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Domain Analysis as a Multidimensional Research Framework: Evidence-Based Alignment for LSP Research, Assessment, and Curricula

Abstract: Language for specific purposes (LSP) pedagogy has as its goal the delivery of the specific knowledge, skills, and abilities (KSAs) one must possess in order to function in professional real-world language use contexts. Delivery of such a promise requires well-defined outcomes. This paper argues that when these outcomes are not readily identifiable through theoretically explained data or empirically collected evidence, one must turn to the process of domain analysis as a research framework. The paper first contextualizes domain analysis in an assessment-driven proficiency-oriented reverse design framework (Baumann et al., n.d.) and evidence-centered design (ECD) (Mislevy & Haertel, 2006; Mislevy, 2011). Next, it describes the steps of domain analysis as a multidimensional and systematic research framework to analyze and define language use in specific LSP contexts. It concludes with a discussion of why LSP domain analyses are essential to ensure alignment across LSP research, assessment, and curricula, regardless of purpose or discipline.

Keywords: domain analysis, evidence-centered design, language for specific purposes (LSP), research framework, reverse design framework

Introduction

Language for specific purposes (LSP) pedagogy has as its goal the delivery of the specific knowledge, skills, and abilities (KSAs) for professional real-world language use contexts. This promise of LSP is indeed in alignment with the need to "reframe language learning and language proficiency as the development of a set of functional, real-world skills that broaden and deepen all students' learning at the university, regardless of discipline" (University of Chicago Language Center, 2023, para. 2). LSP pedagogy, in this regard, can also be an effective response to the low language course enrollment crisis in the United States (Looney & Lusin, 2019) by offering language "skills not only to enhance student engagement and performance across all disciplines but also to promise heightened opportunities as students pursue academic and professional careers beyond campus" (University of Chicago Language Center, 2023, para. 2).

Delivery of such a promise requires well-defined outcomes so that students can be equipped with specific KSAs to function in professional real-world language-use contexts. The key question is: What happens when these outcomes are not readily identifiable through theoretically explained rationale or empirically collected evidence? One could rely on the general knowledge of and about the target domain or could define these outcomes based on personal observations, interactions, or experiences. Or one could take a path that utilizes a rigorous and systematic research framework to analyze the target domain. This paper argues that when these outcomes are not readily identifiable, one must turn to the process of domain analysis as a multidimensional research framework. The paper first contextualizes domain analysis in an assessment-driven proficiency-oriented reverse design framework (Baumann et al., n.d.) and evidence-centered design (ECD) (Mislevy, 2011; Mislevy & Haertel, 2006). Next, it explores

domain analysis as a multidimensional and systematic research framework to analyze and define language use in specific LSP contexts. It concludes with a discussion of how LSP domain analyses are essential to ensure alignment across LSP research, assessment, and curricula, regardless of discipline.

Domain Analysis

Domain analysis is a systematic analysis of language use in a particular domain to identify and define the specific KSAs one must possess to be able to function in that real-world language-use domain. This definition makes several claims. First, it characterizes domain analysis as a process to collect empirical evidence utilizing direct and indirect observation or experience. Second, it portrays domain analysis as a systematic attempt to gather data and information concerning the target domain based on solid methodological ground. Third, domain analysis is positioned as an exploratory endeavor to investigate the target domain without predefined hypotheses or assumptions. Fourth, it shifts the focus to the domain itself by focusing on the contexts, situations, and tasks in the target domain. It, thus, focuses on real-world language-use interactions and explores what learners can do with the language in a given domain. In that, it differs from a conventional needs analysis where the focus is on what the instructors, coursebook authors, or learners themselves think they need to know or would like to know. This last argument does not mean one should not consider instructors and/or learners as key stakeholders of a given domain. Indeed, they can be treated as domain experts, when possible, or as informants if they have experience functioning in the domain.

Domain Analysis and Reverse Design Framework

To understand domain analysis and how it should be positioned in LSP assessment and curricula, we first need to contextualize it in the proficiency-oriented assessment-driven reverse design framework (Baumann et al., n.d.). In this model, one cannot develop curricula until they have an end-of-sequence (i.e., summative) assessment in place that allows them to measure students' performance; only then they can determine whether the curricula will prepare students to meet the target outcomes (i.e., the target functions). And they cannot develop an assessment until they first identify those outcomes. Therefore, the reverse design process starts by defining the target language use (TLU) domain, which requires conducting domain analysis research if those outcomes are not readily identifiable through theoretical rationale or empirical evidence.

