

Techno-pedagogy and the Conversational Learning Paradigm: Delivering the curriculum at the Centre for Individual Language Learning

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Techno-pedagogy and the Conversational Learning Paradigm: Delivering the curriculum at the Centre for Individual Language Learning

Abstract

Techno-pedagogy or the powerful combination of various technologies and pedagogy provides new opportunities to support a range of learning environments. This article describes how the Centre for Individual Language Learning (CILL) at Temasek Polytechnic in Singapore applies techno-pedagogy to a conversational self-organised learning (S-O-L) environment. The concept of S-O-L is explained in terms of conversational constructivist learning events within a social context. We also review the pedagogy of S-O-L in terms of delivering task management components within a learning organisation. We then show how the CILL facility functions as a self-organised conversational learning environment with its adapted working model of S-O-L pedagogy. We then discuss the three key technologies available in CILL and explain how the integration of these three technologies provides for a conversational scaffolding learning environment that helps deliver the CILL curriculum. This pedagogic process facilitates in learners the development of independent learning skills through both collaborative and individualized language learning encounters that enables them to take increased responsibility for self-organising their own learning in both school and the community. The article concludes by discussing the benefits of techno-pedagogic solutions and how these have shaped learning within a self-organised conversational learning environment at CILL.

Key words and descriptors

Self-organised learning (S-O-L), techno-pedagogy, outer and inner learning conversation, conversational scaffolding, conversational constructivism, learning coach, task management and task supervisor.

Introduction

Techno-pedagogy, or the practice of using technology and combining it with conversational pedagogy in education, is a relatively new venture, despite the last twenty years or so of educational history that has seen the emergence of new fields such as educational technology and instructional technology. However, these fields have not generally considered how techno-pedagogy in the form of reflective technology could improve learning. Though information technology (IT) in itself has made an irreversible tidal impact in the way learning will take-off from now on, the practice of combining a variety of technologies, including IT, with the pedagogic conversational model of self-organised learning (S-O-L) is even newer in the field. This article attempts to illustrate how techno-pedagogy provides value-add to IT-assisted reflective learning systems and how this supports learners and conversational learning in the S-O-L environment being developed at the Centre for Individual Language Learning (CILL) at Temasek Polytechnic in Singapore.

The Conversational Self-Organised Learning (S-O-L) Paradigm

Harri-Augstein & Thomas (1985) define learning as "the construction and reconstruction, exchange and negotiation of significant, relevant and viable meanings" (p.2). Human learning is therefore conceptualised in the conversational learning paradigm of S-O-L as both conversational and constructivist. Kelly (1955) defined the psychology of thinking and how knowledge is constructed in terms of individuals as "persons" construing their experiences with prior learned events. Kelly's learning theory is based on a process of psychological deconstruction and reconstruction of experiential learning events. It was defined by Kelly as "constructive alternativism", which formed the core concept underpinning his proposed Personal Construct Theory (PCT). Kelly's fundamental postulate of PCT describes how *"a persons processes are psychologically channelized by the ways in which he anticipates events."* Coombs and Smith

(1998) described thinking as a self-directed "internal learning stimulus" and further refined this psychological process of internal construction of experiences. They described conversational constructivism as an integration of Kelly's PCT with S-O-L and maintain that:

"We live and experience an inner society of conversational relationships within ourselves [and], at the same time, we also experience an outer society that comprises the physical world and other human beings. This duality of psychological existence is fundamental to the learning theory of S-O-L, in that it provides both the metaphor and model from which to perceive the paradigm's inner and outer learning conversation" (p.17).

Personal constructs are regarded as inner conversational reflective processes. These inner-reflective processes are considered to operate as a "self-managed internal learning organisation" and explain the origin of knowledge construction. How a person learns a new concept is described in terms of a "personal paradigm shift" that originates from a "conversational constructivist" learning event. In summary, the learning theory of conversational constructivism provides a systems-thinking model that relates the psychology of one's critical reflection of experiences to knowledge construction. The theory also distinguishes between internalized learning within one's self and collaborative learning with others. It does this by providing the metaphor of the "inner" and "outer" learning conversation. This "person-based" learning theory is later illustrated in figure 4, which models conversational interactions as occurring across the dimensional interfaces of "self" and "other beings".

Harri-Augstein & Thomas (1985) identify three fundamental principles and seven core objectives that illuminate the "person-based" nature and process of developing a conversational learning environment. Coombs and Smith (1998) summarize the three fundamental principles as follows:

1. Real personal learning depends on self-assessment and reflective evaluation through the construction of internal referents.
2. The S-O-L practice depends on the ability of the learner to self-monitor and control the learning process while developing appropriate models of understanding.
3. Shared meaning that is negotiated conversationally from social networks. Such social networks can be understood as conversational learning environments that construct their own viability and validity, resulting in a capacity for creative and flexible thinking.

Harri-Augstein and Thomas (1985) also outline seven core objectives of developing a conversational learning paradigm. Coombs and Smith (1998) state these as:

1. Understanding that the primary purpose of teachers, trainers and therapists is to enable persons to learn more effectively, thereby increasing their capacity for learning.
2. Trying to overcome the problem of practitioner-controlled instruction that ill-equips the learner to learn without the presence or intervention of the teacher or trainer.
3. Design awareness-raising techniques as catalytic conversational tools that enable people to become self-organised learners through critical reflection upon expressed or unexpressed thoughts, feelings and actions, which contribute to the learning intention.
4. Enable learners to become more self-aware of their own learning processes and to control their own learning *via* conversational techniques that support and guide the learner through this episode of personal change and growth.
5. Enable the personal process of self-organisation through the development of a capability to conduct learning conversations with one's self.

6. Identify other people as learning resources. Thus, group-based learning conversations can be developed across appropriate social networks and regarded as the conversational paradigm's understanding of a learning organisation.
7. Understand the analogy between the outer learning conversation conducted across a group-based learning organisation and the inner learning conversation that addresses our internal community of selves as another form of learning organisation. It should be noted that the social networks referred to in principle 3 can be regarded as analogous to both an inner and outer learning organisation of oneself and other social beings.

