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Exploring counter-theoretical instances of graduate learners' self-regulatory processes when using an online repository

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Résumé de l'article

Les théories de l'auto-régulation académique proposent que le processus complexe d'apprentissage est contrôlé par une série de mécanismes cognitifs et metacognitifs qui se manifestent en phases dont la compréhension des tâches, l'adoption des stratégies, l'auto-modération et la réflexion. Alors que les orientations classiques de l'auto-régulation proposent que ces phases travaillent ensemble pour influencer la performance académique, la recherche empirique révélée dans cet article montre que, dans un contexte d'apprentissage en ligne, une amélioration de l'auto-régulation ne reflète pas nécessairement une amélioration de la performance académique. Nous présenterons d'abord une synthèse des cadres de l'auto-régulation académique pour mieux refléter les expériences des 38 apprenants du deuxième cycle qui ont utilisé un dépôt de documents équipé d'un index « Topic Maps » pour compléter des essais. Nous proposerons ensuite des raisons qui expliquent les instances contre-théorique dans les relations entre la compréhension des tâches et la performance académique ainsi qu'entre la compréhension des tâches et l'auto-modération de ces apprenants.

Citer cet article

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Recherche scientifique avec données empiriques

Abstract

Academic self-regulation theories have proposed that learning involves a complex set of cognitive and metacognitive mechanisms that are enacted in phases. These phases include task understanding, strategy adoption, monitoring, and reflection. Whereas classical approaches to self-regulation contend that these phases work together to influence academic performance, the empirical research reported herein reveals that, for essay writing in an online learning environment, improved self-regulation is not necessarily associated with improved learning outcomes. We begin by reviewing frameworks for academic self-regulation, specifically in the context of learners' experiences in online repositories equipped with Topic Maps (ISO 13250) indexes. We then offer explanations for counter-theoretical interactions found between task understanding (a frontline phase of self-regulation) and academic performance in 38 graduate learners who used Topic Maps to tackle ill-structured essay tasks. Our investigation sheds light not only on how learners' perceptions of feedback facilitate task understanding, but also on the complex relationship between task understanding and monitoring proficiencies.

Résumé

Les théories de l'auto-régulation académique proposent que le processus complexe d'apprentissage est contrôlé par une série de mécanismes cognitifs et metacognitifs qui se manifestent en phases dont la compréhension des tâches, l'adoption des stratégies, l'auto-modération et la réflexion. Alors que les orientations classiques de l'auto-régulation proposent que ces phases travaillent ensemble pour influencer la performance académique, la recherche empirique révélée dans cet article montre que, dans un contexte d'apprentissage en ligne, une amélioration de l'auto-régulation ne reflète pas nécessairement une amélioration de la performance académique. Nous présenterons d'abord une synthèse des cadres de l'auto-régulation académique pour mieux refléter les expériences des 38 apprenants du deuxième cycle qui ont utilisé un dépôt de documents équipé d'un index « Topic Maps » pour compléter des essais. Nous proposerons ensuite des raisons qui expliquent les instances contre-théorique dans les relations entre la compréhension des tâches et la performance académique ainsi qu'entre la compréhension des tâches et l'auto-modération de ces apprenants.

Keywords

Topic Maps, Online Learning, Self-Regulation, Task Understanding, Monitoring

Mots-clés

Topic Maps, apprentissage en ligne, auto-régulation, compréhension des tâches, auto-modération

Introduction

Ill-structured problem solving has long been considered an activity that stimulates advanced cognitive processing (Biggs & Tang, 2007; Spiro, Feltovich, Jacobson & Coulson, 1991) in post-secondary learners (Venkatesh & Shaikh, 2011). An ill-structured task refers to an academic activity with potentially multiple solutions, for which the instructor provides little or no initial scaffolding or guidance. Learners are left on their own to derive and dissect tasks and to determine for themselves how to complete them. While the learning sciences literature is divided as to how much and what kind of scaffolding or support should be provided to learners (Kapur, 2008), university education systems do not necessarily provide post-secondary learners with the appropriate tools to engage in this type of task completion (Shaw & Venkatesh, 2005). Essay writing is considered the 'default genre' for assessing learner understanding in higher education (Womack, 1993), especially in the United States, Canada, and Australia (Andrews, 2003). It is therefore important to explore how essay writing can be improved (Scardamalia & Bereiter, 1991; Tynjälä, 2001), especially in its ill-structured form in post-secondary education (Venkatesh, 2008).

