# Using a Five-Step Logic Model Development Process to Design an Intervention for Adolescents With Developmental Language Disorder

# Développement en cinq étapes d'un modèle logique pour concevoir une intervention destinée aux adolescents ayant un trouble développemental du langage

Catherine Julien

Marie-Eve Lamontagne

Francine Julien-Gauthier

Marie-Catherine St-Pierre

Chantal Desmarais

Catherine Julien[1,2], Marie-Eve Lamontagne[1,2], Francine Julien-Gauthier[2], Marie-Catherine St-Pierre[1,2], and Chantal Desmarais[1,2]

[1]Centre interdisciplinaire de recherche en réadaptation et intégration sociale, Québec, QC, CANADA

[2]Université Laval, Québec, QC, CANADA

## Abstract

A logic model is a graphical representation synthetically illustrating the links among resources, activities, results, and expected outcomes of a program. In recent years, the logic model has become a key tool in guiding the development and implementation of new interventions in several health science disciplines. In this study, the logic model was the first step in designing a new intervention program to improve the communication and social skills of adolescents with a developmental language disorder. This article presents the development of a five-stage logic model through a collaborative research process. It offers recommendations to stakeholders wishing to integrate the logic model in intervention development. We developed the logic model for the intervention with three participant groups: (a) adolescents with developmental language disorder ($n = 2$) and their parents ($n = 2$), (b) professionals in practice settings ($n = 9$), and (c) members of the research team ($n = 6$). Findings related to the facilitative processes and the challenges identified come from the analysis of scientific and clinical documents, notes taken during intervention workshops, research team meetings, discussions with the regional resource involved in schools, and three meetings with professionals working with adolescents with developmental language disorder. This article contributes to the existing body of knowledge on the method of logic model development by describing the processes that are specific to the development of a speech-language pathology intervention.

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## Abrégé

Un modèle logique est une représentation graphique illustrant de façon synthétique les liens entre les ressources, les activités, les résultats et les impacts attendus d'un programme. Au cours des dernières années, le modèle logique est devenu un outil clé pour guider l'élaboration et l'implantation de nouvelles interventions dans plusieurs disciplines des sciences de la santé. Dans la présente étude, le modèle logique constituait la première étape de conception d'un nouveau programme d'intervention visant à améliorer les habiletés de communication et sociales d'adolescents ayant un trouble développemental du langage. Cet article présente les cinq étapes, effectuées dans un processus de recherche collaborative, ayant mené à l'élaboration d'un modèle logique. Il propose également des recommandations aux intervenants qui souhaiteraient intégrer un modèle logique pour le développement de leurs interventions. Trois groupes de participants ont participé au développement du modèle logique de l'intervention : (a) des adolescents ayant un trouble développemental du langage ($n = 2$) et leurs parents ($n = 2$), (b) des professionnels des milieux de pratique ($n = 9$) et (c) les membres de l'équipe de recherche ($n = 6$). Les constats relatifs aux processus facilitateurs et aux défis identifiés proviennent de l'analyse de documents de nature scientifique et clinique, de notes prises lors d'ateliers d'intervention, de réunions d'équipes de recherche, de discussions avec la ressource régionale impliquée dans les milieux scolaires et de trois rencontres menées auprès de professionnels travaillant avec des adolescents ayant un trouble développemental du langage. Cet article contribue au corpus de connaissances disponibles sur la méthode d'élaboration du modèle logique en décrivant les processus qui sont spécifiques à l'élaboration d'une intervention en orthophonie.

## Logic Model in Speech-Language Pathology

When designing an intervention, a logic model (LM) can be used to formalize the underlying scientific and clinical foundations of the intervention. This methodological tool provides a framework for conceptualizing and planning the processes that support the implementation and evaluation of the intervention (Hayes et al., 2011). According to the Kellogg Foundation (2004),

> a logic model is a systematic and visual way to present and share your understanding of the relationships among the resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve. (p. 1)

It is a tool that integrates theoretical background and a shared vision among stakeholders about the problem to be solved, the targeted objectives, the activities to be put in place, and the expected outcomes. There are many LM designs, but the conceptualization and planning of LM processes are based on similar key components: resources needed, activities, outputs, outcomes (short-term), and impact (long-term; Kellogg Foundation, 2004).