Defining the Social Context of a Conversational S-O-L Environment

Likening the conversational S-O-L environment to a systems-based learning organisation, Harri-Augstein & Thomas (1985) define the *ideal* pedagogic components as follows:

- (1) the *user* as learner;
- (2) the *learning coach* for generating a learning conversation with the user;
- (3) the *task supervisor* as learning domain organizer;
- (4) the *intentionality manager* for coordinating system design relative to the situated learning needs as a core domain rationale—representing the learning policy; and,
- (5) the social *domain* in which the learning tasks are performed.

Bearing in mind the fundamental principles and core objectives of S-O-L outlined earlier, and in connection to its social context, Figure 1 is a practical interpretation based upon Coombs and Smith's (1998) theoretical model of a task-management conversational learning organisation and draws upon the above five pedagogic components. In this case, these *core* pedagogic components are related to the learning policy roles and resultant organisational structure of the Centre for Individual Language Learning (CILL) S-O-L environment being developed at Temasek Polytechnic in Singapore.

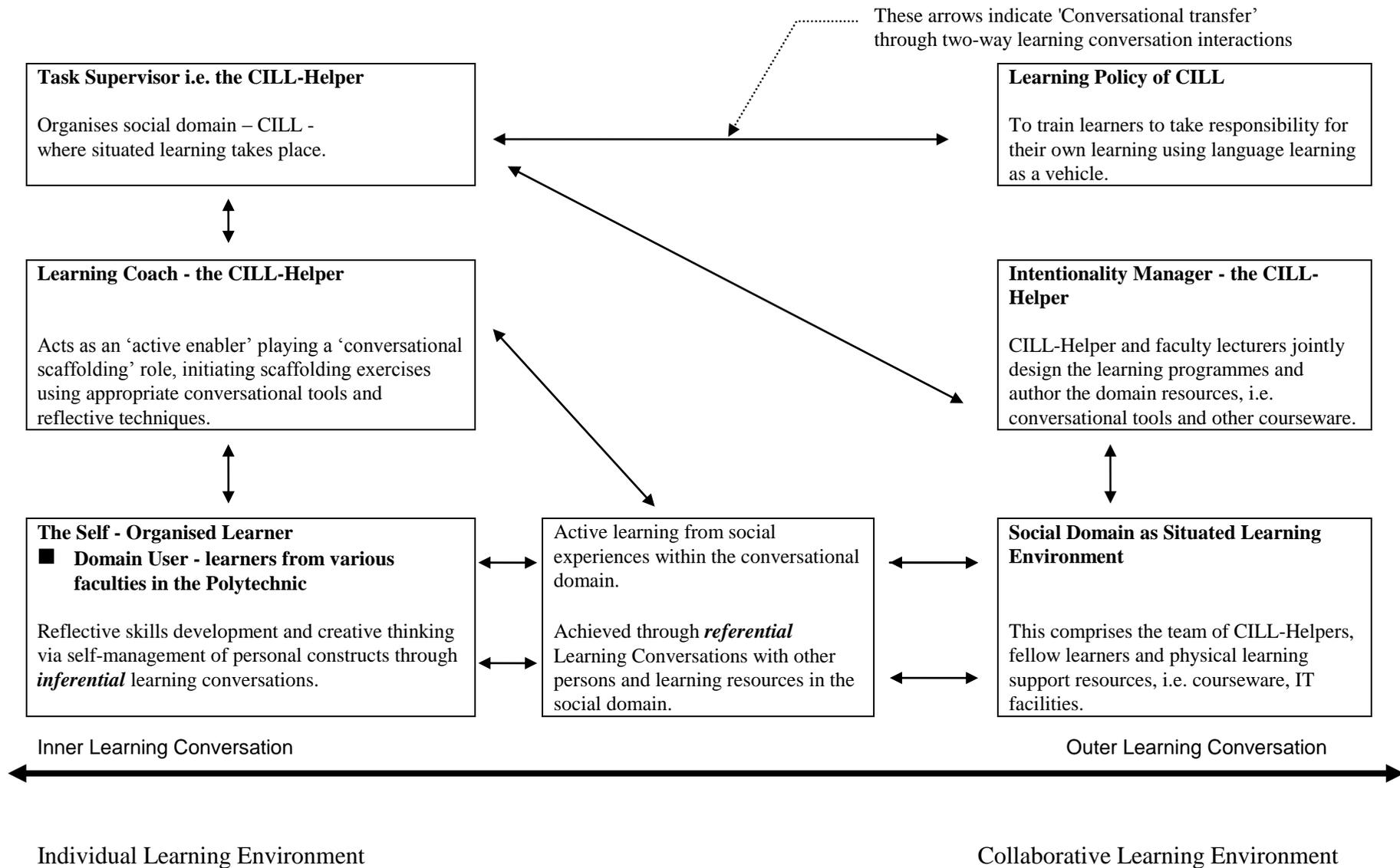


Figure 1. The CILL pedagogic components of a task-management conversational learning organisation

The Pedagogic Social Context Developed at CILL

Established in August 1993, the learning policy of the Centre for Individual Language Learning has been to train learners to take responsibility for their own learning using language learning as a motivational curriculum vehicle.

The training encompasses:

- facilitating learners in acquiring learning-how-to-learn skills;
- providing learners with the opportunities to practice learning-how-to-learn skills by running language learning programmes catering to the needs of:
 - 1) individual learners through individualised programmes;
 - 2) faculty demands through CILL-faculty based group and /or individual programmes;
and,
 - 3) Polytechnic demands through special programmes for identified groups.

CILL thus provides learners with a hands-on approach to enhance the experience of language learning, which is both task and learning focused. This approach enables S-O-L Learning Coaches, known as CILL-Helpers, to initiate pedagogic scaffolding exercises using appropriate conversational tools and reflective techniques to raise learners' awareness to monitor their learning at two levels: at the level of task performance, and at the level of the learning process itself. (See the systems organisation in Figure 1.)