We contend that an academic framework centred on self-regulated learning (SRL; Winne & Hadwin, 2008; Zimmerman, 2008) helps university learners develop an awareness of personal, contextual, and environmental factors that either promote or impede their ability to successfully complete academic tasks such as essay writing. SRL instruction in online learning environments has proven effective in developing academic abilities for task comple-
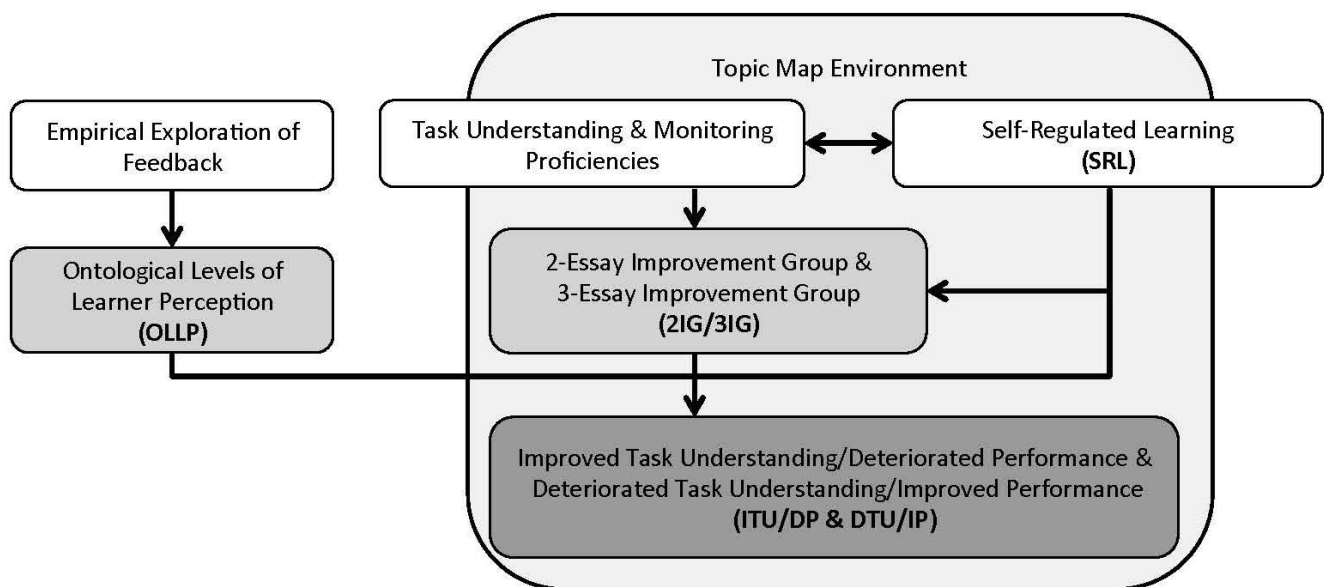
tion. It also helps develop learners who can analyse, identify and reflect on these abilities and self-assess their performance (e.g., Venkatesh & Shaikh, 2008, 2011). In this paper, we explore the self-regulatory construct of task understanding in graduate learners who used an online repository of instructor-annotated essays to tackle a series of ill-structured essay-writing tasks.

The purpose of this paper is twofold. First, we highlight the relationship between two critical components of the SRL framework: academic performance and task understanding. The aim is to better represent individual learning experiences with online repositories. Second, we sought to explain the counter-theoretical interaction between graduate learners' task understanding (Hadwin, 2000; Venkatesh & Shaikh, 2008, 2011) and academic performance when using an indexing technology called Topic Maps (International Organisation of Standardisation [ISO], 2002) to navigate a corpus of texts in order to complete a series of ill-structured writing tasks. Theoretically, improved task understanding and more accurate metacognitive monitoring should lead to a corresponding improvement in performance (Winne & Hadwin, 1998, 2008; Zimmerman, 2000, 2008). By analysing instances where task understanding improved and performance decreased, and vice-versa, we reveal some limitations in current academic SRL conceptions. Specifically, we re-examine the relationships between learners' cognitive processes and environmental factors in an online learning environment.

