

Testing the Effect of Self-Regulated Learning on Self-Efficacy in a Business Process Context

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The purpose of this paper is to examine the effects of self-regulated learning on students' self-efficacy and further examine how motivation and self-management skills subsequently mediate self-regulated learning. This study is based on experimental research. Participants were divided into five groups (revenue cycle, expenditure cycle, production cycle, human resources/payroll cycle, and general ledger/reporting system) to teach business processes and related controls of the assigned cycles. The findings suggest that self-regulated learning, motivation, and self-management skill directly enhance participants' self-efficacy in business processes. In addition, self-regulated learning also has indirect effects on self-efficacy via motivation and self-management skills.

INTRODUCTION

Nowadays, most large and many medium-sized organizations use enterprise resource planning (ERP) systems to collect, process, and store data about their business processes, as well as to provide reports to internal and external parties to assess the organization's efficiency and effectiveness. Installation of ERP systems may change basic business processes of an organization. In addition, ERP systems integrate many different complex business activities, and therefore it can take considerable training and experience to enable employees to master these business activities (Romney and Steinbart, 2009).

Because many processes in ERP systems are automatically triggered in other modules, proper configuration is essential. The importance of effective internal controls in an ERP system cannot be overstated because data errors in one module may automatically propagate throughout the system. Data entry controls and access controls also are essential. The proper configuration and controls of the system require a sound understanding of all major business processes and their interactions (Romney and Steinbart, 2009).

Business processes consist of the revenue cycle, expenditure cycle, production cycle, human resources/payroll cycle, and general ledger/reporting system. The revenue cycle consists of all activities associated with the exchange of selling goods or services and collecting cash from customers for those goods or services. The expenditure cycle involves the activities associated with acquiring and paying for

goods and services. The production cycle consists of the activities associated with using labor and equipment to transform raw materials into finished goods. The human resources and payroll cycle addresses issues associated with the effective development and management of employees and their skills. The general ledger and reporting system examines issues associated with providing management with timely and accurate financial and nonfinancial information about the effectiveness and efficiency of various business activities.

For effective analysis of the appropriateness of business processes, systems analysts and information technology (IT) auditors should possess good IT knowledge, in particular knowledge related to business processes of ERP systems (Newman, 2010; Parker, 2010). To promote this knowledge, teachers and trainers can employ many learning methods, such as instructor-led teaching, demonstrations, learning by teaching, case studies, and role-playing games (Taylor, 2013). However, each learning method may have different effects on learning outcomes. Selecting the most suitable learning method is a crucial task for teachers to assist students to gain the necessary knowledge and skills needed to meet the requirements of employers (Rosow and Zager, 1988; Goldstein and Gilliam, 1990). Learning plays a critical role in increasing students' adaptability and flexibility (Tai, 2006). Recent researchers have suggested that the learning motivation of students represents an important factor in improving the effectiveness of the learning outcome (Tai, 2006). Additionally, researchers have learned that students have more learning motivation when they are assigned to freely regulate their learning. Learning by teaching is an appropriate method to promote students' self-regulated learning. This method allows students to assume the role of teacher and teach their peers. Students must study and understand a topic well enough to teach it to their peers. By having students participate in the teaching process, they gain self-confidence and strengthen their speaking and communication skills (Chen et al., 2012).

There appears to be little empirical research that has examined the effects of self-regulated learning in the business process context. The initial motivation of this study is derived from student comments regarding an undergraduate ERP course. The instructor's assessment of the student comments reveals that business processes are important to student knowledge but the learning style used is not interesting. Therefore, the purpose of this study is to examine the effects of self-regulated learning on students' self-efficacy and to further examine how motivation and self-management skills subsequently mediate self-regulated learning.

THEORETICAL BACKGROUND

Self-Regulated Learning

Self-regulated learning refers to the process when learners actively take control of and are responsible for their learning (Erlich, 2011). When facing environmental changes, people with self-regulated learning tend to put more effort in achieving their learning goals or outcome expectations, especially utilizing their prior experience. Examples of environmental changes are employees learning new or more complicated jobs, and students facing new problems or new assignments with which they do not have background knowledge (Erlich, 2011; Sitzmann and Ely, 2011; Ozan et al., 2012).