At CILL we have also adopted a two-pronged pedagogic strategy to enable learners to take responsibility for their own learning through:

- the provision of language counselling based on some useful scaffolding procedures taken from the problem-management approach to helping, which are then humanistically integrated into Gerard Egan's (1986) counseling model; and,
- providing a conversational learning environment *via* the suggested framework of the Learning Conversation based on Harri-Augstein's and Thomas' (1985) S-O-L paradigm.

As outlined in Figure 1, this pedagogic strategy provides conversational constructivist scaffolding to help learners to:

- develop self-assessment and reflective evaluation skills;
- self-monitor and control their learning process;
- articulate and share learning strengths and needs through access to social collaborative networks and individualised learning environments in CILL;
- develop their capacity for creative, critical and flexible thinking. (Ravindran, 1998b)

The main domain users are novice self-organised learners (S-O-Lers) drawn from both local and international students enrolled from the four faculties of Engineering, Information Technology, Design and Business.

The social domain operates as the situated learning environment (McLellan, 1996) of CILL and comprises of 5 full-time lecturers sharing the pedagogic roles of learning coach, task supervisor and intentionality manager; while working with administrative and technical support staff. CILL is located in the library, in order to provide learners easy access to a

diverse range of learning materials that includes print, audio, video and diverse computer media. The centre's machine technology facilities include an alley of 4 video booths and 12 computer terminals, and a 22-booth listening laboratory. Physical facilities include a facilitator helpdesk and 3 counselling corners and an open study area. On average, the Centre can accommodate about 100 learners at any given time.

From its inception, CILL has adopted what Wenden (1997) terms as a 'learner-autonomy-as-content' orientation. This approach assumes:

"that learners need to learn-how-to-learn...[i.e.] the software for learning is not innate nor acquired incidentally with the same efficiency by all...learner training refers to the instruction that is provided for this purpose and to the content about learning that should be incorporated into a language syllabus...in an explicit and systematic manner. Its immediate aim is to help learners become more reflective, mentally active, and self-directed..." (p. 38).

CILL is mindful of the potential learning-to-learn deficits of incoming learners to the Centre. These non-autonomous prior learning skill assumptions, such as only responding to didactic teaching-learning styles in a passive manner, represent the former social and experiential learning culture that many students have been previously socialized into. This is often caused by the economic and political consequences of delivering traditional mass-education, i.e. the consequence of large class sizes of 30-40 students sitting in forward-facing ranks, which, unsurprisingly, encourages many hard-pressed teachers to use such traditional didactic learning styles. Harri-Augstein & Thomas (1985) refer to such persons as being "disabled learners". This validates one of the prime roles of the learning coach, which is to make learners' take increasing *responsibility* for their learning tasks and actions. CILL is therefore perceptive to the tremendous demand and impact that the S-O-L learning assumptions will

have on novice learners attending the Centre. Hence, CILL's adoption of the counselling and reflective approach outlined in the above Learning Policy and implemented as outlined in Figures 1 and 2.

Ravindran (1998a) captures the dynamic workings of the Language Counselling system that operates within the Learning Conversation working pedagogic model adopted at CILL - see Figure 2. From this model, one can see how CILL-Helpers, as "learning coaches", generate the learning conversation with the user. They also organise the social learning domain by operating as a "task supervisor" and author the CILL curriculum as "intentionality manager" by designing authentic learning tasks that aim to motivate the learner. One can also see how the **macro skills** of initiating, goal setting, modeling, supporting, feedback evaluating, linking and concluding, and the **micro skills** of attending, restating, paraphrasing, summarizing, questioning, interpreting, reflecting feelings, empathizing and confronting, outlined by Kelly (1996), are employed by a learning coach during the learning conversation. Employing these critical skills enables the learning coach to play the role of an 'active enabler'. Unifying these "deep" concepts in practice constitutes as the 'conversational scaffolding' role, purpose and strategy carried out by the CILL-Helper learning coach.