The extensive research on SRL has produced many models, but more importantly, it has revealed that student cognition and metacognition depend on environmental, behavioural, and individual factors (Zimmerman, 2000, 2008). Whereas instructional design and SRL models have been tested in face-to-face classrooms, the growing body of research has not yet determined how and why individual SRL components influence academic performance, especially in online learning environments (Winne, 2004). Building on Greene and Azevedo's (2007) argument that SRL comprises a complex set of factors,

including but not limited to personal strategies, self-beliefs, efficacy, and goal orientation, we submit that (a) task understanding is a pivotal phase in SRL; (b) it develops cyclically and recursively as learners perform academic tasks; and (c) its relationship with academic performance needs further investigation (Venkatesh & Shaikh, 2008, 2011). In addition, adopting a theoretical framework of learners' perceptions of instructor-given feedback (Shaikh, 2008), we posit that focusing on fluctuations in learners' cognitive states can help explain how learners develop self-regulation skills in online learning environments.

Figure 1 presents a roadmap of the paper, including the empirical explorations and theoretical underpinnings. Applying principles based on prior empirical investigations of monitoring proficiencies in online learning environments (Venkatesh & Shaikh, 2008, 2011) as well as feedback that inspired the development of an ontological model of learner perceptions (OLLP; Shaikh, 2008), we observed counter-theoretical instances of interactions between graduate learners' task understanding and performance. We describe and analyse these counter-theoretical instances from an OLLP perspective, while referring to the larger SRL literature.

Topic Map Environment	An online ontology designed by Venkatesh (2008) to facilitate SRL processes, including task understanding and monitoring, in graduate learners writing essays.
SRL	Literature on self-regulated learning
OLLP	A model illustrating learner perceptions of feedback, developed as a result of empirical study conducted by Shaikh (2008)
2IG/3IG	A qualitative exploration (Venkatesh & Shaikh, 2008) of task understanding and monitoring proficiencies in the Topic Map Environment
ITU/DP & DTU/IP	Current paper, which is based on a synthesis of SRL research and two studies – feedback (development of OLLP) and 2IG/3IG (comparison of task understanding and academic performance on essay writing). These led to our current analysis – explanation of counter-theoretical interactions between task understanding and academic performance

Figure 1: Empirical explorations and theoretical underpinnings of SRL in online learning environments

Task Understanding and Performance as Components of Self-Regulated Learning

How SRL models address learners' perceptions of academic tasks

Zimmerman's (2000) self-regulation model proposes a three-phase feedback cycle: forethought, performance (volitional control), and self-reflection. By interacting with and adapting to personal, behavioural, and environmental factors, learners can achieve high self-regulation. These three phases constitute a "self-oriented feedback loop" (p. 14), in which the learners constantly readjust and update their goals in order to accomplish more challenging tasks.

The model highlights the importance of self-motivation beliefs, interests, goal orientation, and the value that learners place on tasks. In the forethought phase, when learners prepare and plan task completion, little attention is paid to the instructor's perceptions, which are reserved for the self-reflection phase. In Zimmerman's view, task understanding therefore reflects only the learner's interpretation, which is inconsistent with our conceptualization of task understanding (e.g., Venkatesh & Shaikh, 2008, 2011).

Development of task understanding across SRL phases

While acknowledging the importance of task understanding as a critical SRL phase, we contend that most students have not developed a complete perception of the academic task when they initially engage with the task. According to Winne and Hadwin (1998, 2008), it is important to note that task understanding develops continuously as students cycle through the self-regulation phases. For example, considering an academic task in a graduate classroom, the information that contributes to task understanding might include (a) the rationale for performing the task, (b) the instructor's assessment criteria, (c) the available resources, and (d) the prior knowledge and knowledge of "self-as-learner" that students bring to the task.

Students may develop task understanding by exploring the task. Thus, they may perform preliminary activities, set proximal goals and try to attain them, and receive feedback from the instructor on their initial progress. Moreover, by developing an impression of oneself as a learner when engaging with the task, the student continuously develops knowledge of "self-as-learner", which reflects changes in task understanding. This in turn influences the student's strategic engagement with the task (Randi & Corno, 2000). Knowledge of "self-as-learner" interacts with, and is continuously influenced by, the task conditions, such as the nature of the task, the assessment criteria and rationale, and the cognitive conditions imposed by the learner, including prior knowledge, metacognitive knowledge and awareness, beliefs, and values. Therefore, task understanding does not necessarily develop as the first phase of self-regulation. Instead, the cyclical nature of SRL means that students revisit and redefine the task as their knowledge of both the task and themselves changes over time (Venkatesh & Shaikh, 2008, 2011).

