

Callout Journals as Part Solution for Negative Transfer in Desktop Publishing tasks

Gorg Mallia Ph.D^{*1}

¹ Centre for Communication Technology, University of Malta, Msida MSD 06, Malta

Negative Transfer was frequently noted during a Desktop Publishing taught undergraduate unit, in which two programs were used to perform a similar task: the layout of a magazine-style page. A metacognitive process in the form of journal keeping, presented as reflective and descriptive callouts stemming from task points in the finished layout, was instilled in an experimental group, while no formal metacognitive procedures were suggested for another (control) group performing identical tasks. Subsequently, there was indication that spontaneous recall of distinction improved in the experimental group, with a lessening of negative transfer in performance, whereas only partial improvement in performance was noted in the control group.

Keywords: Transfer of Learning; Negative Transfer; Metacognition; Desktop Publishing tasks; Instructional Technology

1. Transfer of Learning and Negative Transfer

Transfer of learning can almost be taken as a measure for the effectiveness of learning. Yet, transfer is extremely difficult to trace. In spite of the fact that a body of research has been dedicated to understanding it (Grose & Birney, 1963; Ellis, 1965; Hunter, 1971; Haslerud, 1972; De Corte, 1987; Cormier & Hagman, 1987; Singley & Anderson, 1989; Detterman & Sternberg, 1992; Analoui, 1993; McKeough, Lupart & Marini, 1995; and Haskell, 2001), transfer has remained an elusive concept.

Nevertheless, transfer is crucial to all learning. Transfer 'isn't so much an instructional and learning technique as a way of thinking, perceiving, and processing information' (Haskell, 2001, p.23). But the fact remains, that Transfer of learning remains an elusive phenomenon even within transfer-directed methodological practices, though some success has been noted in schematically fuelled metacognitive strategies and in guided analogical transfer tasks.

Gick & Holyoak (1987), for example, have carried out some seminal researches in this. They pointed out the determinants of transfer by giving four types of factors, summarized as follows:

- (1) The structure of the task to be initially learned and its relationship to the transfer task.
- (2) The assessment of whether the conditions at encoding foster learning of the material and are appropriate for the subsequent transfer task.
- (3) Conditions at retrieval (i.e., the performance of the transfer task) that influence access to and application of appropriate knowledge.
- (4) The background knowledge of the subject.

Much more common is the incidence of the inverse of the phenomenon of successful Transfer of Learning, i.e. Negative Transfer, with practices from frequently performed tasks transferring negatively to similar but separate tasks in changed contexts. In the same paper Gick and Holyoak define this as that "...transfer produced by the inappropriate application of previously learned problem-solving strategies to superficially similar problems... In such cases a strong rule (or set of rules) is activated and applied in the new situation, because it is perceived as similar to previous situations, but the action evoked is inappropriate." (p.19)

* E-mail: gorg.mallia@um.edu.mt, Phone: +356 79538981

The four determining factors quoted above also apply to this, though very often each one of the determinants results in corrupted rather than enhanced learning.

- (1) The base of fidelity between both the original task and the negatively transferred task is usually there, linking performance, but misconstruing transferability.
- (2) and (3) The conditions at encoding will tend to have helped learning of the material to the detriment of the subsequent task or encoding in a similar but different context. The conditions at retrieval are such that the conditions at encoding remain intact and are immutable in spite of diverse conditions prevalent in the transfer task.
- (4) Negative transfer happens primarily in the learning of new tasks following other well practiced tasks.

An important contribution to the knowledge of what constitutes transfer was made by Salomon & Globerson (1987), who made a case for Mindfulness, a state of mind defined as the volitional metacognitively guided employment of non-automatic, usually effort demanding processes. Successful transfer is considered to be a result of mindful abstraction, as opposed to automaticity. The authors give a valuable list of suggestions about instructional procedures that can foster mindful transfer. Examples of these are:

- telling students to learn with the intention of explaining material to another person;
- telling students to generate imagery scenarios of materials they read and relate the materials to knowledge they already possess;
- when subjects' metacognitions and self-awareness are encouraged, their reasoning about formal-operational problems are improved;
- interactive learning increases both learning outcomes and mindfulness on the task, as measured by subjects' self reports;
- team-work may increase learners' mindfulness.

The emphasis here is on the possibility of methodological fostering of transferability, putting an onus on the teacher that is often not considered in research that concentrates primarily on learner characteristics. Salomon and Globerson are stating plainly that teachers can teach for transfer provided they apply the right methods.

2. The research background

During a Desktop Publishing taught undergraduate unit, in which the class was split into two two-hour sessions, each session populated by twenty students, two programs were used subsequently to perform a similar task: the layout of a magazine-style A4 page.

The first program (Microsoft Word for the Macintosh) was known to the students prior to the commencement of the unit, but the second (Adobe Pagemaker for the Macintosh) was new and fully introduced during the unit sessions.

In practice, tools and conventions commonly used in Word were negatively transferred to Pagemaker documents, though the distinctive use of the tools and conventions for these tasks in Pagemaker were learnt by the students, and the same students provided verbal feedback on recall within a short time that the learning took place. Implicit automaticity seems to have accounted for most of the negative transfer here.