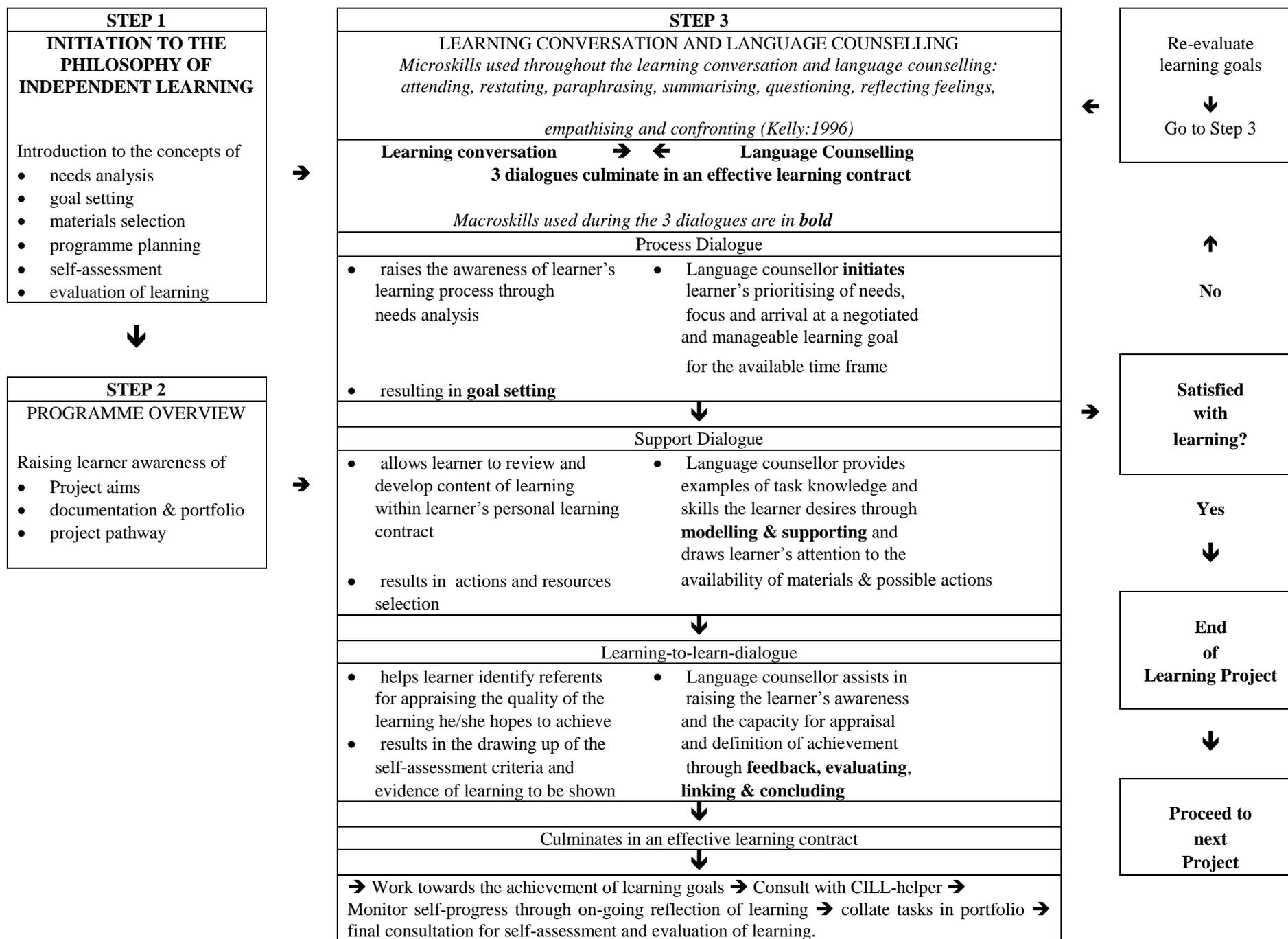
The definition of S-O-L relates the personal construction of meaning to a system of personal knowing, with *meaning* as the basis for all our actions (Harri-Augstein & Web, 1995). Scaffolding is generally understood as an integral component of coaching in a situated learning environment (McLellan, 1996). Conversational scaffolding, however, by a learning coach working in an S-O-L environment consists of helping the learner to ladder-up and elicit new meaning from a task-oriented learning activity, thereby enabling the construction of new knowledge. Conversational scaffolding uses reflective tools and active thinking processes

(Coombs and Smith, 1998) and is therefore a more proactive activity compared to that of the regular concept of scaffolding that considers the coach operating as a 'passive facilitator' and who simply plays an extended teacher role. Figures 1 and 2 capture the dynamic pedagogic processes of 'active enabling' by the CILL-Helpers operating within the CILL social context.

It can also be gleaned from S-O-L's fundamental principle 3 and core objectives 6 and 7 that S-O-L adopts the ideas of social constructivism, in that learning conversations must operate in meaningful real-life contexts, such as social networks, that generate valid and motivational group learning environments. This can be clearly seen in Figures 1 and 2 and explains the pedagogic social context of CILL by virtue of its operating in a real-life needs setting within a Polytechnic learning environment.

CILL in its microcosm, therefore, is an evolving learning environment functioning within the parameters of the S-O-L's fundamental principles and objectives. It illustrates how the components of an ideal task-management conversational learning organization work in reality.

Figure 2. Language Counselling within the Learning Conversation - A Working Pedagogic Model. (Ravindran 1998a). (©ravindran/cill/temasek polytechnic)



Technologies available in CILL

The article has so far illustrated how the CILL has been designed according to S-O-L's fundamental principles and core objectives. This section will discuss how techno-pedagogy represents benefits to reflective learners and can overcome some of the limitations of the non-techno-pedagogic alternative solutions. From this understanding, the key technologies available in delivering CILL's curriculum will be discussed and shown how they combine to support the S-O-L pedagogic model illustrated in Figures 1 and 2. Three kinds of technologies are available in CILL to all domain users. These are: human technology, reflective technology and educational IT.

Human technology refers to the systematic roles and procedures of the learning coach who doubles up as task supervisor and intentionality manager in the S-O-L environment of CILL. The key role of the learning coach is to act as a conversational learning assistant, initiating scaffolding exercises and using appropriate conversational tools and reflective techniques. The role of the task supervisor is to organise the social domain where situated learning takes place. The role of the intentionality manager is to serve as the domain expert that helps design the learning opportunities and author the domain resources, i.e. conversational tools and other courseware (See Figures 1 & 2). The CILL-Helper provides human technology by: playing the role of the learning coach scaffolding the learning conversation; organising the CILL environment according to the needs of each project being run; and, designing the project in negotiation with the individual learner, or group, or faculty member, according to their needs. The CILL-Helper also provides optimum learning situations and harnesses appropriate domain resources suitable for enriching the designed learning opportunities. Human technology therefore defines the key pedagogic roles and procedural practices of "learning enablers" operating within the Centre.

These pedagogic roles also represent a systems-thinking, or cybernetic, set of procedures and working practices from which the S-O-L learning policy may be transparently understood and delivered by teachers operating in this novel learning environment. It would be a mistake to misinterpret these cybernetic roles and procedures as some form of mechanistic learner control. Quite the contrary, the S-O-L pedagogic roles and practices integrated into the CILL learning environment are clarified in this manner so as to provide *transparency* of the unique set of learning purposes and strategies that need to be carried out by the CILL-Helpers. Indeed, this pedagogic structure represents a content-free template that conceptually models the CILL as a radical social learning organisation. Senge (1990) maintains that:

"Systems thinking is a discipline for seeing the *structures* that underlie complex situations, and for discerning high from low leverage change. ...systems thinking offers a language that begins by restructuring how we think... ...with a shift of mind from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in shaping their reality..... Without systems thinking there is neither the incentive nor the means to [put change] into practice. ...systems thinking is the [conceptual] cornerstone of how learning organisations think about their world" (p.69).