LMs also follow an "if, then" logic. For example, *if* the identified resources are available, *then* activities can be facilitated. *If* the activities take place, *then* stakeholders can expect different outputs. *If* those outputs materialize, *then* the stakeholders can expect specific outcomes for the participants, and so on. Program modelling using an LM can therefore inform the scientific and clinical community about what a program is intended to do and how it intends to do it.

The development of an LM follows a systematic and iterative approach, meaning that stages involving back and forth exchanges with all stakeholders must be planned (Hayes et al., 2011). Guo et al. (2011) suggested a four-step development process of an LM. The first step is to (a) define the problem that the intervention program wishes to address; subsequent steps invite stakeholders to (b) identify the need for the intervention, (c) establish the main goal, and (d) outline the specific objectives and desired outcomes of the intervention. In other words, an LM follows a sequence of predetermined steps to which stakeholders are invited to contribute, ranging from the objectives of the program to the activities that make it up.

Throughout the development process, different levels of participation can be expected depending on the expertise and characteristics of the stakeholders involved (Schenkels & Jacobs, 2018). Because stakeholders are engaged at each stage, the use of an LM broadens the consultation processes beyond program managers or researchers (Peyton & Scicchitano, 2017). As such, the Strategy for Patient-Oriented Research of the Canadian Institutes of Health Research (2011) strongly encourages researchers to collaborate with partners who are closely involved with the intervention (i.e., patients, caregivers, and families) to ensure that the intervention intended for them is in line with their needs. Therefore, the development of an LM is fully aligned with this strategy.

Currently, LMs are mainly reported to support intervention development and implementation in public health and acute health care settings (e.g., cancerology, obesity; Ball et al., 2017). Their use in rehabilitation, more precisely in the speech-language field, remains rare. An overview of the existing literature reveals that two studies in the speech-language research field used the LM elaboration guidelines that the Kellogg Foundation (2004; see also Guo et al., 2011; Wium et al., 2010) proposed.

Guo et al.'s study (2011) focused on the effect of an evidence-based ongoing training program targeting speech-language pathologists and audiologists that included an LM. At the end of the workshops, five of the program's eight objectives were met. The authors concluded that this evidence-based ongoing training program, developed using an LM, was successful. Among the advantages of the LM, the authors emphasized the value of its flexible nature and the openness to various points of view that its elaboration imposes (Guo et al., 2011). The LM is developed within a perspective of co-construction, thus it is expected to evolve over time depending on the stakeholders' (participants, clinicians, managers, etc.) responsiveness to the intervention.

Wium et al. (2010) used an LM as part of their study aimed at determining the value of a support program for speech-language pathologists working with educators to facilitate literacy and numeracy. The LM components (i.e., input, process, outputs, and outcomes) helped structure the qualitative data—collected from focus groups, a research diary, testimonials, and other research documents—through transcribing and coding the data according to the LM framework. Similar to Guo et al. (2011), Wium et al. used the LM as an instrument, from a methodological perspective only. As a result, the processes underlying the use of an LM in the field of speech-language pathology have remained poorly documented.

Researchers have identified several advantages to using the LM as a tool for developing an intervention. Developing the LM of an intervention creates multiple opportunities for all stakeholders involved to share opinions on the problem to be solved and the objectives and expected outcomes, as well as to decide on activities (Ball et al., 2017; Guo et al., 2011). Collaboration among stakeholders, which is at the heart of LM development, ensures that the LM is co-constructed (Kellogg Foundation, 2004). Finally, the LM's

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visual representation provides a quick overview of the key elements and details the different components of the program (Hayes et al., 2011; Kellogg Foundation, 2004). Although rare, the use of the LM as a tool for developing speech therapy interventions seems promising in terms of facilitating collaboration among stakeholders and supporting the elaboration of a shared representation of the intervention.