Self-regulated learning skills can be enhanced by building self-efficacy. Four steps for developing self-efficacy are noted by Bandura: (a) observing a proficient model, (b) practicing that model under close supervision, (c) receiving encouragement, and (d) reducing anxiety during practice (Bandura, 1986; Erlich, 2011). Training students through self-regulated learning can increase their confidence – or, in other words, self-efficacy – to perform specific tasks (Cleary and Zimmerman, 2004; Zimmerman and Cleary, 2006).

Students who have self-regulation and receive motivational feedback are shown to have more self-efficacy and be better able to pursue their goals or outcome expectations. When facing obstacles, students in this group will learn to adapt their strategies and behavior. They will build self-efficacy and pursue their outcome expectations (Erlich, 2011; Schunk, 1991; Cleary and Zimmerman, 2004).

Motivation

Motivation plays an important role in the student's learning process (Jurik et al., 2014; Vanthournout et al., 2014). Motivation has been defined as an internal state, need, or desire that energizes and directs behavior (Gears, 2012). Motivation is generally classified as intrinsic or extrinsic (Gears, 2012). Intrinsic motivation is a move to do something for the sake of the activity itself. Extrinsic motivation is pressure, rewards, or threats of punishment in order to get something. Intrinsic motivation has a mediation effect on the relationship between extrinsic motivation and student performance (Mo, 2011). Extrinsic motivation can be an essential factor that drives students to start good learning behaviors. On the other hand, internal motivation is a key factor that can bring the student to his/her long term success (Mo, 2011).

Deci and Ryan (1985) explain that intrinsic motivation will occur after three types of needs are met: (1) need of making own decisions (2) need of having relationships with others and (3) need of being talented. Learning by teaching referred to in this research can respond to all of these three needs. Learning by teaching gives opportunities for students to freely research and become familiar with the assigned topics relating to the business cycle. Students are assigned to present the knowledge to their peers and design their own presentation format. This is also a chance for them to build relationships with their teammates. Students will gain experience by observing behaviors and reactions from other teams. They also can recognize their progress of competence through positive attention, questions and comments from their peers, and productive feedback from the teacher. Moreover, being familiar with the knowledge content and receiving performance feedback will create self-efficacy and motivation to study more. As a result, learning by teaching creates enhanced educational outcomes (Schunk and Meece, 2006; Tai, 2006; Erlich, 2011; Mo, 2011).

Self-Management Skills

Self-management skills refer to the ability of learners to independently monitor, control, and direct their activities to complete tasks (Heward, 1987; Gural, 2013). These skills include setting goals, managing time, monitoring behavior, controlling self-responsibilities, evaluating progress, and adapting to changing situations (Erişen et al., 2014; University of Kansas, 2015). Students' self-management skills are skills that enable them to independently make decisions in a positive way and do not require instruction from other people (Erişen et al., 2014). Students will monitor and evaluate their current behavior, and determine if it meets the criteria of success or not. When encountering problems, individuals will modify techniques to ensure the desired conclusion is reached. Students' behavior is reinforced when the goal is achieved. Consequently, the ability to use self-management skills effectively is based on self-monitoring, self-evaluation, and self-reinforcement (Agran, Blanchard, Wehmeyer and Hughes, 2001; Peterson et al., 2006; University of Kansas, 2015).

Self-management skills can be developed before an individual actually needs them (University of Kansas, 2015). Educational institutions can build a self-management culture which will support students to initiate learning activities; for example, assigning projects which students can self-manage (Cheung and Cheng, 1997; Kazemi et al., 2011). Studies show that self-management skills can be used to improve academic performance, productivity, accuracy, time on task, adaptation, and to decrease problem behavior (Kazemi et al., 2011; Erişen et al., 2014; University of Kansas, 2015). To be able to accomplish a goal, students need to have the required skills and also self-efficacy (Schunk, 1991; Schunk and Meece, 2006).

Self-Efficacy

Self-efficacy refers to a person's belief in his/her ability to do a particular task (Mitchell et al., 1994; Bandura, 1997). Self-efficacy can be classified into two types: (1) general information systems self-efficacy and (2) task-specific information systems self-efficacy (Devaraj and Babu, 2004). This research emphasizes the task-specific information systems self-efficacy of one's perceptions of ability to deal with business processes in enterprise resource planning.