In this framework, the results of the domain analysis lay the groundwork to define the construct (i.e., KSAs that are being measured) to assess language learning in a given specific domain. Developing this assessment makes it possible to reverse engineer the course curriculum since it acts as an operational definition of the construct and thus allows the developers to internalize what it means to reach the identified outcomes and go through a dry run of their teaching at the blueprint phase. In such a model, therefore, defining TLU becomes a foundational pillar for LSP assessment and curricula.

At the same time, the reverse design framework is argumentative inherently and makes several claims. First, it claims that the TLU domain can be identified within certain parameters. Second, it claims that the construct can be defined based on the TLU. Third, it claims that the construct can be operationalized, meaning that, assessment tasks that can measure the key KSAs

in a given domain can be developed, delivered, graded, and reported. Fourth, it claims that learning experiences can be designed to teach these KSAs, which assumes that teaching methods, learning activities, and materials are useful for their intended purposes. Finally, it argues that assessments and curricula can be aligned to the TLU domain, which means that learners' performances can be generalized to the TLU domain.

The argumentative nature of this framework makes the TLU domain definition even more critical; it is essentially where everything starts and ends. In the case of LSP, when the TLU is defined through a rigorous research framework such as domain analysis, it lays a strong foundation for the claims in this argument to be warranted. Domain analysis research is vital to provide a solid argument for the validation of this reverse design process as it helps define the destination before one sets off on a journey and ensures informed and deliberate decisions are made as a result. Since everything is built on and aligned to the TLU domain, it is too much of a risk to define it based on general knowledge of and about the domain or developers' assumptions or experiences.

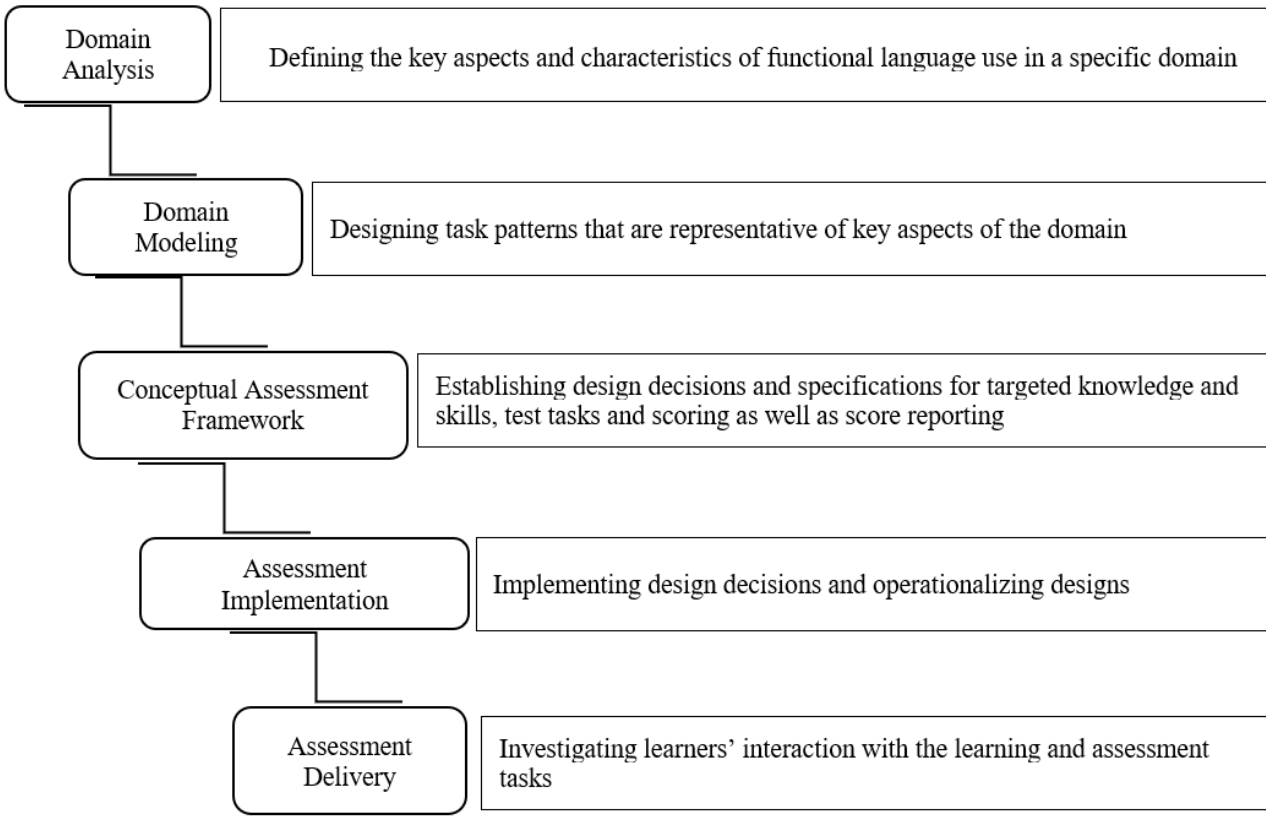
Domain Analysis and Evidence-Centered Design

