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Technology and Strategy Instruction

Jim Ranalli
Iowa State University, jranalli@iastate.edu

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Abstract
Since the 1970s, one strand of second language (L2) pedagogy has been concerned with imparting behaviors and techniques to learners that they can use independently to improve their learning and use of the target language. This strand, known as strategy instruction (SI), has faced a number of challenges including overdependence on teachers for instruction, competition for space in already crowded syllabuses, and the need to provide individualized practice and feedback on strategy use. This entry explores recent efforts to harness digital technologies in support of SI initiatives.

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jranalli@iastate.edu
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Abstract

Since the 1970s, one strand of second language (L2) pedagogy has been concerned with imparting behaviors and techniques to learners that they can use independently to improve their learning and use of the target language. This strand, known as strategy instruction (SI), has faced a number of challenges including overdependence on teachers for instruction, competition for space in already crowded syllabuses, and the need to provide individualized practice and feedback on strategy use. This entry explores recent efforts to harness digital technologies in support of SI initiatives.

Framing the Issue

The goal of strategy instruction (SI) is to impart behaviors and techniques to learners that they can use independently to improve their learning and use of a second language (L2). Research indicates, however, that the relationship between strategies and achievement in L2 learning is not straightforward. Much depends on learners being able to match strategies to the requirements of a specific task and enact them with sufficient skill and monitoring ability to facilitate appropriate and adaptive use. In addition to achieving this complex goal, SI faces a number of practical challenges, including:

- dependence on classroom teachers, who may lack the requisite knowledge and skills for SI;
- a lack of appropriate materials;
- syllabuses already crowded with more direct forms of language instruction, which SI is seen to detract from; and
- the need to provide sufficient practice and individualized feedback on learners' use of new strategies.

Mixed findings in empirical studies of conventional forms of SI have also left many wondering if it is worth the time and effort (Plonsky, 2011), while debates about how to define and research strategies have led to calls for retheorization in order to rekindle the interest of L2 researchers and practitioners (see, for example, Gu, 2012).

To address these issues, some researchers have been exploring the potential roles of digital technologies in SI, which have been used in applications varying from raising learners' awareness about their currently used strategies and suggesting new ones, to directly modeling and providing practice of new strategies. The term that will be used here for such initiatives is *technology-mediated SI*, with the defining feature being the use of digital technologies to extend

the scope and effectiveness of SI in a way that reduces dependence on teachers and the provision of class time.

Technology-mediated SI can be distinguished from a related area of endeavor whose purpose is to prepare learners for the strategic challenges of working in computer-assisted language learning (CALL) environments, referred to as *CALL learner training* (see entry on *Learner Training*). Whereas technology-mediated SI focuses on the supportive role of technology in imparting strategic knowledge and skills, CALL learner training is concerned with efforts, typically led by teachers, to give learners the technical and pedagogical knowledge needed to make best use of digital resources for learning. The two initiatives have different points of departure and (albeit subtly) different goals but in practical application it may be hard to tell one from the other.

Making the Case

Technology can reduce the need to devote class time to SI and lessen the burden on teachers in providing it. In addition, SI stands to benefit from digital technologies in many of the ways that other areas of L2 learning already have. As described by Reinders and White (2010), these include:

- learner access that is not tied to particular times or locations;
- storage and retrieval of students' process and performance data;
- easier sharing and recycling of materials;
- cost effectiveness;
- authenticity;
- use of multimedia;
- new activity types;
- immediate, individualized feedback, potentially taking account of previous performance;
- nonlinearity; and
- increased control by, and thus empowerment of, learners.

Many of these characteristics were evident in a project described by Ranalli (2013b) to teach college-level ESL learners skills in online pedagogical dictionary consultation integrated with language awareness about lexical patterns. The instruction was delivered in an online course consisting of 10 multimedia tutorials, which included short videos interspersed with text-based practice activities. The tutorials, accessed outside of class, engaged learners in increasingly independent use of pedagogical dictionaries to manage cognitive demands. Immediate feedback let learners know where they needed more practice, which they could get easily by reviewing the online materials. A randomized experiment showed a SI group far exceeded a comparison group in the ability to find and use appropriate pattern information in learner dictionaries, while perception data showed most participants felt the materials were interesting, useful, and appropriately challenging.

In discussing his findings, Ranalli (2013b) argues that technology-mediated SI does not remove teachers from the process but instead assigns them a key role in providing learners with opportunities to transfer new strategies to different but related classroom-based tasks aligned with the syllabus. Parallels can be seen here between technology-mediated SI and the

contemporary practice of "flipping the classroom" whereby learners develop foundational understanding and skills outside of class using videos and other online materials to learn at their own pace, followed by application and extension work in the classroom, where instructors are now freer to address individual student needs.