Creating self-efficacy is important for learning performance (Schunk and Meece, 2006). Students that have strong self-efficacy tend to become involved in the study immediately. They learn fast, demonstrate

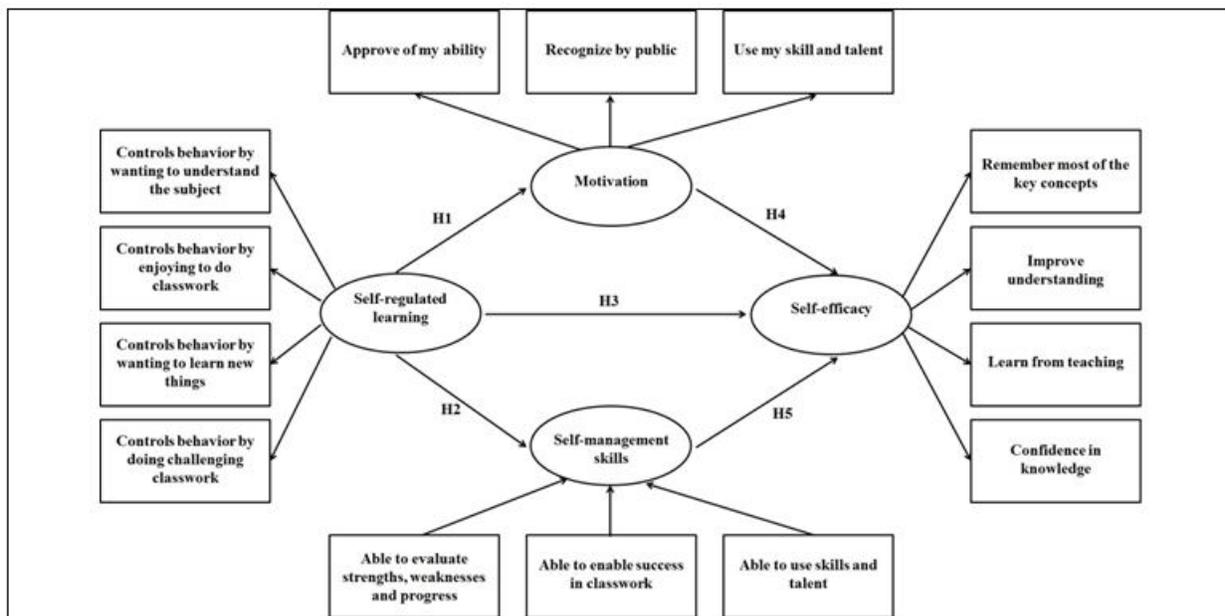
high effort, and continue to learn when facing challenges. These students have the potential to succeed at higher levels than students with less self-efficacy (Schunk and Meece, 2006; Baron and Morin, 2010; Dinther et al., 2011).

Self-efficacy is the outcome expectancy of training and learning that an individual believes will happen from doing a certain action (Bandura, 1986). Schunk & Meece (2006) found that families, schools, and peers can influence self-efficacy. Peers also can increase motivation (Blixen et al., 2015). Furthermore, comparing the student with his/her peers can raise self-efficacy (Schunk & Meece, 2006). However, students' experiences through observation might not be able to increase self-efficacy as permanently as students' self-experiences (Schunk, 1989; Schunk & Meece, 2006). Many researchers (i.e., Cleary and Zimmerman, 2004; Zimmerman & Cleary, 2006) state that self-efficacy is the effect of self-regulated learning and self-management skills. Some training activities for developing management skills may not lead to the ability to evaluate that skill directly. But choosing to use a self-efficacy evaluation may lead to a clearer final outcome (Baron & Morin, 2010), because students' performances are the most reliable measurement to evaluate efficacy (Schunk, 1991; Schunk & Meece, 2006).

RESEARCH MODEL AND HYPOTHESES

The model of the impact of self-regulated learning on students' self-efficacy in this study (Figure 1) was developed with reference to previous research. The model indicates that the effects of self-regulated learning directly impacts students' self-efficacy. In addition, students' motivation and self-management skills construct is a mediator between self-regulated learning and self-efficacy. The hypotheses developed from this model are discussed as follows.

