratio. Specifically, keyword concordances mark the stance and manner of learners while talking to solve problems.

Additionally, move structures of both sides appeared in the flow of SITUATION, PROBLEM, RESPONSE or SOLUTION, and EVALUATION. There were six steps of case building, problem identification, team line explaining, problem inherency, policy feasibility, and policy benefits for the government side. Similarly, the opposition side took the above six steps but focused more on refutation. They emphasized why their policy has a better impact on problem-solving. Overall, problem-solving communication is a schematic, procedural and conversational process. Identifying moves of debating practice is particularly valuable to develop a sense of genre prototypes.

All these reveal a great deal of information to teachers who teach speaking. To begin with, an appreciation for viewing language development as a dynamic and interactive process is significant. Debates create an interaction context to force speakers to discuss topics with diverse stances. This coercion will gradually evoke the willingness to talk, the increased use of a specific linguistic pattern, and critical reflection, which outweighs an advanced grasp of English syntax. In addition, the changing use of problem-solving items can contribute to comprehension and problem solving, especially in an intercultural view. Communication with culture-specific knowledge on sensitive topics helps learners cope with feelings of uncertainty and develop curiosity and empathy; as a result, they become more open to cycling otherness and negotiation (Tosuncuoglu, 2019). It is rewarding to comprehend the allocation of rights and obligations among problem solvers. Finally, resolution-oriented debates would suit young people to develop intercultural communication competence through experience and reflection (McEnery et al., 2019). In

the classroom, they feel safe under a mask of the simulated role to absorb worldview with a tutor moderating possible conflicts. They are aware of different contexts which challenge mechanism stereotypes, misunderstandings, fear, and even hatred. When learners have closer and more frequent exposure to problem-solving activities, they are sure to shed further light on the characteristics of “problem” clarity under decision-making, no matter definition-oriented conversations or resolution-oriented ones.

Context-dependent, relational, and plurilingual, tertiary socialization is even a matter of survival in the country with stumbling barriers for sojourners, such as immigrants or political refugees (Zhu, 2020). The more distinct the cultures, the more problems may occur. Only when cultural discrepancies are understood comes the know-how ability. According to constructivism, simulation can answer questions about how language is realized naturally and how much respondents know about what is appropriate to say in a natural-similar setting. Thus, EFL/ESL teaching should prepare learners to assume intercultural mediators, disparity reconcilers, and agreeable relation builders through appropriate problem-solving practice. The results here further support the possibility of communication simulation towards intercultural issues.

The discussion in this article raises a central issue for instructors: What are the expected linguistic outcomes of language teaching, and how to assess such effects? For example, in this study, when changes in problem-solving language use are considered based on corpus observation, a dynamic and holistic picture of language development emerges. Considering debates transcribed into a corpus suggests individual progress by the type-token ratio, essential word list, concordances, and problem-solving move structure. We hope that the discussion here invites a critical reflection upon the nature and goals of problem-solving language learning and encourages a corpus-assisted assessment of our practices in instruction.

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**APPENDIX. The List of Videos Web Addresses in the Corpora Used in the Study**

- A. Assumption University of Thailand (The hosting University of the WUDC 2020)  
[https://www.youtube.com/channel/UCBArL\\_dL5XiXCiS5pDtyLpQ/videos](https://www.youtube.com/channel/UCBArL_dL5XiXCiS5pDtyLpQ/videos)
- B. Cape Town WUDC 2019 (the official account of the WUDC 2019)  
<https://www.youtube.com/c/CapeTownWUDC2019/videos>
- C. Communications Dutch WUDC (the official account of the WUDC 2017)  
<https://www.youtube.com/channel/UCud1ZqmVILgT4rTJbkhMEmw/featured>
- D. Sample Debate  
[https://www.youtube.com/watch?v=qaFoGHQs\\_\\_4&t=53s](https://www.youtube.com/watch?v=qaFoGHQs__4&t=53s)