By contrast, other technology-mediated SI initiatives have assigned teachers primary responsibility for SI while using digital resources to supplement and extend the instruction. Dreyer and Nel (2003) describe a reading strategies instruction program conducted among L2 learners of English at a South African university. The researchers introduced the strategies using printed study guides and provided individual and small group practice and feedback through contact sessions with instructors. Online materials provided via a learning management system included reading texts and related links that were updated every week, as well as assessments that required learners to use the strategies they were studying. The role of the online materials, then, was to allow additional, scaffolded practice of the strategies beyond the sessions with instructors and to give students access to a wide array of reading materials. Students working with the online materials scored higher on comprehension measures than those in a control group.

In addition to the division of labor between teachers and technologies, initiatives also vary in terms of the number and range of strategies addressed and the manner in which they are imparted. An early project described by Bull (1997) sought to raise users' awareness about a variety of metacognitive (e.g. self-monitoring), cognitive (e.g., note-taking), and social (e.g., questioning) strategies through a text-based dialog system. While ostensibly providing instruction about pronoun placement in Portuguese, the program, called *Mr. Collins*, attempted to probe strategies currently in the user's repertoire and then suggest others that were not. Bull (1997) described how the system operated but did not report an empirical evaluation. This would have been helpful, since systematic reviews of conventional SI research have identified the number of strategies taught (Plonsky, 2011) as well as the instructional method (awareness-raising versus behavior modelling; Hassan et al., 2005) as factors that may moderate the effectiveness of SI.

Mr. Collins and other early technology-based SI initiatives also highlight issues with the level of generality at which strategies are conceptualized. They reflect early L2 strategy research that featured inventories or taxonomies attempting broad coverage of those strategies possibly associated with successful learning, as well as a focus on quantity rather than quality of strategy use. For example, surveys asked students how frequently they engaged in behaviors such as: "I look for words in my own language that are similar to new words in English" (Oxford, 1990, p. 295), which implies a single, general strategy with broad potential application; and the more it is applied, the better. The contemporary approach is to define strategies more narrowly with reference to specific goals and contexts of learning, and to emphasize the importance of matching strategies to specific task demands (Macaro, 2006).

A more likely issue with contemporary approaches to technology-mediated SI is that strategies may be defined too narrowly by equating them with use of particular help options or other features of the digital learning environment. In the online reading strategies instruction project described by Huang (2014), for example, students were regarded as having practiced the strategy

of prediction by accessing a feature called *Guess What*, which provided pictures and questions related to the text they were about to read. While a user's decision whether or not to select this tool before reading would, in a sense, be strategic, many would agree that a primary goal of SI should be to support learners in transferring targeted behaviors to new tasks and situations.

In addition to strategies for language *learning*, those addressing language *use* have also been the focus of technology-mediated SI. McNeil (2014) describes a partially online SI course for college-level learners of English in Korea that taught communication strategies for use in synchronous text chat. The instruction featured video tutorials in which the researcher explained and modeled individual strategies, and which showed the strategies employed in face-to-face communication as well. Students watched the videos outside of class, taking notes and creating dialogues featuring use of each strategy. They also engaged in weekly chatting tasks that they and the instructor later reviewed for evidence of the strategies under study. A post-test showed the SI group performed better than a comparison group and had positive perceptions of the video-based instruction.

Technology has also been used in strategy-based approaches to teaching intercultural pragmatics. Sykes and Cohen (2008) describe a website called *Dancing with Words* that was developed to model strategies for learning, using, and evaluating use of speech acts for college-level learners of Spanish. The site was used in conjunction with a web-based synthetic immersive environment (SIE), or virtual world, called *Croquelandia* in which learners could practice applying the new strategies in conditions resembling study abroad in a Spanish-speaking country. Learners reported increased use of the strategies as a result of their work in the digital environments, which they evaluated positively. The researchers noted in particular how the SIE afforded students low-risk but authentic interaction in culturally realistic conditions while allowing instructors to assess both the students' recorded interactions and their strategic attempts to exploit resources for learning speech acts in the virtual world.

By studying such traces of learner behavior in digital environments, L2 researchers may obtain a much finer-grained understanding of how strategy instruction affects strategic behavior and, in turn, how strategic behavior connects to performance. In educational psychology, researchers have been designing computer-based learning environments to both scaffold and investigate learner strategy use with input from conceptual frameworks such as self-regulated learning (SRL) and graph network theory. The same approach could be taken in L2 research, for example, to investigate strategy chains or clusters; that is, strategies deployed in systematic combinations (Macaro, 2006), which are conjectured to be important but remain understudied. This may be one avenue to retheorization of, and revitalization of interest in, SI in particular and L2 learner strategies in general (see discussion in Ranalli, in press).