A common notion across theorizations of task understanding is the role of feedback on academic performance and the resultant interactions between instructor and student. Therefore, we propose, herein, an empirically derived model developed through a synthesis of the literature on feedback. Through its analysis of learner-generated trace data, learners' metacognitive strategies in an online learning environment, pre- and post-interview data, and learners' performance on a series of ill-structured writing tasks, our model aims to better explain the interconnected and hierarchical relationships between the learners' perceptions of the instructor, the task, and the self-as-learner in an online learning environment. We also address the pressing need to better situate the complex notion of task understanding in the larger construct of academic SRL. The research presented herein builds on prior work on how post-secondary learners using the indexing technology Topic Maps develop both their understanding of an essay-writing task as well as a variety of academic

self-regulatory strategies (see Venkatesh, Shaikh, Zuberi, Urbaniak, Gallant & Lakhana, in press, for a complete review).

The Topic Maps Environment: A Neo-Corpus Repository

We collected data on task understanding and monitoring proficiency from an online neo-corpus repository equipped with Topic Maps technology (see screenshot in Figure 2). The repository contained indexes to 132 instructor-annotated essays written for a graduate course on theories of e-learning. Students browsed the repository while completing their own essay-writing tasks (see Venkatesh & Shaikh, 2008 for a detailed description).

Topic Maps is a malleable, scalable (numerous Topic Maps can be merged), and user-driven form of indexing technology. It is used to develop an ontology of relationships between concepts and associated descriptive resources (ISO, 2002). Creators can use Topic Maps to code content by topic, by relationships between these topics, and by any as-

sociated informational resources, thus facilitating searches and retrievals. Users can opt for context-based searches that are matched with user-defined, context-specific search criteria (Garshol, 2004; Pepper, 2004). This allows greater search flexibility: users can access information that is directly associated with their query topic as well as information on closely related topics. Results are returned not according to keyword 'hits' but instead according to the concepts or ideas in a corpus, which amounts to fewer, more relevant semantic context matches. The unique feature of the Topic Maps environment is that it provides learners with an individualized and adaptable tool so they can customize how content is accessed and organized.

Many Topic Maps are machine-generated by domain-specific algorithms that analyse text corpora and automatically produce sets of topics and their interrelationships. Moreover, as noted by Venkatesh, Shaikh, and Zuberi (2010), there is little if any research on the use of cognitive notions of mental models, knowledge representations, and decision-making processes for problem-solving to facilitate the design of Topic Maps ontologies.

Figure 2: A Topic Maps-enabled online repository of essays

Analysis of Task Understanding Using Ontological Levels of Learner Perceptions (OLLP)

The analyses presented here are based on a previously validated model of ontological levels of learner perceptions (OLLP; see Figure 3). The model describes learners' cognitive states in terms of three perceptions: perception of the instructor, the self-as-learner, and the task (Venkatesh & Shaikh, 2008; Venkatesh et al., 2010). A brief description of the OLLP model is presented in this section.

The nature of feedback: Reviewing the role of feedback in learners' perceptions

Regardless of the instructional approach or the educational epistemology, instructional feedback (hereafter *feedback*) is widely considered an essential component of information processing and knowledge transfer. Extensive research has been conducted on different forms of effective feedback, the timing of feedback, learners' cognitive states during interaction, and motivational and affective issues (e.g., Deci, Koestner & Ryan, 2001; Mory, 2004). Some models of the instructional effects of feedback (Bangert-Drowns, Kulik, Kulik & Morgan, 1991; Kulhavy, 1977; Mory, 2004; Schimmel, 1988) have also considered cognitive load and task complexity.

As reported in Nicol and Macfarlane-Dick's (2006) research overview, effective feedback would reinforce and further academic SRL. Their emphasis on interaction and learners' self-perceptions underlines the importance of motivation, and subsequently reciprocity, in feedback and learning (Molden & Dweck, 2000). By promoting self-worth, interaction can increase learners' motivation and hence improve task understanding (Shaikh, 2008).