The alternative and pedagogically complex structure of CILL represents Senge's "high leverage change". It is a small organisation within a large organisation. CILL generally operates within a different pedagogic paradigm to its parent organisation. This reality requires a greater transparency of its pedagogic roles and procedures for both its learner and support staff participants, as well as the outside college authorities, so as to avoid any misunderstandings. Because CILL represents an unconventional learning environment, it is necessary to reshape the old pedagogic thinking practices of the CILL-Helpers and its novice self-organised learners. The systems thinking operational work templates of figures 1 and 2 conceptualizes these new pedagogic roles and practices in a holistic big-picture manner and

thus *empowers* all the participants to better understand the educational processes involved and become actively engaged in this re-cultured new paradigm classroom. Within this pedagogic framework, however, the actual learning resources and learning programmes are humanistically negotiated by the CILL-Helper according to the learner's identified needs and scaffolding requirements. It is in this sense that the CILL learning environment represents a content-free pedagogic framework. The enabling support structure that CILL provides allows both freedom and flexibility for learners within it, through their individually tailored curriculum programmes.

Reflective technologies refer to the thinking tools used for knowledge elicitation and have been defined by Coombs (1995) as "knowledge elicitation systems". These include the S-O-L scaffolding resources comprising of the: personal learning contract; learning log; learning review and, in the case of CILL, evaluation of learning tools through the process of the learning conversation outlined in Figures 1 and 2. Reflective tools take on the role of knowledge elicitor and promoter of: independent learning skills; critical and creative thinking skills; and problem management skills, leading to self-organised learning during learning conversations that raise the learner's task and learning awareness. Such conversational tools therefore play a critical role in the context of a self-organised conversational learning environment. They give learners much needed practice in; self-assessment and reflective evaluation, self-monitoring, control of learning processes, developing models of understanding, and, creative and flexible thinking, as they work through the chosen projects *via* various conversational interactions within the learning environment.

Harri-Augstein and Thomas (1991) describe the role of conversational tools as a reflective technology:

“Tools that enhance awareness of the construction of personal experience by eliciting representations of personal meaning, support reflection upon the anticipatory mechanism which drives behavior. ...Tools that record behavior directly support the reconstruction of experience which generates feedback about the quality of performance" (p.263).

Techno-pedagogy therefore represents a systematic combination of human and reflective technology with appropriately designed educational IT resources. The value-add benefits of techno-pedagogic IT reflective learning systems over similar non-IT systems has been explained by Coombs and Smith (1999 *in press*) in terms of the system's "reflective capability". They maintain that:

"the learner interface is based upon the reflective capability of the learning system to allow the user to meaningfully elicit knowledge [and] is considered to be a function of the system's reflective learning interface (RLI) capability as well as the user's prior learning. IT can be employed as a catalyst to both assist and accelerate this kind of reflecting process and represents a user-friendly thinking tool. ...many IT instructional systems contain task-based recursive learning features and, therefore, provide an educational *value-add* that aids reflection and improves critical thinking skills".

To illustrate this idea Coombs and Smith qualify the pedagogic benefits of using a wordprocessing IT system over a traditional pen and paper method for, say, authoring an English essay. They considered each pedagogic medium in terms of its medium learning attributes and:

"identified four additional medium learning attributes: namely, a recursive learning feature in using the wordprocessor as both an editor and reviewer of authored content; a text format and design feature aiding better quality manipulation and organisation of the material; additional thinking steps for when using language utilities such as the thesaurus, grammar and spell checker; and finally, the benefits of using an icon-supported graphical user interface. All of these additional features attributed to the wordprocessing medium represent the improved reflective learning capability and quality of this system compared to the use of paper and pen. The central thesis here is that the integration of appropriately

designed IT tools into teaching and learning can vastly improve the quality of critical and creative thinking".

IT reflective learning resources in CILL consists of audio, video, computer and multi-media tools that perform a wide range of pedagogic roles. IT is used to provide a wide variety of materials in multiple media modes such as audio, video, computer and satellite, and provides flexible learning opportunities through the combination of the IT courseware materials available in diverse media formats. For example, the foreign language programmes run in CILL use a combination of print, computer, video and video conferencing technologies to motivate language learning, which also includes dedicated IT languages software in the form of Computer-aided Language Learning (CALL) packages. IT is harnessed to provide greater accessibility of courseware materials for learners to use at their own time, pace, and sequence. IT courseware is flexibly available both on-site and on-line, fostering opportunities for both individualized and collaborative reflective learning tasks. For example, on-line programmes such as Critical Reading and Intercultural Communication are both delivered using interactive media technology, which allows learners to access these modules from either home or on campus in order to learn the skills.

As a reflective learning resource, IT is used to initiate learners into resource-based learning through the use of diverse forms of IT: e.g. video, television, radio, on-line environments, satellite TV, or, via various IT database search facilities, e.g. OPAC (online public access catalogue) and Internet search engines. Learning programmes, such as Job Hunting skills for Engineering students, provides students with the opportunity to engage in problem-based learning using a wide range of technologies to meet their learning needs. Such programmes allow for the trial of new modes of learning. These include learner training in planning,

monitoring, evaluation, resource selection, strategy selection, and, outcomes to be produced when combined with reflective and human technology.