The main two among the conventions that transferred negatively between the tasks using the two programs were:

(a) the use of text boxes that in Word are used to create a movable text environment, and which, though available in Pagemaker, is not needed, but for which a high percentage of the students looked, at the start of any new style-sheet. Most often text-boxes were used instead of the more versatile free-floating text-blocks, with students admitting to using the text-boxes because of transfer from Word;

(b) in Word there is a constraining of text within columns, with flow from one column to the next being automatic, unless stemmed by a command. Text in Pagemaker columns is flexible

and the column marks are only used as guidelines. The majority of students worried about text flow intransigence in Pagemaker columns. In all cases, reasons given for this by the students was the fact that columns in Word had caused flow problems in DTP design of page layout, and this had transferred to the Pagemaker task.

The same negative transferring of convention had been noted frequently before in similar cases in past courses, and in all cases the occurrence persisted till the end of the unit duration, in spite of verbal correcting of procedure by the instructor. It was clear that the learning processes were not adequately covering against the occurrence of this negative transfer, and retention of these conventions was rigid and overriding new learning.

3. Metacognitive strategies

One important use of cognitive strategies is to monitor and control memory and learning processes is Metacognition. Metacognitive strategies are 'executive' or 'higher level' strategies that govern the use of other strategies. Learners who become, or are taught to become, aware of these strategies and may be able to describe them, are said to possess metacognitive knowledge (Gagné, Briggs & Wager, 1992). '*Metacognition* refers to one's knowledge concerning one's own cognitive processes and products ... (it) refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes in ... the service of some concrete goal or objective.' (Flavell, 1976, p.232).

Can metacognitive processes help students to transfer knowledge? One way of doing this is in the notion of mindfulness already discussed above. Another 'pertains to the notion of *learning to learn*' (Byrnes, 1996, p.78).

Flavell's (1979, 1981) theory of cognitive monitoring is made up of four components: actions, goals, metacognitive experiences, and metacognitive knowledge. Derry and Murphy (1986) have summed up Flavell's four components in four general categories of training that instructional institutions might attempt:

- (1) helping learners build a library of learning tactics (actions);
- (2) training students to recognize what they must learn (goals);
- (3) enhancing the frequency and quality of experiences that lead to insights about learning (metacognitive experiences); and
- (4) helping learners build a store of information about the utility of learning tactics, including when and how to use them (metacognitive knowledge) (p.10).

A metacognitive process is one whereby the learners become aware of the strategies they themselves are using while learning, leading to a healthy consciousness of those instructional strategies and the acquired ability to apply the processes even away from the original context. In the classroom metacognitive strategies planned within the instruction can reduce automaticity and help far-reaching transfer.

4. The callout journal experiment

Salomon and Globerson's emphasis on metacognitive processes as a way forward to successful transfer of learning was taken up. Along with this was considered their suggestion that students be told to learn in ways that need to be describable. Against this background was adopted Derry and Murphy's proposal to help learners find ways of building a store of information about learning tactics, the metacognitive process helping the learn-to-learn environment.

Taking all of this into consideration, a callout journal was devised.

It was decided that the callout journal would only be implemented in one of the two classes doing the same tasks. In both the World and Pagemaker layout tasks:

- (a) The students in the experimental group were asked to make a rough sketch simultaneously mirroring the concurrently developing onscreen layout and drawing callouts from the salient fields to write briefly both rationalisations of choices made and technical descriptions in the use of the program, commands and results;
- (b) Once the onscreen layout was finalised, they were asked to print a reduced version in the middle of an A4 paper, and expand very slightly, still in callout mode, the rough annotations jotted down during the process of creation. This could be both handwritten clearly or generated by a word processing program.
- (c) Once the work on both the onscreen layout and the callout journal was done, the work was analysed collectively by the lecturer (leading the class) and all of the students, with each using the callouts to explain ideas, motivations, commands and results.
- (d) Additionally, each student discussed the callout journal with the lecturer, and individual feedback was given. In both (c) and (d) the two predominant cases of negative transfer were pointed out extensively (i.e. that text boxes and columns should not be used in the way they were set out as having been used).
- (e) Since they were not asked to make the callout journal, during the collective and individual discussions the students in the control class only provided a clean printout of the layout and mental recall of the processes involved in its creation.

There were three instigational considerations when this instrument was conceived:

- (1) **Facility:** Since the tasks involved were predominately visual, there was the facile possibility of building a developing visual model of a draft of the layout, sketched by the student just as the actual onscreen layout was constructed. The callouts at this stage were intended to be rough and in point form, penned onto the sketch. This would help with the instantaneity needed for the journal format. The callouts were further intended to help the thinking process.
- (2) **Efficiency:** Desktop publishing tasks are usually very absorbing and if a longer description of processes was demanded, there would have been the chance that it would have had to be in the form of post-task recall, which would have defeated the purpose of instantaneity.
- (3) **Comprehensiveness:** The callouts were intended to be both descriptive and reflective, therefore they covered both metacognitive knowledge and metacognitive experiences, and the actual effort at expression can be considered a move towards mindfulness away from the processes of automaticity that can foster negative transfer.