FIGURE 1
SELF-REGULATED LEARNING ON SELF-EFFICACY MODEL



When students are assigned to do a particular task on their own, students with self-regulated learning will have more motivation to learn than those who don't (Cleary and Zimmerman, 2004; Zimmerman, 2008; Vanthournout, 2014). Students who have positive self-regulated learning will demonstrate higher motivation than those who do not have it. Hence, this study proposes that:

H1: Self-regulated learning by students positively influences their motivation.

Self-management skills can be created by assigning students to freely manage tasks on their own. Students who self-regulate their learning will be able to initiate activities, and monitor and assess their performance in changing situations (Agran et al., 2001; Ryan and Deci, 2006; Bembenutty, 2009). Hence, this study proposes that:

H2: Self-regulated learning by students positively influences their self-management skills.

Students who possess higher self-regulated learning will demonstrate higher self-efficacy (i.e. quickness to learn, confidence in gaining knowledge) than those who have less self-regulated learning (Zimmerman and Cleary, 2006; Bembenutty, 2009; Erlich, 2011; Ozan et al., 2012). Hence, this study proposes that:

H3: Self-regulated learning by students positively influences their self-efficacy.

Motivation that occurs after the three types of needs noted above are met – need of making own decisions, need of having relationships with others (such as friends and teachers), and need of being talented – leads to self-efficacy (Schunk, 1991; Tai, 2006). Thus, this study hypothesizes that:

H4: Motivation positively influences students' self-efficacy.

Students who have self-management skills – including skills in setting goals, managing time, monitoring behavior, controlling self-responsibilities, evaluating progress, and adapting to changing situations – will demonstrate more ability to learn and complete assigned tasks (Baron and Morin, 2010). Self-management skills are positively related to self-efficacy in learning. Thus, this study hypothesizes that:

H5: Self-management skills positively influence students' self-efficacy.

METHOD

Participants

This study was conducted by the researchers during the teaching of ERP courses at three large public universities in Thailand. The participants were 114 graduate students undertaking a master's degree in accounting. ERP is a compulsory subject required to receive the master's degree.

Research Procedures

The research was conducted in the lecture rooms of each university. Participants in each university were divided into five business process groups (revenue cycle, expenditure cycle, production cycle, human resources/payroll cycle, and general ledger/reporting system). Each group had one hour to learn the business process and related controls of the assigned cycle, with one group member explaining related forms, processes, reports, and controls. Each group had to control the teaching pace, evaluate and interpret effectiveness of the teaching performance, and make any required adjustments to the teaching to maintain effectiveness. Other group members asked questions and made comments during the teaching. Instructors observing the teaching graded the group's performance. All students completed a questionnaire to measure the research constructs.

Construction of the Research Instruments

Each student gave his/her answers to the questionnaire using a five-point Likert scale. The scale ranges from 1 for "strongly disagree" to 5 for "strongly agree." This scale was used to rate the self-

regulated learning, motivation, self-management skills, and self-efficacy constructs. Table 1 shows the items in the self-regulated learning on self-efficacy model questionnaire.

TABLE 1
QUESTIONS FOR SELF-REGULATED LEARNING ON SELF-EFFICACY MODEL

| Constructs | Authors |
|---|--|
| Self-Regulated Learning: | |
| 1. I work on my assigned classwork because I can control my behavior by wanting to understand the concept of the subject. | Adapted from Ryan and Connell (1989); Deci et al. (1992); Levesque et al. (2007); Zhao et al. (2012) |
| 2. I work on my assigned classwork because I can control my behavior by enjoying that work. | |
| 3. I work on my assigned classwork because I can control my behavior by wanting to learn new things. | |
| 4. I work on my assigned classwork because I can control my behavior by doing challenging classwork. | |
| Motivation: | |
| 1. It is more important to me that others approve of my ability. | Adapted from Ryan and Connell (1989); Deci et al. (1992); Robbins et al. (2006); Zhao et al. (2012) |
| 2. I work harder on classwork if public recognition is attached to it. | |
| 3. I work harder on classwork if the lecturer allows me to use my skills and talent. | |
| Self-Management Skills: | |
| 1. I have the ability to evaluate my strengths, weaknesses, progress and future classwork objectives. | Adapted from Robbins et al. (2006); Gerhard (2007) |
| 2. I have the ability to manage the success of my assigned classwork. | |
| 3. I have the ability to work on my assigned classwork that allows me to use my skills and talent. | |
| Self-Efficacy: | |
| 1. I am able to remember most of the key concepts covered in the subject. | Adapted from Compeau and Higgins (1995); Bandura (2006); Klobas et al. (2007) |
| 2. I am able to improve my understanding of core concepts covered in the subject. | |
| 3. I am able to learn what I have taught. | |
| 4. Teaching makes me confident in my knowledge. | |