## Using an LM to Provide a Shared Vision of an Intervention for Adolescents With Developmental Language Disorder

A systematic review indicated that few studies have examined the effectiveness of language intervention targeting adolescents with developmental language disorder (DLD; Cirrin & Gillam, 2008). Moreover, research rarely focuses on holistic communication and social skills of adolescents with DLD (Myers et al., 2011). Current single-case study interventions targeting adolescents mainly focus on a specific language skill (e.g., morphological awareness) or address a specific population (e.g., autism spectrum disorder or speech sound disorder; Reed, 2016; Turnbull & Justice, 2017). Research shows that adolescents with DLD are less skilled than their peers in holistic communication skills such as detecting others' communicative intents, responding appropriately to the topic of conversation, and engaging in decision making (Durkin & Conti-Ramsden, 2010). In turn, these difficulties mean that others are less likely to approach adolescents with DLD, thereby further limiting their social interactions. They also face challenges regarding socio-professional integration, as well as forming and maintaining social relationships (Conti-Ramsden & Botting, 2004; Durkin & Conti-Ramsden, 2007, 2010; Johnson et al., 2010; Mathrick et al., 2017; Smith, 2004; St Clair et al., 2011). This is worrisome because these characteristics contribute to the transition to adulthood and to overall quality of life.

The reported outcomes support the need to be proactive and to develop intervention programs aimed at enhancing the communication and social skills of adolescents with DLD (Starling et al., 2012). One research team recently published positive results of an intervention based on mock-interviews targeting communication and social skills for youth with DLD aged 17–19 (i.e., Mathrick et al., 2017). This supports the relevance of empowering adolescents with DLD in terms of holistic communication and social skills.

The fact that interventions intended for adolescents with DLD are rarely documented argues in favour of a structured intervention proposal adapted to them. Furthermore, the knowledge available about the use of the LM to plan and evaluate the impact of an intervention underscores its relevance in this context. In this study, we present an application of the LM in the speech-language pathology field. This application began with the adaptation of a pilot intervention initially designed for a rehabilitation centre that was subsequently adapted for the secondary school setting. The intervention aims to enhance communication and social skills of adolescents with DLD.

The objective of this article is to describe the co-construction of the LM of an intervention for young adolescents with DLD following a five-stage development process involving different stakeholders. Inspired by the four-step model designed by Guo et al. (2011) and in accordance with the Patient-Oriented Research Strategy (Canadian Institutes of Health Research, 2011), the team wanted to take the consultation process a step further. Consequently, in this study, the fifth step in the LM creation is to engage all stakeholders in the development of activities. This article also aims to provide recommendations for speech-language pathologists wishing to use the LM in their practice.

## Method

This study is part of a larger project entitled, "Improving the communication and social skills of adolescents with a developmental language disorder: Documenting implementation and measuring the effects of a new intervention in schools" (Desmarais et al., 2018–2022). The elaboration of the LM is the first phase of this project funded by the Social Sciences and Humanities Research Council of Canada. The project has received approval from the ethics review board of the Centre intégré universitaire en santé et services sociaux de la Capitale-Nationale, which is affiliated with Université Laval (2019-1551). Throughout its implementation, the intervention will be subject to continuous review to ensure a relevant evidence- and experience-based LM for implementation in other secondary schools at the end of the project. This continuous improvement process will be carried out through regular consultations with all stakeholders, communities of practice, and school staff.

### Participants

Stakeholders at various levels must be engaged in the process of developing the current LM to ensure compliance with the co-construction criterion (Kellogg Foundation, 2004). More precisely, three categories of participants were involved in the five stages of the current LM ($N^{total}$ = 21): (a) two adolescents with DLD and their parent; (b) professionals from practice settings (i.e., four speech-language pathologists, three teachers, two members of school boards, one occupational therapist, one guidance

