

Am I planning smart? – Analyzing student goals

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ABSTRACT: Goal setting is an important step in Self-Regulated Learning. Setting goals is not a straight forward task. Some types of goals are more useful than others. The SMART goal setting guideline helps to generate more meaningful goals. In this paper, we present a research roadmap designed to assist learners with the generation of meaningful learning goals. The roadmap consists of a three-stage process: structure goal extraction, continuous text goal extraction, and dialogue-based goal extraction. Findings from each of the stages will support with the implementation of the next one.

Keywords: NLP, Learner Goals, Recommender Systems, Self-Regulated Learning, Chatbot

1 BACKGROUND

Self-regulated Learning (SLR) describes the area of learning strategies, self-assessments, and self-reflection of learners. Learning planning and goal setting is a crucial process of SRL that allows learners to draw conclusions from the learning process through self-reflection (Zimmerman & Moylan, 2009). Goals can be defined in many ways, nevertheless not every formulation is of equal value. By the requirements of the well-known SMART Framework (Doran, 1981), they can be evaluated through a simple set of rules.

With the increasing digitalization of our everyday lives, written texts are gaining more and more importance. For many students, writing text messages has become the preferred method of communication, which they use to communicate with others (Rideout & Robb, 2018). Popular extensions of these classic text messages are chatbots and digital assistants. They open up new

possibilities in the networking of learners and learning support systems by using the same communication channels (Winkler & Söllner, 2018).

We want to help learners with their goal setting by offering a system that can be operated in natural language. Such a dialogue-oriented system should give students the opportunity to compose goals and track their achievements in the context of SRL (Locke & Latham, 1990).

In this article, we present our research roadmap of a system that starts with the evaluation of written learning goals and leads into a dialogue-based learning tool for goal setting. This research roadmap follows the design-oriented approach (Wang & Hannafin, 2005), in which context and theory are examined in an iterative process.

2 THEORETICAL BACKGROUND

The basis of the following goal extraction is the SRL theory. A popular model in SRL is the three phases model of (Zimmerman & Moylan, 2009). It describes an SRL cycle with Forethought Phase, Performance Phase and Self-Reflection Phase (fig. 1).

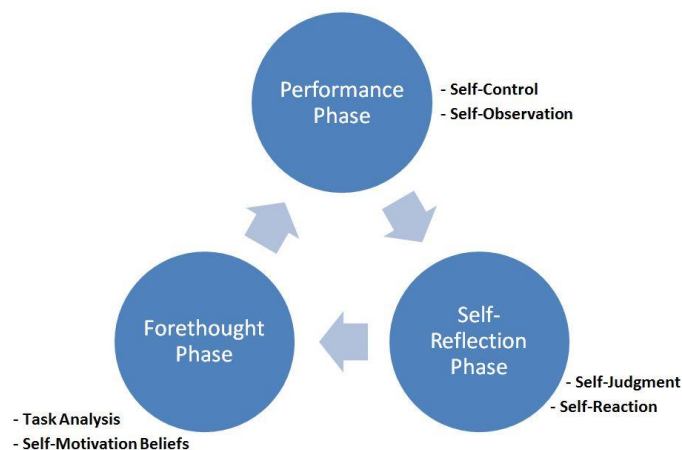


Figure 1: A cyclical phase model of self-regulation (Zimmerman & Moylan, 2009)

Many applications of student facing Learning Analytics can be assigned to the second phase, where learners observe themselves within the learning process. With the introduction of a goal dialogue system, we plan to contribute to the learning planning phase of SRL, which is in many cases overlooked (Jivet, Scheffel, Drachsler, & Specht, 2017).

3 SMART GOAL SETTING

In order to be meaningful, goals should inherit several features as defined by (Doran, 1981). This guideline consists of the acronym “SMART”, which says that goals should be:

- **S**pecific
- **M**easurable

- Assignable
- Realistic
- Time-related

The following example (fig. 2) is intended to illustrate the features of a SMART goal:

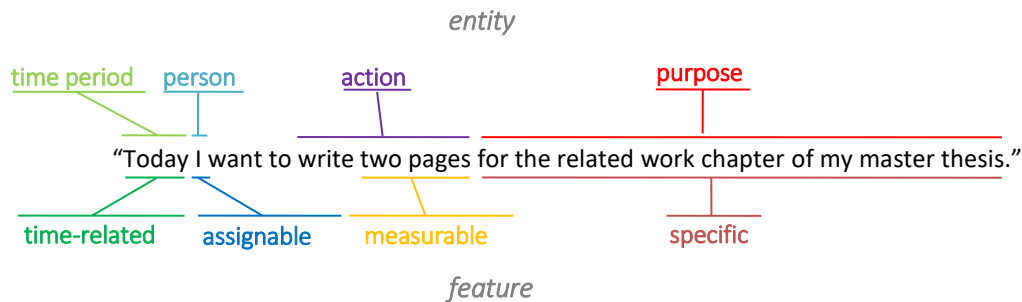


Figure 2: SMART goal example

As this example shows, many features match entities. It turns out, the assessment of the realistic feature is not included in the wording and strongly dependent on author and context. The SMART guideline contains the idea that the progress of goal achievement has to be assessed in the future. Therefore, the measure is strongly related to the defined time period, which represents a deadline. The specificity feature can be described as a connection between the actual action and a superior intention. It can be seen as a hierarchy of goals, in which the achievement of subordinate goals also benefits superior goals (Cropanzano, James, & Citera, 1993).

4 RESEARCH ROADMAP

Our Research roadmap has the purpose to create a system that helps learners to set smart learning goals. It consists of a three-stage process, which leads from a structured to a dialogue-oriented input (fig. 3). These stages are defined as:

- Stage 1 – Structured Goal Extraction
- Stage 2 – Continuous Text Goal Extraction
- Stage 3 – Dialogue-based Goal Extraction

In the transition from one stage to another, learners gain degrees of freedom in the possibility of defining goals. This increases the variability of the used wording and requires more complex extraction rules and procedures.



Figure 3: Research Roadmap for extracting learning goals

Stage 1 - Structured Text Goal Extraction

This stage is the beginning of the roadmap and focuses on the extraction of goals from a predefined wording. It simplifies the definition of learning goals to one sentence, which has to be completed by the learners. As already seen in fig. 2, SMART features are comprised by textual entities. The most variable entities in this context are actions and purposes. With actions, learners describe conditions for achieving a goal, while purposes are used to place goals in a higher context.

Actions should be examined for measures (see chapter 3). These measures could be countable numbers or a set of verbs describing a state of progress (like “*finish*” or “*complete*”).

In the following two subsections (4.1.1 and 4.1.2) we present some example structures which enable a SMART analysis of learning goals. They are exemplarily designed for one week, in order to create a useful SRL cycle. The assessment of the closeness to reality can only be covered by an additional input field. As mentioned in chapter 3, this information is not included in the goal formulation.

Time-period-based Goal Formulation

With a time-period-based goal formulation, learners can set an action to a purpose. It can be formulated as follows and is a flexible structure for one-time conditions:

“ This week I want to **[action]** to **[purpose]**. “

Event-based Goal Formulation

Through an event-based goal formulation, learners can define focus events within a time period. Every time this event occurs, the learner defines a specific action to perform. The wording can be chosen as follows:

“ Every time I **[event]** this week, I want to **[action]** to **[purpose]**. “

In contrast to time-period-based extraction, an additional condition (event) is involved. It should, therefore, be chosen in such a way that it occurs frequently in the time period. A predefined selection of events can, therefore, be considered as a simple solution.

Stage 2 - Continuous Text Goal Extraction

This stage is concerned about goal extraction from continuous text. By further opening the goal formulation, it extends the structured text goal extraction through goal extractions from textboxes. This enables learners to freely define goals in their preferred sentence structures. The Continuous Text Goal Extraction stage has to deal with more varieties of SMART learning goals and should include sentence analysis, POS analysis, and entity extraction. It should include feedback in the form of recommendations to improve learning goals (Verbert et al., 2012), which can be achieved by a set of tips. These can be shown if a particular feature of the SMART guideline could not be found in the goal formulation.

Stage 3 - Dialogue-based Goal Extraction

This stage is the end of the roadmap and marks the dialogue-based goal extraction. It defines a conversational extension to the continuous text goal extraction, which is able to extract goals from a conversational dialogue, question on goal formulations and provide examples how to define SMART goals. This stage should ideally be integrated in a chatbot-system that tries to model goals as described in (Brusilovsky & Millán, 2007).

5 USE CASE SCENARIO

Our roadmap of goalsetting and applied goals could be integrated into SRL diaries. They should enable not only to document one's own learning progress but also to set goals and evaluate their achievement. A dialogue-based goal extraction with an intuitive interface would enhance these systems. It would help students in defining meaningful goals for their SRL cycle by asking questions and recommending improvements.

6 OUTLOOK

The goal extraction mechanisms proposed in this paper can help learners to define and keep track of meaningful goals. In the next step, we plan to follow our research roadmap in order to implement such a system and study its effects. It should show insights about the possibilities and limitations of its use, which result from the entire roadmap process.

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