RESULTS

In this study, the participants are predominantly young with 57.9 percent of all students of age 24-30 years. In addition, they are mostly female (85.0 percent) and 54.6 percent of participants are accounting staffs. The data was analyzed using a software package based on structural equation modeling (SEM) techniques. The SEM approach is used to evaluate causal relationships among constructs in the proposed model simultaneously. Although the sample size of this study (114 samples) is less than the recommended sample size (150 or more) (Anderson & Gerbing, 1988), it meets the minimum requirement of 50-70 for a model involving four latent variables (Sideridis et al., 2014). Therefore, the preliminary SEM was analyzed.

Prior to testing all of the hypotheses, the full-measurement model of all constructs was assessed using confirmatory factor analysis (CFA). Then the proposed model was analyzed to examine the hypothesized relationships among constructs. The chi-square (χ^2), relative chi-square (chi-square/degrees of freedom),

root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), root mean square (RMS), and comparative fit index (CFI) were used to assess the fit of the model.

In general, model fit is considered to be adequate if chi-square is low relative to the degrees of freedom with an insignificant p value ($p > 0.05$). The relative chi-square should be 3 or less (Kline, 2011; Tabachnik and Fidell, 2013). The value of RMSEA should be less than 0.07 (Steiger, 2007) and goodness-of-fit index (GFI) and comparative fit index (CFI) should be greater than 0.90 (Segars & Grover, 1993). The value of RMS should have a small value (Tabachnik and Fidell, 2013) and AGFI should be larger than 0.8 (Bagozzi and Yi, 1988; Hair et al., 1998; Jöreskog and Sörbom, 1994). Before testing a causal model, the reliability and discriminant validity of the CFA are assessed. The value of factor loading, Cronbach's alpha (α), composite reliability (CR), average variance extracted (AVE), maximum shared variance (MSV) and average shared variance (ASV) are used to assess the reliability and validity (both convergent and discriminant validity) of a CFA. The thresholds for these values are factor loadings and Cronbach's alphas > 0.50 , $CR > 0.70$, $AVE > 0.50$, $MSV < AVE$ and $ASV < AVE$ (Hair et al., 2010).

The resulting 14 items of four factor models have good fits (chi-square = 68.194, $df = 62$, $p\text{-value} = 0.275$, chi-square/degrees of freedom = 1.100, RMSEA = 0.030, GFI = 0.920, CFI = 0.991, RMS = 0.016 and AGFI = 0.865). All factor loadings exceed 0.5 and each indicator is significant at 0.05 levels. Individual item R^2 ranged from 0.321 to 0.888. The testing reliability and validity in a CFA demonstrate adequate reliability and validity (factor loading and Cronbach's alpha > 0.50 , CR ranged from 0.718 to 0.888, AVE ranged from 0.500 to 0.667 and MSV and $ASV < AVE$). Table 2 presents the values of these items.

TABLE 2
RELIABILITY AND DISCRIMINANT VALIDITY OF THE MEASUREMENT MODEL

| Constructs/Indicator | Factor Loading | α | CR | AVE | MSV | ASV |
|--|----------------|----------|-------|-------|-------|-------|
| Self-Regulated Learning: | | | | | | |
| - Controls behavior by wanting to understand the subject | 0.689 | 0.784 | 0.798 | 0.501 | 0.308 | 0.153 |
| - Controls behavior by enjoying to do classwork | 0.732 | | | | | |
| - Controls behavior by wanting to learn new things | 0.763 | | | | | |
| - Controls behavior by doing challenging classwork | 0.631 | | | | | |
| Motivation: | | | | | | |
| - Approve of my ability | 0.945 | 0.778 | 0.798 | 0.589 | 0.132 | 0.073 |
| - Recognized by public | 0.540 | | | | | |
| - Use my skill and talent | 0.619 | | | | | |
| Self-Management Skills: | | | | | | |
| - Able to evaluate strengths, weaknesses and progress | 0.613 | 0.633 | 0.718 | 0.500 | 0.308 | 0.220 |
| - Able to enable success in classwork | 0.823 | | | | | |
| - Able to use skills and talent | 0.567 | | | | | |
| Self-Efficacy: | | | | | | |
| - Remember most of the key concepts | 0.748 | 0.882 | 0.888 | 0.667 | 0.283 | 0.183 |
| - Improve understanding | 0.790 | | | | | |
| - Learn from teaching | 0.773 | | | | | |
| - Confidence in knowledge | 0.942 | | | | | |