counsellor); and (c) six research team members. The first two participant groups—adolescents with DLD and their parents, and professionals from practice settings—corresponding to a convenience sample, were recruited on a voluntary basis from the larger study sample through the partnerships established by the principal investigator for the main study. These participants had a consultative role and did not participate in the fall 2019 intervention because they were older (15 years old) than the targeted population (12–14 years old). They were invited to share their opinions about the components, but final decision making was left to the members of the research team (Jacobs, 2010; Pretty et al., 1995).
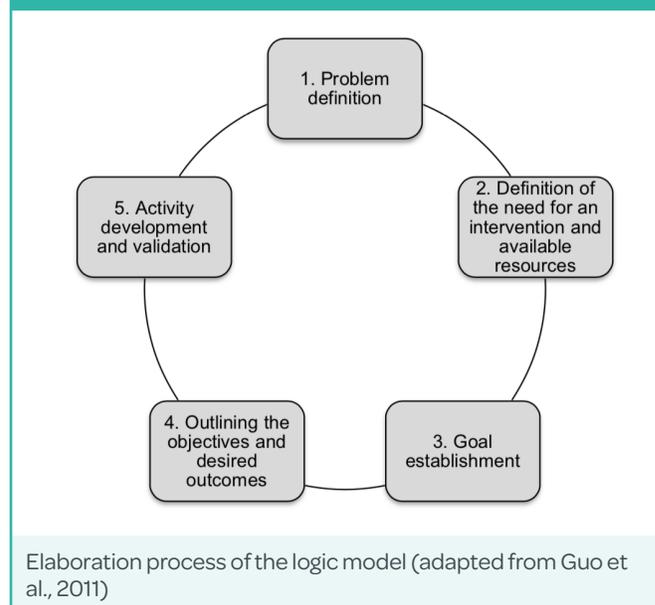
## Procedures

In this study, the five-stage development of the LM (illustrated in **Figure 1**), following a sequential and iterative process, is inspired from Guo et al. (2011).

Multiple sources of information form the body of data used for the development of the LM (see **Table 1**). First, document analysis includes the intervention program offered in a rehabilitation centre in the city of Québec. In addition, a literature overview was conducted in CINAHL and What Works to search for recent publications on interventions designed for adolescents with DLD. Second, field notes from research team meetings, observations of two workshops carried out at the rehabilitation centre for adolescents with DLD, discussions with the regional resources involved in school settings, meetings with school boards, and one meeting with adolescents and professionals (advisory committee) supplement the data collection. All field notes were taken by a postdoctoral fellow—a trained speech-language pathologist—and validated with the principal investigator. The meetings took place between January and August 2019. These meetings, held at the beginning of the intervention development process, promote collaborative work and communication because the people consulted were those who would be implementing the intervention. Field notes provided a personalized representation of the reality of each stakeholder (e.g., adolescents' interests, available resources, knowledge of professionals in the school team) with the goal of rendering the adaptation of the intervention relevant for all.

## Results

The five stages of the LM elaboration process are reported as a narrative synthesis. For each stage of the process, we describe the facilitative aspects, the challenges that were faced, and the solutions put in place to overcome these challenges.



**Figure 1**

Elaboration process of the logic model (adapted from Guo et al., 2011)

## Stage 1: Defining the Problem

The results of the scientific literature and consultation meetings revealed two main issues to be addressed by the intervention. First, adolescents with DLD are less able than their typically developing peers to detect other people's attempts to communicate, to respond adequately to the subject of conversation, and to be involved in the decision making (Durkin & Conti-Ramsden, 2010). Together, these difficulties result in a reduced number of positive social relationships. Second, when asked about the choice of interventions to deploy, school personnel who work with these adolescents named three challenges to be solved: (a) the need to widen the scope of speech-language interventions (i.e., talking about social communication and not only oral language skills), (b) the need to support adolescents in their professional orientation, and (c) the need to promote young people's active learning with regard to social skills.

These components of the problem were shared with the members of the advisory committee. They were invited to validate and supplement these challenges with their own needs and experiences. In the end, they unanimously agreed with these statements. When asked about the form and substance of the definition of the problem, advisory committee members did not suggest any changes.

Some challenges arose during this first stage of the LM elaboration process. Indeed, during the advisory committee meeting the families voiced concerns about the diagnosis of their adolescent (associated difficulties, changing

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**Table 1**

**Data Used at Each Stage of the Elaboration Process**

| Stages | Document analysis | Field notes |
|---|---|---|
| 1. Problem definition | Literature review on communication and social skills difficulties of adolescents with DLD pilot intervention offered in a rehabilitation centre in Québec City | Interviews with speech-language pathologists specializing in adolescents with DLD<br>Meeting with the advisory committee<br>Meeting with regional resources<br>Research team meetings |
| 2. Definition of the need for an intervention and available resources | Literature review on school-based intervention programs specifically designed for adolescents with DLD | Interviews with speech-language pathologists specializing in adolescents with DLD<br>Meeting with regional resources<br>Meetings with school boards<br>Research team meetings |
| 3. Goal establishment | | Meeting with the advisory committee<br>Research team meetings |
| 4. Outlining of the objectives and desired outcomes | Literature review on school-based intervention programs specifically designed for adolescents with DLD<br>Documentation from the pilot intervention | Meeting with the advisory committee<br>Research team meetings |
| 5. Activity content development and validation | Rounds of revision of the intervention guide<br>Documentation from the pilot intervention | Workshop observations<br>Research team meetings |