In testing or assessing learners' language ability or performance, the key goal is to provide an accurate and valid interpretation of that person's language skills in the real-life context for which the test is developed (Dursun, 2019). Similarly, in teaching language skills, the key goal is to design, develop, and provide learning experiences (i.e., create a learning system) that enables learners to gain and use the intended KSAs for which a course or a curriculum is developed. However, both of these goals are not easy to attain as they seem to be. Such an endeavor requires a carefully structured and rigorous design process, which is the promise of the Evidence Centered Design (ECD) framework (Mislevy, 2011; Mislevy & Haertel, 2006).

ECD is a multifaceted and structured research and development framework to create rigorous assessments based on which the learning systems can be built. ECD considers the assessment process as an argumentative enterprise and offers a path to create a solid argument for validation of test score interpretation and use by establishing explicit links between design decisions and scores obtained from the test (Chapelle et al., 2018). ECD does this by providing three types of connecting evidence: 1) the inferences needed to be made about the test takers; 2) the language evidence produced by the test takers and how that evidence provides information about the test takers' language ability; and 3) the test tasks and whether they are designed in such a way that allows the test taker to provide the evidence needed to produce meaningful interpretations. To provide this evidence, ECD utilizes a development path consisting of five layers: Domain Analysis, Domain Modeling, Conceptual Assessment Framework, Assessment Implementation, and Assessment Delivery respectively. Figure 1, on the following page, describes the role each layer plays in the process.

Figure 1

ECD Process as a Framework to Define and Operationalize Constructs of a Specific Domain (adapted from Dursun et al., 2020)



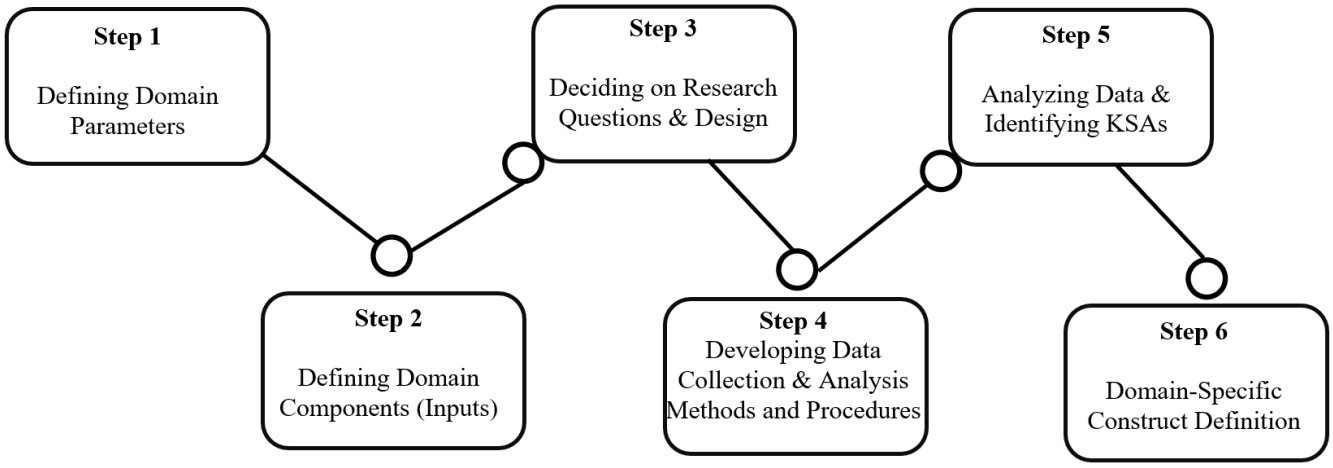
Domain analysis is the first phase in the ECD in which the researcher aims to identify and define the key aspects and characteristics of functional language use, in a specific domain in the case of LSP. Domain analysis outcomes provide evidence-based tangible concepts and a high level of detail that could be used to inform the design decisions (e.g., which skills are in more or less demand and how these could be represented in assessment tasks). Like its position in the reverse design framework, everything else in the process depends on and aligns with domain analysis, making it a foundational pillar. In the ECD, it is through domain analysis that one can identify target functions (i.e., target outcomes) upon which assessment models, test design choices, and operationalization can be built and delivered. The consideration and collection of evidence from the onset eventually establish the premise for curricular design choices, which then makes it possible to provide learning experiences that enable learners to gain and use the intended knowledge, skills, and abilities.