Despite the extensive SRL literature, the components of SRL that are influenced by feedback, such as metacognitive monitoring, need to be further explored and characterized (Carless, 2006; Dunlosky & Bjork, 2008; Winne, 2004). Instructional support for monitoring has met with limited success (see, e.g., Dunlosky & Metcalfe, 2009; Pressley & Sch-

neider, 1997), perhaps due to a lack of controlled experimental designs (Thiede, Anderson & Therriault, 2003; Venkatesh & Shaikh, 2011). In addition, as self-efficacy and self-regulation increases, the feedback provided should decrease in amount but increase in complexity (e.g., Puntambekar & Hübscher, 2005). Therefore, the continuous monitoring of learners' cognitive states, and not just their performance, should be carefully considered when developing instructional material that requires high self-regulation skills.
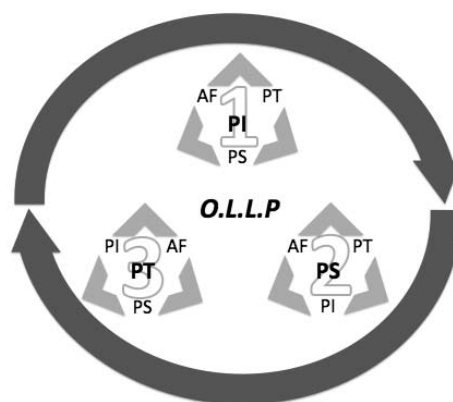
PI: Perception of Instructor
PS: Perception of Self-as-learner
PT: Perception of Task
AF: Affective Factors

Figure 3: Ontological levels of learner perceptions (OLLP)

The empirically derived and validated model of hierarchical and ontological levels of learner perceptions of feedback (see Figure 3) highlights the influence of multiple factors on how students interpret feedback from instructors and their own perceptions of "self-as-learner." The taxonomy takes into account initial tasks and interactions between learners and instructors, and includes the following mutually exclusive learner perceptions:

- Learner's perception of the instructor: learners must perceive instructors as reliable and valid sources of knowledge.

- Learner's perception of self: includes learners' perceptions of their own worth, esteem, confidence, self-efficacy, and ability.

- Learner's perception of the task: includes the inherent usefulness of the task and the transferability of skills learned to other scenarios and situations.

Our research (Shaikh, 2008; Venkatesh & Shaikh, 2008) has shown that learners who are engaged in academic tasks will ontologically prioritize three perceptions: perception of the instructor, the self-as-learner, and the task. Through experience with a given instructor, task or situation, learners choose which of the above three perceptions take precedence, thereby influencing to varying degrees how they use their cognition to successfully complete a task. For example, in the initial stage, perception of the self and the task are secondary to how learners perceive the feedback provider, i.e., the instructor. In subsequent iterations of a task, learners develop and incorporate other perceptions as well as connections between the three above-mentioned perceptions.

SRL models, and more specifically those that explicitly define task understanding, assume a positive relationship between task understanding, metacognition, self-reflection, and academic performance (e.g., Winne & Hadwin, 1998). Theoretically, performance is expected to increase with increasing task understanding and improved monitoring accuracy. However, in the present study, we identify specific counter-theoretical instances where increased task understanding corresponds with decreased performance, and vice versa. Using the OLLP as the analysis framework, we provide an explanation for how students and instructors monitor progress and performance on academic tasks. The aim is to describe the counter-theoretical relationships observed between task understanding and performance. The OLLP model, which explores cyclical and ontological interactions between these components, appears better suited to explain fluctuations in academic performance and relate them to self-regulation skills.

From Quantitative to Qualitative: Exploring the Relationship between Task Understanding and Academic Performance

Initial quantitative exploration of task understanding and performance

Elsewhere, Venkatesh & Shaikh (2011) examined a group of 38 learners to statistically explore how self-regulatory mechanisms influence essay-writing ability. The learners used a neo-corpus facilitated by Topic Maps, as presented above (Figure 2), to complete a series of ill-structured essay-writing tasks. Quantitative data analyses revealed that task understanding, performance, and monitoring measures were related in a complex loop that is inadequately represented by traditional statistical methods using the individual as the unit of analysis. In fact, non-parametric regressions using the writing task as the unit of analysis revealed that increased confidence and inaccurate predictions decreased the likelihood of improved performance, whereas increased bias and task understanding resulted in increased likelihood of improved performance. We set out to further investigate this relationship using inductive content analysis of a rich data set obtained from interviews with learners and their logfile traces of repository use.

Redefining and further analysing a theoretical sample

Shaikh (2008) illustrated the effects over time of instructor feedback on learners' self-regulation when engaging in an academic task. To further explore this dynamic, Venkatesh and Shaikh (2008) selected a theoretical sample of 12 participants (from the above-mentioned sample of 38 learners) based on the number of iterations required for performance improvement on the essay-writing task. Initially, learners who earned a B range grade or lower (i.e. B+, B, B-, or C) for their first essay were selected. These learners were then assigned to one of two categories: improvement to an A range grade after two versus three or more attempts to complete the writing task. Seven learners were classified

into the two-essay improvement group (2IG) and five into the three-essay improvement group (3IG). This sampling strategy allowed us to observe fluctuations in task understanding as well as the effect of time on task and time in-between tasks on the relationship between performance improvement and task understanding.