The results of direct, indirect, total effect of adjusted model in the standardized score, and goodness-of-fit indices of the proposed model are exhibited in Table 3. The results provide good support for four hypotheses. All of the five path coefficients are statistically significant ($p < 0.05$). Self-regulated learning has a small impact on motivation ($R^2 = 0.032$), so H1 is marginally supported. Self-regulated learning has a positive impact on self-management skills and on self-efficacy, so H2 and H3 are supported. The relationship between motivation and self-efficacy is statistically significant, so H4 is supported. Finally, self-management skills indicate significant impact on self-efficacy, so H5 is supported.

TABLE 3
DIRECT, INDIRECT, AND TOTAL EFFECT OF ADJUSTED
MODEL IN STANDARDIZED SCORE

| Dependent Variables | R ² | Relation | Independent Variables | | |
|--|----------------|-----------------|-------------------------|------------|------------------------|
| | | | Self-Regulated Learning | Motivation | Self-Management Skills |
| Self-efficacy | 0.330 | direct effect | 0.255* | 0.204* | 0.324* |
| | | indirect effect | 0.207* | - | - |
| | | total effect | 0.462* | 0.204* | 0.324* |
| Motivation | 0.032 | direct effect | 0.179* | - | - |
| | | indirect effect | - | - | - |
| | | total effect | 0.179* | - | - |
| Self-management skills | 0.278 | direct effect | 0.527* | - | - |
| | | indirect effect | - | - | - |
| | | total effect | 0.527* | - | - |
| chi-square = 54.788, df = 60, p-value = 0.666, chi-square/df = 0.913, GFI = 0.939, AGFI = 0.894, CFI = 1.000, RMSEA = 0.000, RMS = 0.019 | | | | | |

* $p < 0.05$

CONCLUSION

This study examines the direct and indirect effect of relationships of self-regulated learning, motivation and self-management skills on self-efficacy. Structural equation modeling (SEM) analyses confirms the hypothesized positive relationships among students' self-regulated learning, students' motivation, students' self-management skills and students' self-efficacy.

In summary, the results of this study suggest that teachers should allow students to control and take responsibility for their learning in the business process context. This self-regulated learning, in turn, will increase students' ability to monitor, control, and direct their activities to complete the learning of business processes. Moreover, this ability will eventually affect students' beliefs in their ability to gain knowledge in business processes. However, the results do not indicate much impact of students' self-regulated learning on students' motivation.

This research has some limitations that hamper the ability to generalize the study results. Participants were asked to complete their teaching tasks within one hour, which might affect the strength of relationships of factors in the study. The data of self-efficacy in this study are collected in cross-sectional forms. This form of collection data might have some impact on the higher relationship of research constructs. Research of Brouwers and Tomic (2000) indicate that perceived self-efficacy has a longitudinal effect on depersonalization and a synchronous effect on personal accomplishment.

The results of this research provide sufficient grounds for conducting future research. Although the self-regulated learning construct in this study does not indicate much impact on students' motivation, the

research results of Vanthournout et al. (2014) demonstrate the complexity of the relationship (both direct and indirect) between motivation and quality of learning. Measurement of motivation in this research might affect the research results. This study measures intrinsic motivation while Ryan and Deci (2000) suggest measuring both intrinsic and extrinsic motivation. Therefore, this result encourages further research to examine both intrinsic and extrinsic motivation as suggested by Ryan and Deci (2000). Finally, future research might extend this research model by adding the self-accomplishment construct along with self-efficacy. Previous research (i.e., Brouwers and Tomic, 2000) conclude that self-efficacy has a longitudinal effect on personal accomplishment.

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