Contextualizing domain analysis in the reverse design and ECD frameworks provides a compelling argument for its role in ensuring evidence-based alignment for LSP research, assessment, and curricula. Next, the paper will explore how domain analysis research can be conducted.

Domain Analysis as a Multidimensional Research Framework

Conducting domain analysis research, similar to any other research project, cannot be prescriptive. The context and scope of the research as well as the resources researchers have access to directly impact how one can go about conducting such a study. This section explores the main steps in typical domain analysis research in an attempt to provide a framework to plan and execute it in a logical progression. Figure 2 lays out each of these steps followed by key questions and considerations researchers should reflect on at each step.

Figure 2
Domain Analysis as a Multidimensional Research Framework



Defining Domain Parameters

Defining the domain parameters is the foundational step in the process. This step demands thinking about and reflecting on the mandate (i.e., the needs and conditions that necessities the investigation of such a domain) as well as the degree of specificity of the domain of interest. In this step, a researcher needs to brainstorm all the measurable factors that define the domain or set the condition of its operations. The end goal is to analytically define the parameters (i.e., label the domain) in order to locate its components/inputs. Different levels of specificity, for example, will demand a different scale of research and therefore will result in the investigation of different components.

Some of the key questions one should ask include:

1. What is the LSP domain that needs to be analyzed?
2. What is the mandate to investigate this LSP domain?
3. What is the purpose of that LSP domain?
4. How accessible is the domain to researchers?
5. What are the essential contexts in the domain?
6. Who is the target audience in this domain?

7. What tasks are domain participants involved in?

This list of questions is not exclusive but shows the questions one should consider to plan this step accurately. For example, more ambitious domains require more ambitious domain analyses. The bigger your domain is, the more complex your analysis will be. On the other hand, a disadvantage of keeping it too narrow will be the inability to generalize the findings beyond the very specific domain. Consider, academic English language proficiency, North American academic writing conventions, and Chinese language skills for digital commerce. Each of these will require a different analysis at a different scale. Similarly, there could be certain cases where the domain, or certain components of it, are not completely accessible because of their sensitive nature which might dramatically impact one's ability to analyze them.

This step naturally involves making certain decisions to define the domain parameters. And this makes the researchers active agents in the process. While this brings the advantage of starting from a clean slate, one must be careful not to be unconsciously biased in deciding which factors and conditions to look at to define the domain parameters. There is no golden or prescriptive standard to define parameters. Many factors including the researchers' or institutional interest and motivation might impact these choices.

Defining Domain Components

Once the domain parameters are defined, one must put their attention to identifying its components. By domain component, we mean any input that can credibly inform the understanding of the functional language use in a given domain. Each domain will have its distinguishing components to help define its key aspects and characteristics. Similar to the first step, the researchers need to develop an analytical view to make informed and deliberate decisions regarding which components to investigate and how they might eventually impact the outcomes.

Some of the key questions one should ask at this step include:

1. Who are the stakeholders in this domain?
2. How are they engaged with the domain?
3. What are their roles in the domain?
4. What are the key documents, archives, and texts in the domain?
5. What are the key tasks domain participants must participate in?
6. Is there any published literature on the domain?