We used a cross-sectional sampling strategy that was used for the same set of 38 learners examined in Venkatesh and Shaikh's (2008, 2011) study. In the present study, we sampled a second set of learners who showed an inverse relationship between task understanding and performance, i.e., a counter-theoretical sample. Learners were initially selected based on whether their task understanding improved or decreased across writing tasks. Based on their performance, they were then placed into two distinct categories: improved task understanding and decreased performance (ITU/DP) or decreased task understanding and improved performance (DTU/IP). Change in task understanding across repeated writing tasks iterations was determined by the instructor's coding of a self-assessment measure called the Task Analyzer and Performance Evaluator (Venkatesh & Shaikh, 2011). Performance was measured as the overall grade on the writing task as assessed by the instructor. Our categorization yielded seven instances in the ITU/DP group and 14 instances in the DTU/IP group.

This sampling strategy enabled us to refine the relationship between task understanding and performance and provided the rationale to further explore two of the three distinct cognitive features of task understanding according to our 2IG and 3IG analysis: knowledge of self-as-learner and perception of the assessment criteria and rationale (Venkatesh & Shaikh, 2008). In addition, the important role of confidence (as a monitoring measure) and learners' ability to accurately predict their performance also appeared to moderate ITU/DP and DTU/IP interactions.

Data Sources

The analysis data were collected from interviews, repository logfile traces, learners' monitoring measures (including bias, discrimination, monitoring accuracy, predictions, and prediction confidence), and learner's academic performance on six ill-structured essay-writing tasks. The data were then coded according to the four fundamental components of the OLLP model: perception of instructor, perception of self-as-learner, perception of task, and affective factors. The data collection and measurement procedures are described in detail in Venkatesh and Shaikh (2008, 2011).

Data Analysis and Results

Analysing Counter-theoretical Instances of Task Understanding and Academic Performance

Coding Scheme

Based on the explorations of ill-structured essay-writing tasks, the theoretical derivations of task understanding, and the protocol of time-line interviews, we propose that our conception of task understanding and its three cognitive components (perceptions of assessment criteria and rationale, knowledge of self-as-learner, and perceptions of instructor and instructor's feedback) is well suited for analysing and understanding counter-theoretical instances in the ITU/DP and DTU/IP samples. Our codes are derived from the ontological model (OLLP) proposed in Figure 3.

Summary of codes and sample results

Table 1 presents the levels described in the OLLP and those derived from the counter-theoretical samples. The explanations and examples are meant to situate the overall results and provide insight into how we distinguished between OLLP and counter-theoretical codes.

Level(s) in OLLP	Code Derived	Code Explained	Data Examples
Perception of task & Perception of instructor	Knowledge of self-as-learner	Links to personal experiences and academic abilities	"… [my] personal experiences have led me to raise and research new questions."
Perception of instructor, Perception of task, & Perception of self-as-learner	Perception of assessment criteria and rationale	Understanding of assessment criteria and instructor's expectations	"I feel it sufficiently meets your [instructor's] criteria because my ideas are relevant, the issues are current, and the theory and readings support my opinion."
Perception of instructor, Perception of self-as-learner, & Perception of task	Performance and confidence predictions	Degree of learners' accuracy of perceived performance	Measured with 'bias' scores (Venkatesh & Shaikh, 2011), which reflect the degree of underconfidence.

Table 1: Summary of Codes and Examples of Data

Knowledge of self-as-learner

Our overall goal for the data analysis was to determine potential causes of improved task understanding and decreased performance, and vice versa. As our analysis progressed, it emerged that learner's self-perceptions were central to the explanation for counter-theoretical instances. Although for many of the ITU/DP learners, improved task understanding was associated with the ability to create links to personal experiences, their decreased performance was associated with a feeling of discomfort in exploring new territory or in defining both the pros and cons of the subject matter. As a female ITU/DP learner stated, referring to her initial attempt at the writing task, "I wondered about this log: it's fairly out there", and, "I found I had to remove conjecture statements and replace them with affirmations". However, in a subsequent iteration, she was able to further refine her conceptualization of the task and increase her comfort level with the task. She stated that, "… [my] personal experiences have led