5. Indicated outcomes

It became evident after a number of tasks in Pagemaker were annotated, that a metacognitive process had been instigated, and the mindfulness stimulated by the conscious descriptions of thought and actions in the callout journals, helped reduce negative transfer between the using of Word and Pagemaker for similar tasks.

This was further indicated by the fact that no such results were forthcoming in the control class, in which the instructional design had been exactly the same as in the experimental class, with the only difference being the presence of the callout journal.

Reference in classroom discussion to text-boxes, except in cases where they were actually specifically needed on the pagemade page, disappeared by the third Pagemaker task in the majority of students in the experimental class, whereas continuous reference to text boxes used misguidedly in Pagemaker persisted in the control class almost to the end.

No mention of text-boxes was also made in the callout journals as from the third Pagemaker task, but since the control class was not producing callout journals, I could not compare outcomes in this way. I did, however, after the third task, discuss with students in the experimental class as to whether they could spontaneously recall what they had written by way

of rationalisation in the first callout journals. Many referred predominantly to the negatively transferred text-box and column use in pagemaker tasks. From this it is indicated that this was both a memory-jog in subsequent tasks, and the initiating of a metacognitive strategy that mindfully helped the clear transfer of learning from the Word tasks to the Pagemaker tasks, avoiding the pitfalls of negative transfer.

As from the third Pagemaker task onwards, comparing the use of columns in final layouts between the students in the experimental and control classes, the more flexible designs, whereby text overlapped the set column width, could be found almost predominantly in the work of the students who had stated their injudicious use of it in their callout journals.

There could be a number of other reasons why this might have been the case (for e.g. an incidental occurrence of more openly adventurous creative tendencies in the individual students of one class as opposed to the other). However, taken in conjunction with the progress registered in one class, and the fact little such progress could be noted in the other in the case of the use of text-boxes, the indications are that the more flexible use of columns in the experimental class stems from the metacognitive instigation of the callout journal use.

The qualitative process described in this paper seems to have indicated that callout journals used regularly, concurrently with tasks that can negatively transfer from one to the other, can help foster a metacognitive process that mindfully lessens that negative transfer.

References

- Analoui, F. (1993). *Training and transfer of learning*. Aldershot: Avebury.
- Byrnes, J. P. (1996). *Cognitive Development and Learning in Instructional Contexts*. Boston: Allyn & Bacon.
- Cormier, S. M. & Hagman, J. D. (Eds.). (1987). *Transfer of Learning: Contemporary Research and Applications*. San Diego: Academic Press.
- De Corte, E. (ed) (1987). Acquisition and Transfer of Knowledge and Cognitive Skills [Special Issue]. *International Journal of Educational Research*, 11 601-712. Oxford: Pergamon Press.
- Derry, S. J. & Murphy, D. A. (1986). Designing Systems that Train Learning Ability: From Theory to Practice. *Review of Educational Research*, 56, 1-39.
- Detterman, D. & Sternberg, R. J. (Eds.) (1992). *Transfer on trial: Intelligence, cognition, and instruction*. Norwood, NJ: Ablex.
- Ellis, H. C. (1965). *The transfer of learning*. New York: Macmillan.
- Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence*. Hillsdale, NJ: Laurence Erlbaum Associates.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of psychological inquiry. *American Psychologist*, 34, 906-911.
- Flavell, J. H. (1981). Cognitive monitoring. In W. P. Dickson (Ed.), *Children's oral communication skills (35-60)*. New York: Academic Press.
- Gagné, R.M., Briggs, L. J., & Wager, W. W. (1992). *Principles of Instructional Design* (4th ed.). Fort Worth: Harcourt Brace Jovanovich College Publishers.
- Gick, M. L. & Holyoak, K. J. (1987). The Cognitive Basis of Knowledge Transfer. In S. M. Cormier & J. D. Hagman (Eds.), *Transfer of Learning: Contemporary Research and Applications (9-47)*. San Diego: Academic Press.
- Grose, R. F. & Birney, R. C. (Eds.). (1963). *Transfer of Learning*. Canada: Van Nostrand.
- Haskell, R. (2001). *Transfer of Learning: Cognition, Instruction, and Reasoning*. San Diego: Academic Press.
- Haslerud, G. M. (1972). *Transfer, Memory & Creativity*. Minneapolis: University of Minnesota Press.
- Hunter, M. (1971). *Teach for Transfer*. Thousand Oaks, CA: Gorwin Press.
- Mckeough, A., Lupart, J. & Marini, A. (Eds.). (1995) *Teaching for Transfer: Fostering Generalization in Learning*. Mahwah, N.J.: Erlbaum.
- Salomon, G. & Globerson, T. (1987). Skill may not be enough: The role of mindfulness in learning and transfer. In *International Journal of Educational Research*, 11 623-638. Oxford: Pergamon Press.
- Singley, M. K. & Anderson, J. R. (1989). *The Transfer of Cognitive Skill*. Cambridge: Harvard University Press.