As a learner-training tool, IT provides a useful means for learners to: practice the selection of materials; analyze and synthesize information; critically evaluate information sites; compare and contrast information gathered from various technological systems; enhance creative and critical thinking skills when reviewing information from database publication sources. IT provides the means to deliver virtual learning environments and learning communities through a variety of facilities such as e-mail, Internet Relay Chat, and bulletin board discussion groups. An example is the foreign language students' virtual discussion forum that was used prior to their trip to France & Germany. Questions by participants, be they individual or group-based, were posted via the e-mail facility to clarify doubts about foreign exchange, safety concerns and other matters. Opportunities to participate in such exercises enhance a student's self-directed learning capacity in both an individualised and collaborative manner. The Individual Foreign Language learning programme, or IFLL, uses a combination of IT resources to promote individual, pair, or group work, in language reception, and, production skills, remediation, consolidation and enrichment activities. IT also facilitates the provision of a publishing platform for learners to reflectively review their language learning experiences, trips abroad and other items of interest. *CILL Matters*, CILL's electronic newsletter, gives both learners and staff the opportunity to share learning tips, materials and other learner contributions on a world-wide basis and provides an authentic outlet for such collaborative learning tasks.

IT communications platforms can also serve as an e-mail advisory service, supporting various learning services that include learning tasks, project information, and cyber-tutoring programmes in CILL. "CR On-Line", the Critical Reading programme, uses IT as a learning tool to give learners' learning opportunities as well as facilities to exercise reflective thinking

skills through online discussion. This programme involves pedagogic cyber-tutoring activities with cyber-learners. More examples include the interactive “Mock Interview Programme” that allows learners to practice answering interview questions. The electronically interactive Japanese Hiragana programme allows learners to work either individually or in small groups, so as to learn how to write and pronounce the Hiragana script and its corresponding sounds. Test-taking skills for the “Writing” programme is yet another technologically delivered interactive on-line module that engages the learners in cyber-learning and the facilitators in cyber-tutoring, which combines a virtual learning platform for learning conversations to take place within a language counselling curriculum.

As an IT management tool for document/data management, IT serves a valuable function in supporting learning coaches. It facilitates in the capture of learner particulars, number and type of visits to the Centre, maintaining consultation records and, through that, learner progress profiles. Add on to that consultation booking trends and other critical project-related information. This enables the “task supervisor”-cum-“intentionality manager”-cum-“learning coaches” in the Centre to decide on appropriate interventions, so as to ensure optimum effective learning and resource utilisation. For learners, however, IT-based assessment courseware provides feedback on previous performance scores and gives general progress information that enables a learner to ladder-up, or down, the prior-learning event according to his/her ability. For example, the Language Assessor (a CATest), which consists of a number of test-taking skills that pedagogically builds assessment feedback routines into the learning process.

Delivery of the CILL Curriculum

The CILL curriculum, comprising of learner-training and language learning, is delivered through various individualised projects, CILL-faculty designed projects, and projects designed to meet the needs of special category students. Such students include foreign students, conditional entry students, Foreign language and Business culture students and students learning a foreign language. All these CILL students benefit from using the techno-pedagogic-assisted curriculum, i.e. using the powerful combination of various educational and information technologies that are integrated into the pedagogy of a self-organised conversational learning environment as outlined in Figure 3.

Figure 3 utilizes the Purpose, Strategy, Outcome and Review (P-S-O-R) systems analysis heuristic of Harri-Augstein & Thomas (1991) and summarizes the key components in the delivery of the CILL curriculum. The P-S-O-R conversational heuristic provides the researcher with a useful tool from which to conduct a pedagogic systems analysis of CILL's learning environment and illustrates how technology and pedagogy are integrated into the various project designs delivered in CILL.