me to raise and research new questions. I have so much to express on this topic and its offshoots, and I intend to address that in another log […] I'm also getting more comfortable stating [the] dark side." For this learner, the nature of the task involved questioning and developing conjectural thoughts, especially those that contradicted commonly accepted understandings of the topic. Another ITU/DP learner noted that, "…after going on my first interview with [a large corporation], I was able to see close relationships with the research and the application of the material", and "I tried to reflect on my experience through the readings and relate it to something meaningful, to what I experienced during my interview." For this learner, finding meaning required searching for and defining a connection by applying learned material to a real-world situation. Of relevance was his lack of confidence about the completed task and the positions he took. He stated that he was constantly "trying" or "attempting" to incorporate what he believed was a "visionary position." With respect to the instructor's criteria, both these learners understood what was asked of them, but due to a lack of confidence in their opinions

and/or subsequent discomfort, their performance suffered.

In the case of the DTU/IP group, although their task understanding decreased over time, they were more likely to take risks with the essay-writing task. As one DTU/IP learner mentioned, "…in previous assignments, I was not sure about the criteria or the purpose of the task, but I was comfortable sharing my opinions." Many stated that they were required to develop a "thick skin" so they could introduce "scenarios" or "problems" that could be discussed in a manner congruent with the instructor's expectations. On a number of occasions, the DTU/IP learners were aware of their inability to understand the nature of, or rationale for, the essay-writing task. For example, one DTU/IP learner stated that, "…despite [my] struggles to grasp the core [idea] of the assignment, I believe I have finally met the criteria for it based on my taking one topic and pulling it apart in the time and space allotted."

Of particular importance for improved task understanding is the way that learners conceptualized the use of the Topic Maps repository to complete their essay-writing assignment. In other words, some learners appreciated the purpose of the Topic Maps technology and how it could help them succeed academically. The ITU/DP learners were more intrigued by the Topic Maps tool and used it more extensively. By immersing themselves in others' work and by attending to multiple instances of instructor feedback, they were able to further refine their understanding of the task. As stated by an ITU/DP learner, "The beauty of working in this environment is that it is so easy to get lost in them […] and you can search for so long. I want to learn; I want to read everything." Our results show that although increased repository use does not translate into improved performance, it does lead to a deeper understanding of the task itself.

Uncertainty about one's conception of the task, "attempting to" or "trying to" meet instructor criteria, being "intimidated by others' work", the fear of "looking like an idiot", expressing confusion about the ill-structured nature of the task, feeling "tor-

tured" by continuous internal debates on the subject matter and task, feeling assured through anonymity, and finding "comfort" in familiar names and situations are just a few examples of how learners' self-perceptions affected their task understanding and performance. In addition, the results revealed that individuals with higher self-regulation (determined by interviews and self-assessments) were more likely to seek extrinsic sources of motivation (e.g., instructor feedback) to build task understanding. On the other hand, learners in the ITU/DP group, whose performance decreased, were unable to disassociate grades from feedback and effort. Members of the ITU/DP group were more likely to abandon the essay-writing task. One ITU/DP learner who eventually improved her performance towards the end of the course felt that, "… [i]f I didn't get the high score, I think I would have stopped writing the [essay]s altogether."

Perception of assessment criteria and rationale

Learners in both the ITU/DP and DTU/IP groups showed variable understanding of the assessment criteria, resulting in strikingly different levels of task understanding and performance. Moreover, in-depth understanding of the assessment criteria did not translate into improved academic performance. Although learners in both groups were able to reiterate the instructor's expectations for "pros and cons", "examining both sides of a debate", "integrating personal experiences and opinions", "finding connections to theories and readings", and "stating [the] dark side", many were unable to transfer this understanding into a well-thought-out and developed argument or essay. The data on one learner, who found herself in both the ITU/DP and DTU/IP groups over the course of three successive writing tasks (her performance improved between essays 1 and 2, but she fared poorly on essay 3), underscore how perceptions of assessment criteria influence task understanding but do not appear to impact performance. Referring to her first essay, she stated, "I feel it sufficiently meets [the instructor's] criteria, because my ideas are relevant, the questions are current, and the theory and readings support my

opinion." Her task understanding is incomplete, because she does not take into account the practical applications required. Reflecting on her third essay, she formulated her task understanding much better, as evidenced in her self-assessment: "I applied the practical to the theoretical, posed pertinent (and I feel valuable) questions, and attempted to answer the questions."