Pedagogical implications

Developing materials and tasks for technology-based SI is time- and labor-intensive and requires technical as well as pedagogical knowledge. However, modern-age teachers who are technology-savvy and instructional designers working in the area of L2 learning may find this to be an investment worth making, in which case the following guidance is provided.

A meta-analysis of the effectiveness of SI research in general (Plonsky, 2011) offers insights into characteristics of successful interventions. Plonsky found that longer interventions reported stronger effects than shorter ones, as did those focusing on fewer rather than more strategies. In addition, Plonsky notes that some strategies addressed in SI research have lacked empirical justification so it is important to consult the existing literature to determine whether addressing a particular behavior via technology is warranted and feasible.

L2 strategy researchers have produced guidelines for conventional strategy instruction (Rubin, Chamot, Harris, & Anderson, 2007) that are worthy of note. First, cognitive strategies should be taught in conjunction with metacognitive strategies to avoid learners acquiring new skills while lacking understanding about how to plan, monitor, and evaluate their effectiveness. Second, SI should be explicit in the sense that learners are aware that they are practicing a strategy, as this will support its transfer to new contexts of use. Third, SI should include awareness-raising to show learners the strategies they currently use as well as modeling of the target strategy in action. Fourth, practice should be plentiful, incorporating scaffolds at the beginning which are gradually removed, as well as opportunities for self-evaluation and transfer to new tasks and learning contexts.

An additional guideline emphasizes the integration of SI with other language-focused activities in class so that learners view it as a natural and complementary component of L2 learning. While the rationale for technology-based SI is, in part, to reduce demands on timetables and teachers, it has been noted above that connecting out-of-class SI to in-class activities will be important and the teacher's role in this will be central.

When it comes to planning the particulars of the intervention, it will be important to seek a balance between theory and design. As with SLA more generally, much remains unknown about how SI is best accomplished. SI developers should take account of relevant theories (e.g., skill acquisition) but also remember that instruction is influenced by particulars of the context and participants, so solutions will always have a local element. Materials should be prototyped and tested with target users as early and as often as possible to avoid design flaws leading to large, wasted investments of time, energy, or funding. Even very simple piloting materials such as hand-drawn mockups of interfaces or tutorial storyboards can be used to identify the different ways target users may respond and thus inform the design.

It may also important to break the strategy down into subcomponents – a process called *skill decomposition* – so that all the parts requiring attention can be identified and appropriate forms of instruction for each can be developed. For example, teaching ESL learners in college composition courses to do simple collocation searches on web-based corpora will likely entail the acquisition of skills in using query syntax in addition to conceptual understanding of the nature and pervasiveness of collocation. These different forms of knowledge representation may require different types of presentation and practice activities, after which learners will need additional practice in orchestrating the subcomponents (see Ranalli, 2013a, for a discussion).

For content creation, screen-capture software can be used to model strategies, particularly in terms of onscreen behaviors. Commercial products such as Camtasia Studio combine screen-capture capability with post-production tools that include voiceover narration, callouts for

highlighting or annotating onscreen elements, captioning, and zooming and panning for close up viewing or providing context. Interactivity can be added that requires users to click on a particular area of the screen or answer simple comprehension questions about the input before they continue viewing.

Learning management systems (LMSs) can help organize, sequence, and manage delivery of strategy instruction. LMSs such as Moodle or Blackboard offer ways to integrate multimedia input with practice activities and link elements into cohesive units of instruction. They can also provide a centralized point of access and cumulative information about progress and performance using gradebook features. Some LMSs also allow for adaptive provision of materials, for example, by requiring performance at a certain level before giving access to the next module in a sequence, or allowing learners to skip modules based on their performance in a prerequisite skill, thus individualizing instruction. SI developers can use metadata to provide more detailed information about the contents, applicability, and types of students who might benefit as a way to support wider sharing of materials across SI projects (Vovides, Sanchez-Alonso, Mitropoulou, & Nickmans, 2007).

Because technology-mediated SI is by definition achieved through the use of digital technologies, there will be natural limits on the types of strategy to which it can be applied. And yet, as the reach of such technologies extends further and further into our everyday lives, those which support L2 learning will only increase, thus expanding the potential of this area of endeavor. Future technology-mediated SI interventions are unlikely to attempt the scope of older initiatives, some of which sought to address the broad range of strategies learners might need in acquiring a second language. This should not be seen as a disadvantage, however, given the move in the wider field of L2 learner strategies away from decontextualized strategy inventories in favor of more specific and thus theoretically justifiable targets for research and development.

SEE ALSO:
CALL (Computer-Assisted Language Learning) Materials Development
Learner Characteristics, Individual Learner Differences, and Learner Role
Learner Training (Teaching and Technology)
Learning Management Systems
Online Learning
Strategies for Independent Vocabulary Development
Technology in Instruction
Virtual Worlds

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Further Readings

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