These are just a few critical, non-exclusive, questions that can help researchers develop an analytical view in identifying which components to investigate. The main goal in this step is to select components in a way and scale that allow researchers to collect sufficiently unbiased evidence. When possible, looking at multiple components will provide a more in-depth analysis and prevent researchers from relying too heavily on their point of view when they examine the domain. However, it is also critical to think of practicality. That is, researchers need to carefully evaluate the investment they will make in allocating their resources to investigate a particular component and the amount of useful evidence they will obtain as a result.

Another important consideration in this step is to define inclusion and exclusion criteria to be able to justify the choice of particular components as objectively as possible. Prioritizing

the components in terms of their relevance and importance can help define these criteria. This is an important point because this will later impact the arguments one can make regarding the generalizability of the findings. Table 1 summarizes some generic components that have been investigated in domain analysis studies along with the types of investigation each component might lead to and how they can inform the researchers. This table does not intend to provide an algorithm or prescription for researchers to choose components. Rather it is to underline the fact that there are many components one might consider and thus needs to develop a bottom-up approach in identifying them and justifying their use.

Table 1

Some Common Domain Components, Methods, and Analyses to Define the Target Language Use Domain

Components	Type of investigation	How it can help?
Stakeholders: program administrators, test takers, teachers, prospective employers, talent acquisition managers etc.	• Needs analysis questionnaires and/or interviews • Expert consensus	• Identify key knowledge, skills, and abilities • Define specific contexts and situations vital to the domain
Documents: textbooks, manuals, syllabi, curricula, job descriptions, corpora	• Content & context analysis • Task analysis • Corpus analysis of target linguistic features	• Specify the types of content • Define the topics of interest • Understand specific language tasks and functions
Contexts: classrooms, job interviews, field/work practices	• Observations • Interviews • Questionnaires	• Identify key knowledge, skills, and abilities • Define specific instances of language use
Published Literature: peer-reviewed journal articles, reference books, textbooks, domain specific magazines, etc.	• LSP research articles • Proficiency guidelines and standards • LSP reference books	• Define and operationalize the language used in the specific context for assessment purposes
Second Language Acquisition Theories	• LSP-relevant SLA/Applied Linguistics theories	• Explain the underlying knowledge and skills responsible for LSP-oriented language use

Deciding on Research Questions and Design

Once the domain components are identified, the researchers need to come up with their research questions as well as a strategy to answer these questions (i.e., a research design). The overall goal is to decide what information should be elicited from each of the domain

components to answer the research questions and decide on a plan to investigate them. The choice of what aspects of the domain to investigate needs to be deliberately aligned with the purpose or mandate of the domain analysis. Different components presumably will let the researchers explore a different aspect of the domain. However, sometimes multiple components can be analyzed to gain a different or an in-depth view of the same aspect. For example, in a given job-specific domain, one may interview prospective employers as well as do a content analysis of recent job posts to understand key qualifications and vital tasks needed to be successful at that job. In that regard, working on research questions will help specify the type of information that can be collected from each component. And it will let the researchers see, at an early stage, if they are missing any vital data points. At this stage, it is also important to ensure triangulation, making sure that the data is not biased because the wider the domain, the more ambitious the analysis of components will be.

Some of the key questions one should ask at this step include:

1. How many components should be included in the domain analysis research?
2. What data can be collected from each component?
3. How will these data inform the process?
4. How will the data be collected?
5. In what order should the data be collected? (i.e., do the data need to be collected concurrently across different components, or are the results needed from one component before investigating the others?)
6. For components involving human subjects, who are the participants and what is the plan to recruit them? (e.g., what are institutional policies and procedures that review and monitor using human subjects for such research?)
7. For components involving materials, documents, and published literature, what are the (re)sources and what is the plan to obtain them?

Reflecting on these questions will facilitate writing specific, demonstrable, and investigable research questions and will lead to a more informed research design. Good research questions should demand a clear research plan and push the researchers to utilize the strategy that can answer such questions. For example, do the questions demand a qualitative, quantitative, or mixed-methods design? The explanation and discussion of numerous research designs in each of these categories are beyond the scope of this paper. One may refer to introductory research methodology books to understand the nuts and bolts of various research designs.

