

**The Influence of SRL (Self-Regulated Learning)
Training Program as a Platform towards
Multidimensional Literal Discourse
in Language and Mathematics among Young Learners**

by

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Abstract

The purpose of the current study was to examine the effect of a holistic intervention program integrating components of self-regulated learning into the components of literacy and multidisciplinary discourse in language and mathematics among young learners on developing literacy skills, self-regulation and expressions in oral discourse. These subjects were chosen due to their importance as core subjects and their contribution in training the learner in the 21st century (Kramarski & Michalsky, 2015; Mevarech & Kramarski, 2014; OECD, 2010; Zimmerman & Schunk, 2011). According to professional literature, Self-Regulated Learning (SRL) is a dynamic and circular process in which the students set goals, plan, review and assess their work, while referring to cognitive, metacognitive, motivational and behavioral contexts components.

The behavioral expression of self-regulated learning is literacy discourse, both an internal literacy discourse of the learner with himself and an external literacy discourse of the learner with those around him regarding his knowledge, the essence of the task and the appropriate strategy for its execution. Developing **literacy competence** among elementary school students involves developing educated, interpretative and critical language skills in reading, writing and oral discourse in **all fields of knowledge** and throughout **the years** of elementary school (e.g., the Ministry of Education, 2001; NCTM, 2000; OECD, 2010).

Language literacy is the ability to understand a text or a task using skills of **identifying meaning, interpretation and reflective analysis** (RAMA, 2012A; OECD, 2010). **Mathematical literacy** is the ability to engage in and use mathematics in a variety of contexts by **describing the task and performing a reflective analysis** (OECD, 2012).

The current study examines these skills **in language and mathematics** among fourth grade students, while focusing on **common components** for literacy discourse in both examined fields of knowledge: **identification, modeling, conclusion and transference**.

The outline of the study was experimental, using mixed method quantitative and qualitative methodology. Participants in the study were 403 4th-grade students from seven schools. The intervention program in the current study was based on training to cultivate self-regulation and an active and engaging multidisciplinary literacy discourse. For this purpose, the current study developed a tool for written and verbal discourse – the **MEMIR** tool (**Thoughts-Words-Reflection** for context and multidisciplinary understanding), which weaves **self-regulation and literacy discourse** in learning and is available for

multidisciplinary training in language and mathematics. This tool allows the cultivation of literacy and self-regulation that are expressed by achievements, literacy discourse and transfer abilities of varying levels of difficulty – near transfer within subject which was examined in the first research question – and far multidisciplinary transfer examining the use of skills learned in one field (such as language) in another field (such as mathematics), as examined in the second research question.

The **full MEMIR** contains **general** (generic) questions that apply to various fields of knowledge, questions that demand high level understanding, finding connections, choosing strategies and using reflection, as well as **specific (focused)** questions with direct and explicit guidance that deals with examples in that fields of knowledge (the What? When? Why? How? – questions asked are supposed to advance the student’s ability to solve the tasks).

The **partial MEMIR** includes general (generic) questions aimed at self-regulation **or** specific (focused) questions aimed at the advancement of literacy discourse.

For the purpose of examining the contribution of the full and partial MEMIR on the literacy and self-regulation measures in the fields of language and mathematics, the students were divided into **six** groups and the comparison between them was conducted **in connection to each of the two research questions.**

Herein are the two research questions as well as a description of the groups examined in relation to each of them:

1. What is the level of the effect on **literacy and self-regulation measures** of training under the **full MEMIR**, meaning **training in self-regulation and literacy discourse**, compared to training under the **partial MEMIR**, meaning a general (generic) training in self-regulation or in literacy discourse only, when all types of training are **integrated in both fields of knowledge – language and mathematics?**

The groups examined for the purpose of answering this question are those practicing the **integrated fields of knowledge** via the full or partial MEMIR and a control group, as follows:

1. **Integrated + full MEMIR** (N=66) This group was trained in **self-regulation and literacy discourse** in language and mathematics.

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| <p>4. Integrated + partial MEMIR – Self-regulation (N=57)</p> | <p>This group was trained only in self-regulation in language and mathematics.</p> |
| <p>5. Integrated + partial MEMIR = literacy discourse (N=53).</p> | <p>This group was trained only on literacy discourse in language and mathematics.</p> |
| <p>6. Control (N=72)</p> | <p>This group was not trained but studied according to the regular curriculum.</p> |

2. What is the level of effect on **literacy and self-regulation measures** of training under the **full MEMIR** (self-regulation and literacy) **integrated with language and mathematics** compared to training under the **full MEMIR in language or mathematics alone?**

The groups examined for the purpose of answering this question are the groups trained only in the full MEMIR, meaning, in both measures – self-regulation (generic training) and literacy discourse (specific training), integrated in language and mathematics and each field of knowledge separately, as well as a control group, as follows:

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| <p>1. Integrated + full MEMIR (N=66)</p> | <p>This group was trained in self-regulation and literacy discourse in language and mathematics.</p> |
| <p>2. Language + full MEMIR (N=89)</p> | <p>This group was trained in self-regulation and literacy discourse in language only.</p> |
| <p>3. Mathematics + full MEMIR (N=66)</p> | <p>This group was trained in self-regulation and literacy discourse in mathematics only.</p> |
| <p>6. Control (N=72)</p> | <p>This group was not trained but studied according to the regular curriculum.</p> |

In the framework of the second question, the far transfer ability was also examined, meaning, the ability of students who were only trained in one field of knowledge (language or mathematics) to perform far transfer to the other field of knowledge.