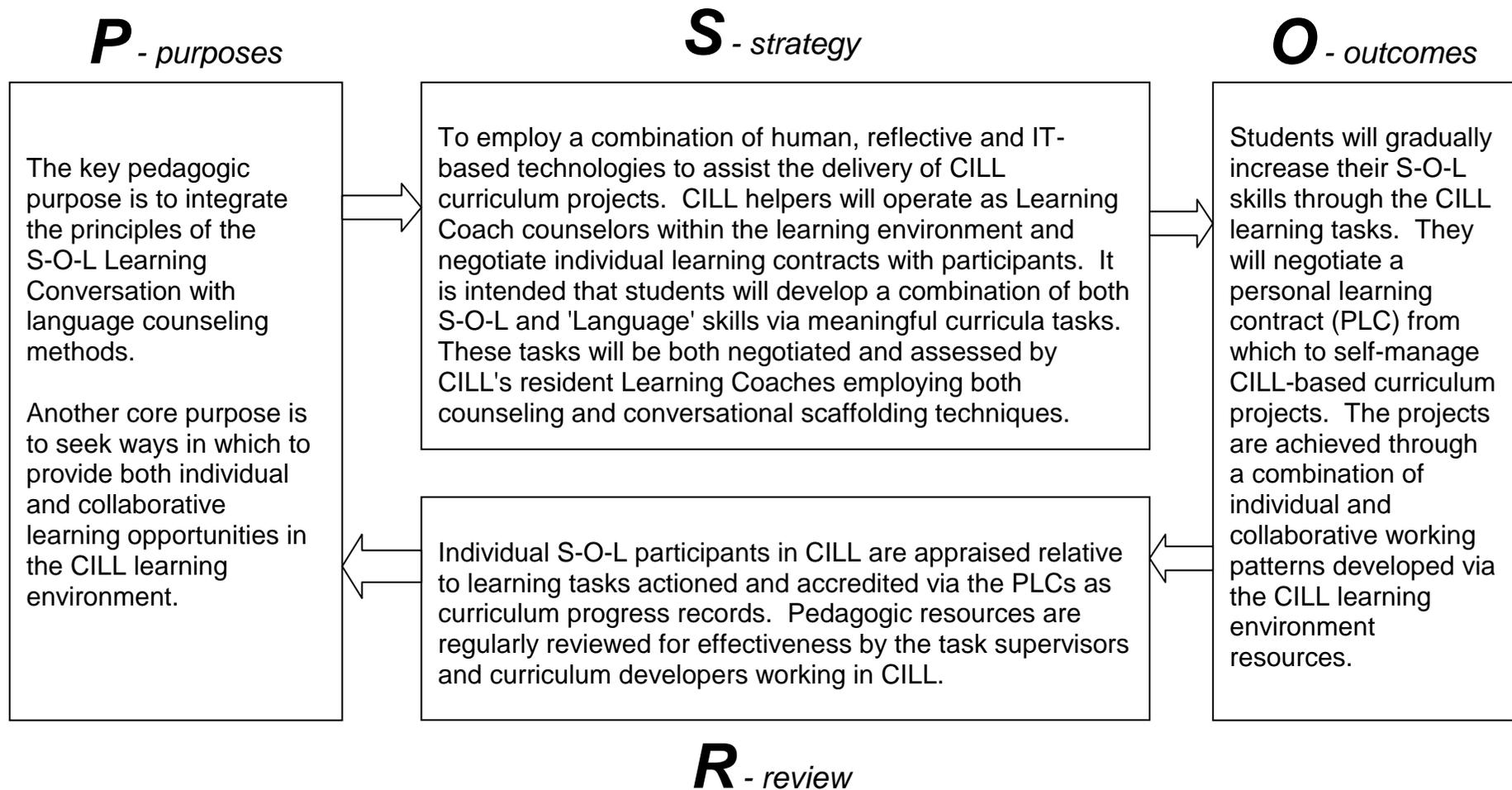


Figure 3. P-S-O-R analysis of how CILL's S-O-L curriculum is delivered

The use of techno-pedagogy in CILL has greatly enriched the learning environment by providing learners in CILL with training and practice in:

- problem-based learning through problem management of their learning needs;
- critical and creative thinking skills in the course of designing their own learning plan, selection of resources and strategies to achieve their goals, deciding upon various feedback techniques for self-assessment and learning review, as well as production of learning evidence;
- learning in individual, collaborative, virtual, open and flexible learning environments and the social and learning skills required for these;
- working at their own pace, according to their own needs, in their preferred sequence and time;
- managing their own learning portfolio and learning documents management, which is to be shown as evidence of effort at learning;
- reflecting upon their abilities at task and learning management through reflective tools;
- taking responsibility for their own learning; and,
- constructing, reconstructing and negotiating meanings, in the light of the influx of information from wide-ranging resources and reflective technologies that build new knowledge.

Techno-pedagogic Implications

This on-going experiment in CILL draws, on average, about 1000 students per month. Its on-going success shows that techno-pedagogy:

- does have a role to play in supporting collaborative and individualised language learning. How we utilize it will determine the learning mileage we can provide to cater for the needs of learners;
- provides an enriching approach in facilitating and enabling learners in independent learning skills through the effective use of reflective technology to elicit learning conversations that support their reflective learning tasks;
- offers alternatives for effective input for learning and facilitating, leading to richer learning outcomes;
- demands of the learner a learning-to-learn capability to self-organise his/her learning that also encourages individual creative and critical thinking skills;
- provides the tele-learning means to achieve borderless learning space for both individualised and collaborative learning, which cannot be offered through a traditional classroom pedagogic agenda;
- creates paradoxical learning environments, such as, virtual and on-site, flexible and structured, individual and collaborative learning environments; and,
- creates a new breed of learners and facilitators, with new definitions of learning environments and enriches pedagogy through new applications of existing technologies and support systems, as in the case of CILL.

Techno-Pedagogic Learning Environments in CILL

Looking at the social context of CILL, and its relationship to the social dimensions of a self-organised conversational learning environment, one can see that CILL delivers a techno-

pedagogic learning environment that integrates the individual task-based activity with group learning collaboration - as highlighted in Figure 4.