*Note.* DLD = developmental language disorder.

terminologies). The families also discussed their confusion about the trajectory of speech-language services in the health and social services system, which is not specific to the proposed intervention program. These challenges required the research team to reframe the issue to keep the focus on the problem at hand (i.e., the behaviours to be modified in the context of the proposed intervention). When the interventions were of a theoretical nature, such as the evolution of labels for the language disorder, research team members were able to respond to them. When participant interventions focused on aspects removed from the expertise of the research team, such as the trajectory of services at school, parents were invited to refer to the school speech-language pathologist.

### Stage 2: Defining the Need for an Intervention Program and Identifying Available Resources

The analysis of the initial intervention guide brought to light the elements of the program, as implemented in a rehabilitation centre, that required adaptation for the purpose of implementation in a school environment (e.g.,

availability of human resources). Subsequent discussions with the school teams revealed significant variability in the availability of human resources. For example, one school decided that activities would be carried out by the speech-language pathologist and the special education technician, while the other school assigned this responsibility to language-class teachers.

In terms of research, this variability represents a challenge in documenting the effectiveness of the intervention because school personnel will likely have different backgrounds, even if they have received the same training as part of the implementation of the intervention. The variability of human resources also meant that the intervention guide had to be inclusive of various categories of personnel as activity facilitators.

### Stage 3: Establishing the Goal

Insofar as the goal of the intervention had to be determined in relation to the problem and the needs identified, the participants were able to rapidly agree thereon. As in Stage 1, the research team submitted a

written proposal of the goal of the intervention to the various participants. It was decided by mutual agreement that the intervention should have the general objective of supporting the communication and socialization of adolescents with DLD. If the comments put forward concerned the wording rather than the meaning, no challenges were identified at this stage.

## Stage 4: Outlining the Objectives and Desired Outcomes

Similar to Stage 3, the participants agreed on the specific objectives and expected outcomes of the intervention. The comments focused on the wording rather than the objectives in substance. Again, presenting the objectives in written form seems to have facilitated this stage. Consequently, document analysis (i.e., initial intervention guide and summary review of the literature) highlighted five objectives of the intervention that were validated through the consultation with stakeholders: (a) improving the communication skills of adolescents with DLD, (b) improving the social skills of adolescents with DLD, (c) improving adolescents' self-knowledge of their strengths and difficulties, (d) improving practitioners' knowledge of the characteristics of adolescents with DLD, and (e) raising awareness among school staff about their educational practices with adolescents with DLD.

The members of the research team asked the participating parents of adolescents with DLD about the intervention activities. At this point in the consultation process, the parents mentioned that they would like to be informed about the content of the intervention program involving their children. However, in a research context where the team wishes to document the outcomes of an intervention on parents' perceptions of their child's abilities, it is necessary to limit potential confounding biases. Following a suggestion from parents, the research team produced an information brochure offering an overall description of the planned activities. This communication tool responds to parents' need for information in a format they suggested. It gives parents a general overview of what their children have worked on, without compromising the validity of future results.

## Stage 5: Developing and Validating Activities

Document analysis (i.e., initial intervention guide and summary review of the literature) made it possible to identify the scientific evidence on interventions with adolescents with DLD to integrate into the proposed activities. Activities were mainly developed and adapted by two members of the research team who are speech-language pathologists. Two guiding principles governed the intervention in a cross-cutting fashion. The first principle states that an effective intervention must ensure learning curve progress. In other words, the progress of each activity respects an explicit instruction approach integrating teaching, modeling, application, feedback, and synthesis (Bui et al., 2006). The second principle suggests that the learner be placed in a situation of explicit learning, which is most effective for school-aged students (Dollaghan & Kaston, 1986; Palincsar & Brown, 1984; Skarakis-Doyle, 2002). For example, the tutor clearly explains to the student that they will learn communication breakdown repair strategies, communication skills, and social skills. An additional principle to be applied in the intervention emerged from a meeting with the advisory committee: the adolescents with DLD wanted their teacher to actively participate in the activities; for example, by sharing personal memories or his or her responses to a questionnaire.

