# Self–regulated learning and successful MOOC completion

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**Abstract.** MOOCs (Massive Open Online Courses) were considered as a disruptive innovation in education. However, they suffer from low completion rates. This raises a question about learning skills of MOOCs users. It was indicated that self-regulated learning (SRL) skills are critically important in online–environment because learners should plan, manage and control their learning activities in order to finish MOOC successfully. However, researches have not treated SRL in much detail. The research was conducted in 24 MOOCs offered by National Research University Higher School of Economics on the National Platform Open Education in 2017. A total of 2815 learners participated in the study and completed an online–survey, which consisted of demographic questions and the self-regulated learning questionnaire. This work builds on the SRL framework, proposed by Zimmerman, which describes learners' actions during the process of study. In this paper, a more detailed approach to access the association between SRL and educational outcomes of MOOCs learners was implemented. As a result, only one SRL phase, which is forethought, is statistically significant in the regression model, while performance and self–reflection do not predict learners' success. According to the research results, such SRL sub–processes as goal–setting, self–efficacy, and task value are the most helpful for MOOC completion. This conclusion can be useful for future interventions in MOOCs.

**Keywords.** massive open online–courses, self–regulated learning, educational outcomes

## 1 Introduction

A few years ago MOOCs (Massive Open Online Courses) were considered as a disruptive innovation in education. Advocates suggested that MOOCs will be successful in delivering educational resources to the masses (Davis et al., 2016). However, according to the research by Reich & Ruipérez–Valiente (2019), MOOCs have failed the expectations: efforts to establish equal opportunities through MOOCs have not been successful. Moreover, MOOCs suffer from low completion rates: up to 90–98% of learners do not finish their courses (Healy, 2017; Reich, 2014).

The retention rate raises a question about learning skills of MOOCs users. For example, according to Littlejohn et al. (2015), there is a relationship between learners' self–regulated learning (SRL) skills and MOOCs completion. SRL skills are critically important in online–environment because learners should plan, manage and control their learning activities in order to finish MOOC successfully (Wang, Shanonn, & Ross, 2013).

Previous studies have reported that SRL skills predicted retention in MOOCs (Milligan, Littlejohn, & Margaryan, 2013). Moreover, the ability to self–regulate learning process helped to achieve personal objectives in MOOCs (Kizilcec, Pérez–Sanagustín, & Maldonado, 2017). Learners with stronger SRL skills were more active during MOOCs (Maldonado–Mahauad et al., 2018), they were more likely to revisit course materials (Kizilcec, Pérez–Sanagustín, & Maldonado, 2017) and tended to use a more flexible approach to organize learning process (Littlejohn et al., 2015). However, researches have not treated SRL in much detail: they tend to use a sum variable instead of particular subscales, which were originally suggested.

Zimmerman (1990) proposed the SRL framework, it includes "self–generated thoughts, feelings, and actions that are planned and cyclonically adapted to the attainment of personal goals" (Zimmerman & Schunk, 2012). SRL can be described through actions, which learners perform when they study. As shown in Figure 1, SRL consists of three phases or subscales: forethought, performance, and self–reflection.
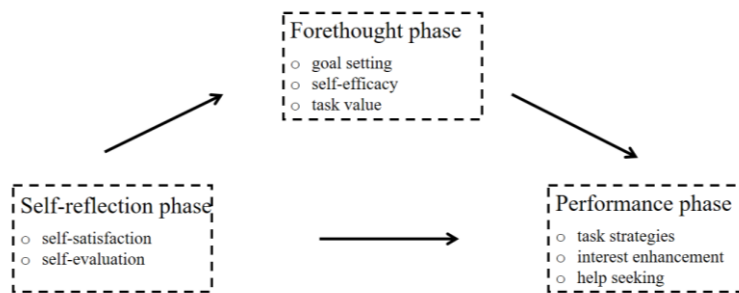


**Fig. 1**. The self–regulated learning framework.

Each of the phases integrates affective, behavioral or cognitive sub–processes. Forethought phase includes goal setting, self–efficacy, and task value. Performance phase combines task strategies, interest enhancement, and help seeking. Self–reflection phase consists of such cognitive factors as self–satisfaction and self–evaluation. SRL skills can be successfully trained through prompts in MOOCs to provide learners with targeted help to lower psychological barriers. However, the impact of particular SRL skills on MOOC completion is unclear yet. The purpose of this study was to examine whether such SRL skills as forethought, performance, and self–reflection affect learners' educational outcomes.