However, regardless of the specific research design, in classroom-based LSP, the researchers need to make sure that the domain analysis research is exploratory. That is, they should not start their investigation with predefined assumptions or hypotheses in mind. This requires avoiding the appraisal mode, in which researchers need to evaluate or justify certain claims regarding a readily-available product. In classroom-based LSP, where the goal is to define TLU to be able to align research, assessment, and curricula, such a mandate usually does not exist.

Developing Data Collection and Analysis Methods and Procedures

Good research questions and a corresponding research design will determine how one can collect and analyze data. At this point, researchers need to design the tools that enable them to

first collect and then analyze data to answer their research questions. It is critical to have a systematic data collection process in place. This needs to be built on a data collection method that is aligned with the research purpose, its design, and the type of data it requires. For example, if the research purpose and questions require data to be expressed in numbers, a quantitative data collection method might be needed. If they require data to be expressed in words, a qualitative data collection method will be needed. On the other hand, if they require data to be expressed both in numbers and words, the need for mixed-methods data collection will emerge. Let's say a researcher is interested in exploring skills, abilities, and strategies needed in a socioculturally-sensitive business communication context. Since the aim would be to gain a detailed insight into a specific business context and explore how participants, potentially with different organizational roles, perceive and experience socioculturally sensitive communication, qualitative data need to be collected. And therefore, the researcher will need to utilize one or more qualitative data methods such as surveys (either interviews or questionnaires), focus groups, observations, or ethnographies to collect those data.

After the data collection method has been decided, the researchers need to plan how to develop the corresponding data collection tools and procedures (i.e., protocols). For example, if a questionnaire needs to be developed, they need to decide on the types of questions to include as well as how to deliver it to participants and record the responses. Similarly, if interviews need to be conducted, the researchers need to decide what forms the questions will take, how and where exactly the interviews will take place, whether to record the interviews, and so on.

Once the data are collected, the researchers need to develop corresponding analysis methods and procedures in alignment with the research purpose and questions as well as with the types of data being collected. For example, if the data collected consist of texts such as transcripts from the interviews or responses from open-ended questionnaires, a thematic analysis method might need to be utilized to examine the data to identify common themes. Similarly, the analysis methods and tools need to be designed in a way that elicits an answer to the research questions. However, this does not mean digging for only the information one needs to respond to the research questions. Especially, in qualitative research methodology, data can be messy. Therefore, it is important to have protocols including coding schemes in place to analyze data as objectively as possible. This will help establish a high-level consistency at the time of data analysis.

Some of the key questions one should ask at this step include:

1. What data collection methods do the research purpose and questions necessitate?
2. What procedures and instruments are needed to collect the data systematically and consistently?
3. What data analysis methods and procedures are required to analyze the data?
4. What protocols are in place for the data analysis to be objective and consistent?
5. What kind of statistical or coding methods are needed to analyze the data?
6. What kind of software (if any) is required to analyze data?

These questions will help develop data collection and analysis methods and procedures systematically. However, one should consult introductory research methodology books to understand the specifics of how to develop and implement these methods and procedures.

Analyzing Data and Identifying Knowledge, Skills, and Abilities (KSAs)

At this step, the researchers will analyze the data using the data analysis methods and procedures developed in the previous stage to respond to each of the research questions. There are numerous techniques to cleanse, organize, and synthesize the data to make sense of it, which readers might inform themselves about through research methods handbooks. This step will result in laying out what it takes to function in a given domain by identifying and defining the key aspects and characteristics of functional language use. The ultimate goal in analyzing the data in the domain analysis research is to identify patterns of key knowledge, skills, and abilities that are critical to function in the specific domain under investigation.

Some of the key questions one should ask at this step include:

1. What are the key situations, contexts, and content of the LSP domain?
2. What does it take to function in the LSP domain?
3. What are the key tasks and interactions that users are engaged in within this domain?
4. Which tasks are more or less in demand?
5. What are the key knowledge, skills, and abilities to complete these tasks?

One of the important points in identifying the patterns is to let the data talk to avoid the appraisal mode and prevent the potential influence of self-bias. Especially in classroom-based LSP, teaching background, philosophy or preferences may shadow the findings. In other words, one must embrace surprises even if it goes against the general conventions. For example, Lear (2021) investigated legal Spanish for public interest law in the US. The study found that there is no need for any Spanish writing skills in this particular domain since attorneys never need to write in Spanish in any given task that they are involved in as they handle their clients' cases. On the other hand, the study found that sight translation plays a vital role in that domain. Similarly, Lear and Moraga Guerra (2021) investigated Spanish for the clinical social work domain in the US. The study found that there are not any instances in this domain where social workers are expected to just "speak" or "listen" to their clients. Instead, in all the instances social workers needed to engage in dialogic speech with their clients, which underlined the necessity for solid interactional competence around which different assessment tasks and learning activities were built as a result. Both of these examples underline the importance of being willing to change the direction contingent on the revelation of new data or insight.