When a first version of the intervention guide was submitted for review, several participants wanted to comment on and review the proposed activities. This resulted in four rounds of revision of the intervention guide by outside experts (i.e., four speech-language pathologists, three teachers, one occupational therapist, and one guidance counsellor). The research team sent a personalized message to all professionals, targeted according to their area of expertise (e.g., guidance counsellor), inviting them to comment on the working document, but also to share their perspective as educators (e.g., on playfulness or activity relevance).

At each round of revision, we integrated modifications to improve the intervention guide before submitting it to another category of professionals for revision. Although the research team made the final decision, its members incorporated most of the comments. When this was not possible, they made sure to justify their decision based on solid theoretical grounds. The recognition of the expertise of each professional involved and the research team's openness to comments resulted in constructive and pertinent criticism. In addition, the fact that practise professionals were involved from Stage 1 of the development process meant that they were aware of the objectives of the intervention and the context in which it was implemented.

That said, the wealth of experience and perspectives that participants from various fields of expertise provided was a challenge in terms of streamlining the content of the final version of the intervention guide (McLaughlin & Jordan, 2015). Indeed, the research team was concerned with producing an intervention guide that details scientific underpinnings in lay language. Balancing popularization and scientific rigour was a guiding principle for advisory committee members throughout the review process.

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Moreover, to the extent that the intervention was an adaptation of a previous pilot intervention conducted by one of the project partners, the research team valued transparency about the changes made to the initial design.

## Discussion

This article aimed to describe the process of developing an LM of an intervention designed for young adolescents with DLD in a secondary school setting. Our experience shows that whereas co-constructing an LM is feasible and useful, both facilitators and obstacles are encountered in the process. Findings from the elaboration process of the LM led to the formulation of eight recommendations for speech-language pathologists wishing to use this tool in their practice. They stemmed from reflexive exchanges among research team members, in light of the available scientific knowledge, which took place after the advisory committee meetings.

### Recommendations

After completing the five-stage LM elaboration process, we reflected on the field notes and on the decisions reached to produce the first version of the LM. This led us to outline recommendations for speech-language pathology research teams wishing to use LM development as a basis for formalizing and synthesizing the presentation of an intervention. These recommendations (see **Table 2**), aimed at limiting challenges and enhancing facilitators, are twofold: Level 1 recommendations correspond to a general reflection on the results, while Level 2 recommendations concern specifically the experience of developing an LM in the field of speech therapy.

#### *Level 1 Recommendations*

For Stage 1, the first broad recommendation is to focus on the target population and the context in which the intervention occurs. This can direct participants' feedback and expectations about the proposed

intervention. In addition, if the LM is intended for wider use than the research context in which it is implemented, we recommend that the various sections be written in a flexible and inclusive manner. This increases the likelihood that different environments adopt the intervention and that it will benefit a larger number of participants. In accordance with the fundamental principles of the LM, we recommend promoting a collaborative approach involving as many categories of stakeholders as possible (Canadian Institutes of Health Research, 2011; Kellogg Foundation, 2004). This will ensure that the LM and the resulting program are culturally appropriate for the setting and sustainable, and that results are relevant to participants (Canadian Institutes of Health Research, 2011). In the context of this research, time was an issue because we only had a few months to prepare the intervention. Our experience has shown the importance of identifying a person or a small group to make the final decision. However, the LM will evolve throughout the longitudinal project in which it is incorporated. Stakeholders will therefore be able to participate more actively in subsequent versions of the LM.