Performance and confidence predictions

The analysis of bias scores (as calculated in Venkatesh & Shaikh, 2011) revealed that most of the students were underconfident about their performance. The results also suggest a general bias across essays. The bias scores on successive iterations of the writing task revealed that the ITU/DP group was more underconfident about their performance prediction compared to their DTU/IP counterparts. Therefore, although the DTU/IP group lacked a thorough understanding of the task, they became better at monitoring their performance as the course progressed. This finding is significant because it sheds light on the assumption that a deeper understanding of the task leads to better monitoring ability, and therefore better ability to predict one's performance with the least amount of bias. Our results indicate that the relationship between task understanding and performance could be mitigated by learners' monitoring proficiencies (see, e.g., Venkatesh & Shaikh, 2011). However, regarding the relationship between task performance and monitoring ability, other aspects, such as knowledge of self-as-learner, perception of the instructor and the instructor's feedback, and information need, appear to play a greater role.

OLLP as a Framework for Counter-Theoretical Instances of Self-Regulatory Processes

Our analysis shows that the link between task understanding and SRL depends on a multitude of factors, including knowledge of self-as-learner, information need, perceptions of the assessment criteria and rationale, and perceptions of the instructor. The OLLP model deepens our understanding of how learners' perceptions of the task, the instructor, and the self-as-learner influence task completion. The model offers a distinct interpretation of the task completion process, conceived as a cyclical and ontological dynamic of three types of learner perceptions.

Although SRL models focus on distinct phases in task completion, the emphasis is placed primarily on individual learners' cognitive states and performance. In general, learners progress through different cognitive phases. In contrast, the OLLP model places the emphasis on the key stakeholders in the process. Consequently, the cognitive phases do not stand alone, nor do they reflect the learner alone: they also take into account the influence of instructors and the nature of the task.

From the ITU/DP and DTU/IP analysis, the importance learners place on the instructor and on their perceived ability to complete a task takes precedence over the task itself. Many in the ITU/DP group felt it necessary to abide by and satisfy the instructor's criteria. This resulted in a perceived improvement in task understanding. However, it also stifled learners and resulted in mediocre performance, as they were unable to create meaningful connections between the task and themselves. In addition, they were incapable of dissecting the task or objectively determining the requirements for a thoroughly and comprehensively completed task.

When learners place undue importance on the instructor, they fail to see ontological interactions between the three perceptions, and they perceive the connections and complex relationships more hierarchically. If they were to reflect on the recursive connections between the three types of perceptions and their constituent components, they would be more likely to understand themselves more accurately in relation to the task and to the instructor, and more likely to understand how the instructor conceptualized the task. This relational perspective facilitates learners' ability to understand themselves as well as their instructors and tasks from multiple perspectives. This can in turn lead to a highly self-regulated learner who can dissect, interpret, and complete complex tasks in a variety of learning situations.

Educational Significance

Whereas, in cognitive psychological terms, it has been established that learner task understanding is a crucial component of academic self-regulation (e.g., Winne & Hadwin, 1998, 2008), our results offer specific suggestions for improving individual components of task understanding when tackling complex tasks in online environments.

For ill-structured activities such as searching for relevant information in order to write an essay, traditional higher education methods overemphasize instructor-designed and -guided criteria for task completion. Although learners may eventually complete their tasks in these conditions, they generally lack the ability to understand situations from the multiple perspectives of the key stakeholders in the process. This instructor-centred approach constrains the learner's ability to fully understand complex tasks, which in turn can hinder academic performance. The OLLP model directly addresses this issue by depicting learners as having multi-perspective views of themselves in relation to their instructor and tasks. It also provides researchers with a framework to determine varying cognitive states of learners so that they could design tasks to foster optimal learner engagement and improvement.

For learners who wish to improve their task performance in diverse educational and professional environments, the question arises as to whether task understanding is context- and/or learner-dependent. Our exploration and analysis indicate that there is little value in creating such dichotomies or attempting to pinpoint which SRL constructs must be considered. As we have shown, task perception is both situation- and learner-dependent: learners analyse and complete tasks in a variety of ways according to the situation. Our goals are therefore to understand learners' characteristics and to promote instructional strategies that result in heightened interconnections between the three types of perceptions defined by OLLP. Although we are aware that task understanding morphs as learners attempt to improve their performance, our results indicate

the need to explore specific conditions that govern how, when, and why changes in learner cognition influence task understanding, successful task completion, and overall academic performance.

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