The students' learning process in practicing the full MEMIR was active and engaging and the learners' functions were assessed in context with performing tasks and their relevant discourse in various phases of the intervention program (before, during, and at the end of the study as well as two months after the end of the intervention, for examining preservation and transfer).

The main variables examined in the study:

1. **Literacy achievements in tests:**

- a. In language and mathematics (identification, modeling, conclusion and transfer).
- b. In language and mathematics in near transfer (**within** subject).
- c. In language and mathematics in far transfer.
- d. Preserving and transferring over time (two months after the intervention).

2. **Self-regulated learning skills with an emphasis on** cognition and metacognition.

3. **Literacy discourse**

The study applied a mixed method methodology of assessment. A **quantitative assessment for literacy achievements in exams and a qualitative assessment** of the literacy discourse in both language and mathematics lessons. The research tools were administered at both the **macro** and **micro** levels:

- The **macro level** (N=403) refers to the **quantitative** tools that were administered to **all** students in the study groups. These quantitative tools included questionnaires for examining self-regulation, tests for examining achievements in language and mathematics, a task for examining preserving transfer ability over time and assimilation of self-regulated learning skills.
- The **micro** level refers to three **qualitative** research processes: analyses of **oral discourse** (expressions) in language and mathematics lessons conducted on a sample of **six classes** (N=155) selected from all intervention groups. The tools used for the qualitative part were transcripts of the class discourse, examination of nine portfolios in which the students worked, and 25 interviews.

The variable examined in the **qualitative part** of the study was **oral and written literacy discourse units in language and mathematics**. The discourse units referring to the first research question were analyzed in the context of the phases of self-regulated learning (monitoring, control and evaluation), while the discourse units referring to the second question focusing on transfer ability were analyzed in the literacy context of near and far transfers. Analysis of the discourse units with regard to the second question was based on

the oral discourse in class, the answers of the interviewed students and the written discourse by examining portfolios.

The qualitative and quantitative findings of the study examined in the first and second questions indicate the importance of training via the **full MEMIR** which is focused on **self-regulation** (generic training) **and literacy** (specific training), **integrated in both language and mathematics fields of knowledge**. It was found that this type of training advances literacy achievements, near transfer and contributes to cultivating high-order thinking skills such as reasoning as well as metacognitive expressions in oral discourse in language and mathematics. **Furthermore**, the findings regarding the first question indicate an advantage for a literacy-focused specific partial training as opposed to partial MEMIR focused on self-regulation (generic training) in advancing language achievements. With regard to the second question, it was found that training with the full MEMIR **in one field of knowledge only**, language or mathematics, advances near (within subject) transfer and far transfer.

The novelty of the current study lies in the construction of an **innovating training tool**, MEMIR (**T-W-R** for context and multidisciplinary understanding), which **holistically** integrates the **general-generic component** for cultivating self-regulated learning with the **specific component** focusing on **multidisciplinary literacy**, suitable for learning in different fields of knowledge. **Its contribution is evident for the theoretical, methodological and practical aspects.**

For the theoretical aspect, the study broadens the knowledge of conceptualization related to the characteristics of literacy discourse in language and mathematics and the sub-components of literacy discourse: identification, modeling, conclusion and transfer, and their integration with the components of self-regulation: planning, monitoring, control during the task and estimation – end reflection at the end of the task. Another theoretical contribution of the study is the suggestion of a model that amalgamates these terms into super-terms of converting learning via MEMIR: **direction, quality, strength and quantity**. This important conceptual broadening can contribute additional knowledge to the existing theoretical basis, since thus far, few studies **examined and estimated** cultivation of literacy discourse **in two central fields of knowledge simultaneously while integrating it in cultivation of self-regulation**.

In the methodological aspect, the **contribution** of the study is in the construction, validation and development of tools for the young learner:

- a. A tool integrating self-regulation and multidisciplinary literacy discourse;

- b. Indicators for estimating multidisciplinary literacy discourse;
- c. Construction of indicators for estimating the self-regulation process out of a quantitative and qualitative perspective, which contributes to validating the conclusions of the study (convergent validity; Goetz & Le Compte, 1984, convergent validity).

For the practical aspect, the findings of the study encourage the implementation of training programs for self-regulation in schools, with the purpose of developing high self-regulated learning skills among the learners in order to improve achievements in language and mathematics, in accordance with the goals of the Ministry of Education (Circular of the Managing Director of the Ministry of Education, 2014, 2015). Thus far, a study program integrating literacy discourse and self-regulation in language and mathematics has not been developed, especially for young students. The findings of the current study strengthen the **developmental** aspect and the approach supporting metacognitive interventions at a young age, as they indicate their efficiency due to the high learning motivation of students at these ages, and also because students of these ages are not fixated on learning strategies that may not always be effective (Kramarski, Weiss, & Sharon, 2013; Neuenhaus, Artelt, Lingel, & Schneider, 2011; Wright, 2016).

The current study provided **indications** that the **MEMIR is an efficient mediating platform for students to develop an ability to conceptualize self-regulated learning skills and literacy thinking**. Furthermore, the MEMIR contributes to converting metacognitive abilities that facilitate the students' ability to discuss thinking skills while making intellectual use of the solution phases of the task, the names, rule and definitions, perceiving thinking skills as explicit learning goals and being able to name, evaluate and assimilate the learning process. Moreover, working with MEMIR deepened the understanding of both students and teachers of the required thinking skills for successful execution of learning tasks in their field of knowledge.

The study further discusses findings and offers directions for future studies.