Finally, we encourage researchers working with speech-language pathologists to become familiar with the development of an LM as part of their study design. This method is useful in specifying the various components of a given program involving many stakeholders. This in turn implies accepting that the process of developing the LM may not be suited to a stringent study design such as a randomized controlled trial, where strict control over an intervention parameter is required. Co-construction with participants, which is inherent in the development of an LM, leads to the integration of their wishes. For example, it was necessary to find a compromise to meet the parents' desire to be informed of the specific content of the activities carried out with adolescents without introducing bias concerning their perspective on the evolution of communication skills. This may be incompatible with the

| Table 2 | |
|---|---|
| **Summary of the Recommendations** | |
| Level 1 | Level 2 |
| Focusing on the target population and the context | Developing a common language between speech-language pathologists and participants |
| Writing in a flexible and inclusive manner | |
| Identifying one person or a small group to make the final decision | Submitting proposals to stakeholders for Stages 1 to 3 (problem, needs, and objectives) |
| | Considering from the outset the resources available in the settings concerned |
| Accepting that the process of developing the LM might be limiting as part of a stringent study design | |
| | Recognizing the expertise of all stakeholders involved |

*Note.* LM = logic model.

requirements of certain study designs, such as those where the judge must be blind to the experimental condition. Thus, it is important to acknowledge the limitations of implementing a co-constructed intervention, such as the introduction of potential confounding bias.

### Level 2 Recommendations

For the problem definition stage, our first recommendation is to develop a common language between speech-language pathologists and participants. This includes developing shared terms to be used throughout the LM, such as the diagnostic labels encountered in speech-language pathology. Next, we recommend submitting proposals to stakeholders for Stages 1 to 3 (problem, needs, and objectives). In our case, this was an excellent starting point for discussions with adolescents, considering that their language difficulties limited their ability to spontaneously provide elements of discussion. More specifically, we recommend that these suggestions consider from the outset the resources available in the relevant settings, such as schools or educational services for children, which are also frequently subject to budgetary constraints. This makes it easy to collectively identify a problem or an objective that corresponds to a shared reality. Finally, since speech-language interventions are likely to become increasingly interdisciplinary (Breault et al., 2019; Institut national d'excellence en santé et en services sociaux, 2017), it is important to recognize the value of the expertise that all stakeholders, including teachers and educators, bring to the elaboration process. In addition, the ecosystem-based nature of the development of the individual calls for intervention in settings attended by adolescents, including school environments.

### Clinical Implications

In clinical settings, speech-language pathologists must make a number of decisions, particularly about intervention methods (Selin et al., 2019). A range of factors influences this decision-making process, namely the patient's characteristics, the peculiarities of the workplace, and the characteristics of the speech-language pathologist (Selin et al., 2019). Our experience of co-constructing an LM in the field of speech-language pathology invites these professionals to extend this decision-making process to all stakeholders who are likely to be involved in the program, such as partner institutions and users and their families, from the input required through to the expected outcomes. Considering the benefits observed at all stages, the time dedicated to developing a shared vision and goals that make sense to all those involved cannot be underestimated.

As a concrete clinical outcome of this study, the LM is represented in the Appendix. It is expected that this example will provide a concrete tool for speech-language pathologists, as well as other rehabilitation professionals who wish to develop a program using the LM as a framework. Over the next 2 years, the intervention program presented in this article will be implemented with students with DLD from Québec secondary schools. The impact on the students as well as their experience and that of the school staff will be documented. This feedback will allow for the LM to be improved before publicizing the intervention program on a broader scale.

### Limitations

Two main limitations of this study should be underscored. First, the study included a convenience sample and participants were therefore not randomly selected. However, the interest and availability of participants in the context of action research are decisive for the future implementation of such research and for the longer-term commitment to the intervention. Second, the LM resulting from this study nevertheless reflects choices we made at each stage of the process, and hence inevitably includes a degree of subjectivity. That said, incorporating the best available scientific evidence and consulting with all stakeholders at each step of the process minimizes subjectivity bias.

### Conclusion

This study contributes to the existing body of knowledge in science implementation by applying an LM in the field of speech-language pathology. Findings from this elaboration process have resulted in the formulation of eight recommendations—some of which are general and some more specific to speech-language practice—to support speech-language pathologists in using an LM for intervention development.

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## Authors' Note

Correspondence concerning this article should be addressed to Chantal Desmarais, Rehabilitation Department, Faculty of Medicine, Université Laval, 1050, Ave de la Médecine, Québec, QC, Canada, G1V 0A6. Email: **chantal.desmarais@rea.ulaval.ca**.