## 2 Research methods

### 2.1 Methodology

The research was conducted in 24 MOOCs offered by National Research University Higher School of Economics on the National Platform Open Education in 2017. At the beginning of the online–courses learners were invited to participate in the pre–course survey. Within learning process, they completed weekly quizzes and the final test. In order to complete the course, learners should get a minimum required score and then purchase the verified certificate.

### 2.2 Procedure and instruments

The invitation to the survey and the personalized links were emailed to MOOCs learners by Enjoy Survey mailing system. Learners completed an online survey that included demographic information and the SRL questionnaire. All data were collected anonymously: no names or other personal data were captured.

The demographic questions included age, gender, educational level, and prior online–learning experience. The Russian version of the SRL questionnaire was adopted from the instrument validated by Littlejohn et al. (2016). The SRL questionnaire included 29 items that referred to three subscales: 11 items for forethought, 11 items for performance and 7 items for self–reflection. Learners responded to each item using a 4–point Likert scale that ranged from completely disagree (1) to completely agree (4).

### 2.3 Sample

A total of 2815 learners participated in the study and completed an online–survey (response rate = 4.99%). The average age was 31 ($SD$ = 10), 73% were females and 81% held a bachelor's or higher degree.

### 2.4 Variables

The certification rate was rather low (8%), in this case, platform data on learners' grades on weekly quizzes was used as the outcome measure. The average score on quizzes ranged from 0 to 100 points with 60 as a threshold for successful completion. Since this variable was not normally distributed, it was recoded into a dichotomous variable, where 0 refers to the result lower than 60 points out of 100 and 1 is equal or higher than 60 points.

The individual score for each SRL subscale was computed by averaging ratings of corresponded items. Table 1 provides descriptive statistics for the data from the SRL questionnaire. Cronbach's alpha was estimated for the current sample at 0.81, ranging from 0.49 to 0.68 for the subscales.

**Table 1. Descriptive statistics for the SRL questionnaire.**

| Subscale | SRL sub–processes | Number of items | $M$ ($SD$) | Cronbach's alpha |
|---|---|---|---|---|
| Forethought | Goal–setting | 4 | 12.44 (1.96) | 0.49 |
| | Self Efficacy | 4 | 13.77 (2.01) | 0.81 |
| | Task value | 3 | 10.51 (1.50) | 0.74 |
| total average | | 11 | 12.24 (1.44) | 0.68 |
| Performance | Task strategies | 5 | 15.81 (2.44) | 0.63 |
| | Interest enhancement | 3 | 10.44 (1.55) | 0.79 |
| | Help–seeking | 3 | 6.87 (1.88) | 0.51 |
| total average | | 11 | 11.04 (1.40) | 0.49 |
| Self–reflection | Self–satisfaction | 4 | 11.63 (2.22) | 0.69 |
| | Self–evaluation | 3 | 9.99 (1.67) | 0.68 |
| total average | | 7 | 10.81 (1.63) | 0.54 |
| total SRL | | 29 | 34.09 (3.84) | 0.81 |

Table 2 illustrates subscales and subscale–total correlations. The correlation between subscales ranges from 0.56 to 0.64. The correlation between subscales and the total SRL score exceeds 0.8.

**Table 2. Correlations for the SRL subscales.**

| | Forethought | Performance | Self–reflection |
|---|---|---|---|
| Forethought | | | |
| Performance | 0.56** | | |
| Self–reflection | 0.64** | 0.63** | |
| total SRL | 0.86** | 0.85** | 0.86** |

*Note*:** $p < .01$

Age was used as a continuous variable, ranging from 13 to 79. Education level was coded as a dichotomous variable, where 0 is some school or post–secondary education and 1 is bachelor, master or Ph.D. Prior online experience was coded as a dichotomous variable, where 0 means lack of prior experience at online–learning, 1 means some experience at online–learning.