Both Lear (2021) and Lear and Moraga Guerra (2021) also revealed that the contexts and topics were inherently sensitive in their LSP domain, which poses an interesting challenge when it comes to designing and developing assessments. One of the key principles in testing is to avoid biased or sensitive materials that can trigger any kind of emotion among the test takers. That is to ensure that the test takers' performance is not impacted by any construct-irrelevant factors. In both cases, however, the test materials had to include sensitive materials from real-life cases as a result of what their data analysis revealed. And that went against the conventional practice that a language assessment specialist would hold.

Domain-Specific Construct Definition (Domain Analysis Results)

The last step in the domain analysis research is to come up with a domain-specific construct definition that details what it takes to function in the LSP domain. The ultimate goal in this step is to outline all the demonstrable and measurable actions or behaviors showing knowledge, skills, or abilities needed to function in all the essential situations and contexts pertinent to an LSP domain. This is essentially where researchers present their research findings or results. These are going to be unique because these outcomes were not readily identifiable through theoretically explained rationale or empirically collected evidence to begin with.

Some of the key questions one should ask at this step include:

1. Which skills are in more or less demand?
2. What skill set is required from a learner to function in this domain?
3. What does it take to engage in an authentic situation/task in that domain?
4. What does it take to interact with the users in that domain?
5. How can these skills be represented in assessment tasks? (i.e., to what extent can these be operationalized?)
6. What language construct approach will be utilized to define the construct?

These are just guiding questions to help organize and present the results. Each study might yield different construct definitions depending on the research mandate and purpose. It is important to keep in mind that certain underlying factors will impact how one defines the target language use domain. That is the perspective on 1) what it means to know a language; 2) underlying factors relating to the ability to use language; and 3) how one understands specific instances of language use (Fulcher & Davidson, 2007). In other words, the choice of researchers' language construct approaches will impact the way they define the domain. For example, if the construct is defined from an interactionist perspective (Bachman, 2007; Chapelle, 1998) contextual features of specific-purpose language use and its interaction with the language knowledge as well as LSP background will be considered in shaping the domain-specific construct (Douglas, 2000). On the other hand, if the construct is defined from earlier versions of the trait-based perspective (Carrol, 1961; Lado, 1961), language knowledge components or forms such as grammatical forms and lexical meanings will be considered in defining language proficiency traits. Readers are encouraged to refer National Academies of Sciences, Engineering, and Medicine (2020) for a detailed review of various perspectives to define language constructs.

This means the researchers, in this step, should clearly explain what language construct approach they ground their definition on. Eventually, this will impact how they present their construct definition (e.g., in the form of descriptors and Can-Do statements as seen in the ACTFL proficiency guidelines) as well as how it will be operationalized in the test design stage-see appendixes in Dursun et al. (2020) and Lear (2021) for sample domain analysis results/outcomes). Overall, once finalized, domain analysis outcomes will provide evidence-based tangible concepts and a high level of detail that could be used to inform the design decisions both in the design of summative assessment and the realignment of the LSP curriculum.

Conclusion

The domain-specific TLU definition, undoubtedly, plays a critical role in making evidence-based assessment and course design decisions. When the TLU definition is not readily available, one must conduct domain analysis research, as outlined in this paper. TLU is essentially where everything starts and ends. This paper argues that in the case of classroom-based LSP, when the TLU is defined through a rigorous research framework such as domain analysis, it: 1) ensures an evidence-based alignment across LSP research, assessment, and curricula, regardless of discipline; 2) helps establish links between course goals, content, materials, learning activities, and learners' goals; 3) delivers the essential knowledge, skills, and abilities for learners to be able to function in the LSP domain; 4) ensures the implementation of fair, useful, and meaningful assessments; 5) helps with accurate and valid interpretations of learners' performances and thus leads to accurate decisions; and finally 6) ensures positive washback on stakeholders.

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