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## Appendix

### Logic Model of the Intervention

**CONTEXT**

Students with developmental language disorder (DLD) are less skilled than their typically developing peers in terms of communication and socialization.

In particular, they may have difficulty detecting others' communicative intents, responding appropriately to the topic of conversation, and engaging in decision-making.

Stakeholders in school settings consider themselves poorly equipped to intervene adequately with these students and wish to maximize the support they can offer to enhance their communication and social skills.

**INTENTIONS**

- Provide students with DLD with tools to help them get to build self-awareness and build social relationships more easily

- Allow school personnel to better intervene with students with DLD

**GOALS**

**FOR STUDENTS WITH DLD**
- Improve their communication skills
- Improve their social skills of students with DLD
- Improve their knowledge about their strengths and difficulties

**FOR SCHOOL PERSONNEL**
- Improve their knowledge related to the characteristics of students with DLD
- Develop their awareness of their educational practices with students with DLD

**FOUNDATIONS OF THE INTERVENTION**

1. A **progression of learning** that consolidates the link between the knowledge that students with DLD have of their strengths, abilities, difficulties, and interests, as well as their application in a social or professional context.

2. **Explicit learning** places the learner in an awareness of the learning object and is effective for the school-age population, as are students with DLD.

3. Principles of **evidence-based practice**, integrating expert clinical knowledge with adolescent with DLD, as well as evidence from research in program development and population's preferences.

**REINVESTMENT OF THE OBJECTIVES**

• In an **ecological perspective** of the development of the person, the role of significant adults around students with DLD is paramount in the reinvestment of the objectives. For this purpose, the activities proposed as part of the intervention include, in particular, discussions between the student and his/her parent on different themes. Students are also invited, if they wish, to present the results of their learning to those around them through their participant's notebook.

• It is therefore necessary for the school to hold an **information meeting** for students and their families. This meeting, led by the school employees responsible for implementation, aims to present the objectives of the program, the nature of the activities and the resource persons within the school.

**ELIGIBILITY**

The **inclusion criteria** for participating in the intervention program are as follows:

1. Have a language disorder and/or code difficulty 34 (language deficiency) from the Department of Education and Higher Education;

2. To be 12 to 15 years old;

3. To be a student attending a school where the program is offered.

| RESOURCES/INPUTS | ACTIVITIES | OUTPUTS | OUTCOMES (students) | OUTCOMES (school personnel) | IMPACTS |
|---|---|---|---|---|---|
| • **Human resources:** 2 **school's employees** available for 13 classes of 75 minutes (approx. 16.25 h/employee) and 1 guidance counsellor available for 2 classes of 75 minutes (2.5 h), if this resource is available in the school setting<br><br>• **Financial resources:** Allow training for school's employees (6 h * $65/h = $390/employee), lead the activities (16.25 h * $65/h = $1056.25/employee), preparation (6.5 h * $65/h = $422.50), co-lead with guidance counsellor (2.5 h * $65/h = $162.50), and obtain the recommended material ($300) **(total = $ 2,331.25)**<br><br>• **Material resources:** 1 notebook/student, classroom equipped with an iPad, interactive board, chairs, and tables to accommodate all students (max. 12 students)<br><br>• **Organisational resources:** facilitate the release of school's employees | **Students**<br>• **Individual** (preparatory activities to complete at home)<br>• In **small teams** (classroom activities including discussion, video analysis, and role-play)<br><br>**School personnel Hybrid training[1]**<br>• In-person<br>• Web platform for independent content appropriation and forum for exchanges | **Students**<br>• 6/12 students/class completing the notebook<br><br>• 2.75 h for preparatory activities<br><br>• 16.25 h for in-class activities<br><br>**School personnel**<br>• 6-hour training<br><br>• 16.25 h hours for in-class activities | **Improve or maintain:**<br>• Communication skills<br><br>• Socialization skills<br><br>• Perceived strengths by the student<br><br>• Perceived self-efficacy by the student<br><br>**Decrease:**<br>• Perceived difficulties by the student | **Improve or maintain:**<br>• Knowledge related to the characteristics of students with DLD | **Support:**<br>• Satisfactory social participation for students with DLD<br><br>• Successful school-to-work transition for students with DLD<br><br>• Dissemination of good practices to other school stakeholders |

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