This study examined a binary logistic regression model for learners' success in MOOCs, explained by SRL subscales and demographics. The following regression equation (1) was suggested:

$$Ln\ (p_i\ (\text{probability of successful MOOC completion})/1 - p_i) = \beta_0 + \beta_1\ \text{x}\ \textit{forethought}$$
$$+\ \beta_2\ \text{x}\ \textit{performance} + \beta_3\ \text{x}\ \textit{self–reflection} +\ \beta_4\ \text{x}\ \textit{age} + \beta_5\ \text{x}\ \textit{gender} + \beta_6\ \text{x}\ \textit{educational}$$
$$\textit{level} + \beta_7\ \text{x}\ \textit{prior online learning experience} + \varepsilon_i\ (1)$$

## 3 Research results

I begin with general observations about survey results and platform data on learners' grades. Scores on the SRL questionnaire range from 11 to 43.33, where higher scores indicate a higher level of SRL. About 42% of participants have prior online–learning experience. Average grades on weekly quizzes indicate that 45% of learners exceed the threshold of 60 points.

Next, I looked at the effects of the SRL subscales on learners' success in MOOCs. To estimate the result I examine a binary logistic regression model, where learners' results is the outcome variable. The SRL subscales here are used as predictors and age, gender, level of education, prior online–learning experience as control variables. Table 3 shows the results of the binary logistic regression model.

**Table 3. Binary logistic regression analysis for learners' success in MOOCs.**

|  | *OR* | *β* | *S.E.* | *z* |
|---|---|---|---|---|
| SRL subscales |  |  |  |  |
| forethought | 1.12** | .03** | .01 | 8.54 |
| performance | .97 | −.01 | .01 | −2.33 |
| self–reflection | .98 | −.01 | .02 | −1.28 |
| Control variables |  |  |  |  |
| age | 1.01** | .01** | .01 | 3.21 |
| gender (1=male) | 1.15 | .03 | .10 | 1.59 |
| educational level (1=bachelor or higher) | 1.18 | .04 | .13 | 1.50 |
| prior online–learning experience (1=yes) | .74** | −.07** | .06 | −3.72 |
| constant | .04** | −.27** | .01 | −8.16 |

*Note:* the dependent variable in this analysis is learners' educational outcomes coded as 0 is the result is lower the threshold of 60 points out of 100 and 1 is the result is equal or higher than 60 points

$\chi^2 = 127.73\ df = 7\ p = 0.00$ Pseudo $R^2 = 0.03\ N = 2815$

** $p < .01$

The results of binary logistic regression leads to the following regression equation:
$$Ln\ (p_i\ (\text{probability of successful MOOC completion})/1 - p_i) = -.27 + .03\ \text{x}$$
$$\text{f}orethought + .01\ \text{x}\ \textit{age} - .07\ \text{x}\ \textit{prior online learning experience}\ (2)$$

The results show that out of three SRL subscales only forethought is statistically significant at $p < .01$. This indicates forethought subscale significantly predicts learners' success in MOOCs, taking into control demographics characteristics. To assess the effect of forethought subscale on the outcome variable, the other variables remain constant. The results of binary logistic regression shows that the odds to get 60

or points on weekly quizzes were 1.12 times higher for learners with a high level of forethought.

Other subscales, which are performance and self–reflection, are not statistically significant in predicting learners' success in MOOCs. Such demographics as gender and education do not show any significant results either. However, older age and absence of prior online–learning experience increase chances to finish MOOC with 60 or more points.

## 4 Conclusions

This work builds on the SRL framework, proposed by Zimmerman, which describes learners' actions during the process of study. Like in prior research (Milligan, Littlejohn, & Margaryan, 2013), level of SRL predicted course attainment. In this paper, a more detailed approach to access the association between SRL and educational outcomes of MOOCs learners was implemented. As a result, only one SRL phase, which is forethought, is statistically significant in the regression model, while performance and self–reflection do not predict learners' success. According to the research results, such SRL sub–processes as goal–setting, self–efficacy, and task value are the most helpful for MOOC completion. This conclusion can be useful for future interventions in MOOCs since SRL is not a fixed trait and it can be developed through practice (Zimmerman, 2015).

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