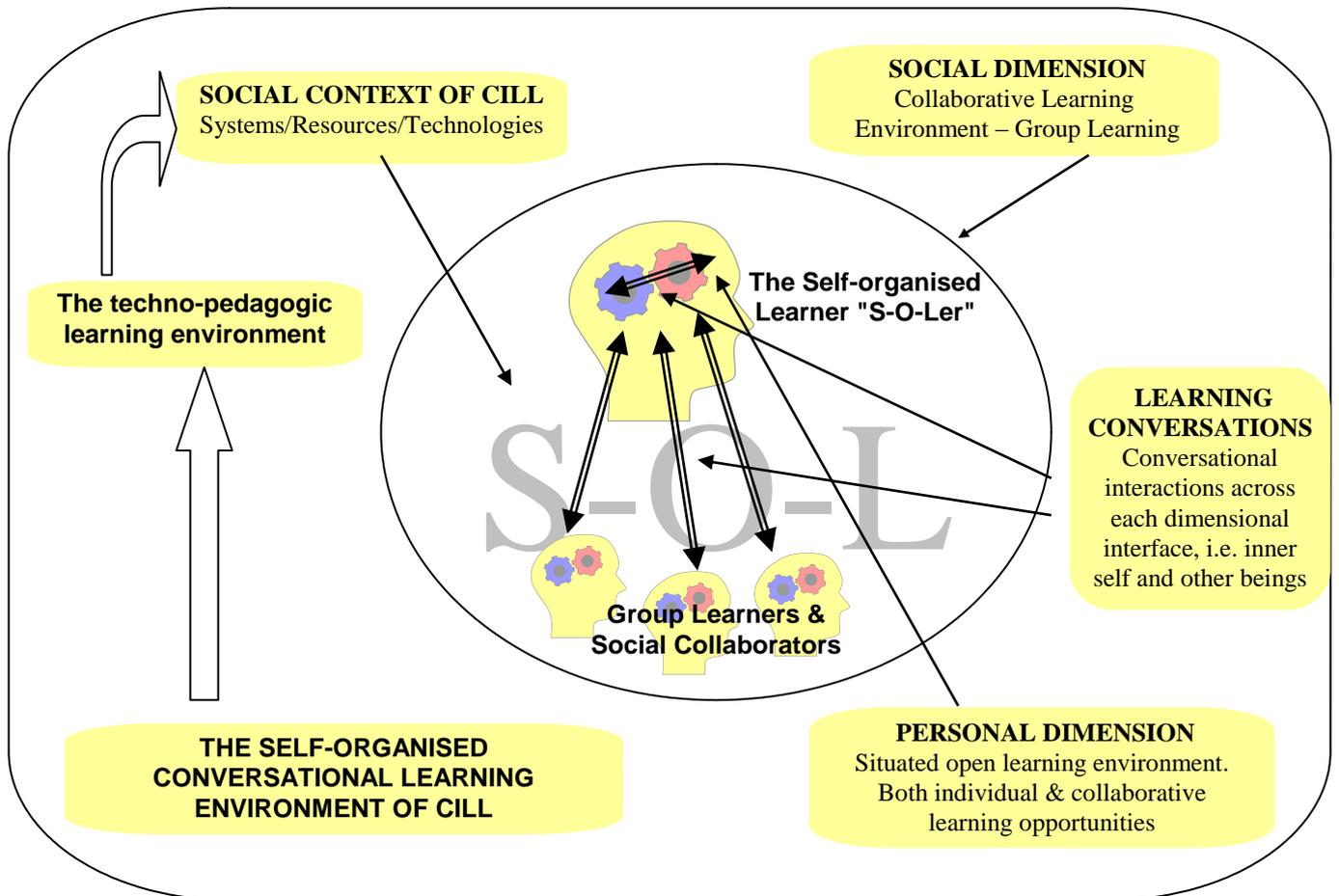


Figure 4. Techno-Pedagogic S-O-L Environment in CILL

Figure 4 shows how learners in a self-organised conversational learning environment, such as CILL, using systems/resources/technologies have the flexibility and choice of migrating from a situated open learning environment, as an autonomous learner, to that of a collaborative learning environment and vice-versa. The same pedagogic flexibility applies to opportunities to transfer between a virtual and an on-site physical learning environment, or vice-versa, and between a flexible learning environment to a more structured one. This systems-based flexibility underpins the pedagogic design of a techno-pedagogic learning environment, thereby creating enriched knowledge-building opportunities *via* multiple forms of personal

and social interactions that delivers the learner's ability to enhance their self-organised learning capacity.

Although CILL operates in the S-O-L paradigm, we have, in fact, the paradoxical emergence of a combined collaborative and individualised learning environment. Collaborative learning vis-à-vis self-organised learning may seem paradoxical, but it is, in fact, in line with the S-O-L interpretation of social constructivism. This is because learning conversations must operate in meaningful real-life contexts, such as social networks, and that these real-life social situations generate valid and motivational group learning opportunities. In a sense, the collaborative learning environment is a manifestation of S-O-L's fundamental principle 3 and core objectives 6 and 7, as outlined earlier in this article. The paradox is that collaborative learning is actually about individual learning within a social context. Westera (1999) explains that while collaborative learning refers to collective processes and social construction, its primary focus is to optimise conditions for individual learning. It must be remembered that while collaborative learning is about sharing knowledge, co-operation and the collective construction of knowledge, learning remains strictly an individual process. Hence, the juxtaposition of the collaborative and individualised learning environments within the context of the self-organised conversational learning environment - as illustrated in Figure 4. A learner coming into CILL, therefore, has the choice of working in a self-organised learning environment either as an individual, or, in pairs, or small groups. The choice between autonomous or collaborative learning activities will depend largely on the nature of the curriculum project undertaken relative to the learner's task needs agenda that is defined and negotiated within their personal learning contract by their learning coach.

Conclusion

Perkins (1999) states that “the science of mind emerging from contemporary psychology has much to say to education. It points to styles of instruction that help learners to understand and use actively what they are learning, not just to memorize information and execute routine skills”. Techno-pedagogy helps to motivate learners by increasing the learner's responsibility and awareness of their curricula learning tasks and thus moves them towards active participation and partnership of educational delivery process. Perkins (1986) also considers that “ *Modelling* is a good way to introduce learners to a complex process... A pattern of thinking is, of course, a design. In acting out a pattern of thinking for learners, a teacher provides a model case of that pattern of thinking” (p.108). Techno-pedagogy contributes to the promotion of this learning strategy as it facilitates this "modelling" critical thinking process - *via* use of the S-O-L reflective technology tools and procedures - throughout the learning events and social experiences that are conducted in CILL.

Bolter (1984) claims that electronic technology gives a more catholic appeal to a number of trends in twentieth-century thought, in particular, the notions of mathematical logic, structural linguistics and behavioral psychology. Separately, these trends were minor upheavals in the history of ideas; taken together, however, they become a major revision in our thinking. Likewise, the potent combination of techno-pedagogic tools and autonomous learning processes, despite their individual developments, creates a major impact in the way that collaborative and individualised language learning is supported in a self-organised conversational learning environment.

Brookefield (1986) explains that teaching and learning is now to be viewed as a “transactional drama in which the chief players (learners and facilitators) ...interact

continuously to influence the nature, direction and form of subsequent learning”. Brookefield (1986) also explains that the role of the teacher is now to “assist learners to attain a state of self-actualization or to become fully functional persons... suggest alternatives, point up contradictions, draw attention to relationships of dependence, or prompt painful critical scrutinies of assumptions, value frameworks or behaviors.” Techno-pedagogy seems to be able to facilitate the enactment of this ‘transactional drama’ and to lead learners to a state of self-actualisation. The educational mileage we get out of techno-pedagogy lies in the distinction that Leuddeke (1998) suggests, in that we consider the ‘new applications of technology’ rather than the ‘applications of new technologies’.

‘Man’s reach should exceed his grasp’. Such is the spirit that drives Audi's advertising media campaign. It suggests a feeling that nothing is impossible. That the future of road-holding may yet take a new turn... (Audi advertisement, 1999). The future of motivational learning has already begun to take new turns down roads not previously taken, through the catalyst of educational technology solutions, and demonstrates the pedagogic cutting-edge influence that IT has impacted upon the world of teaching and learning. We suggest that properly designed reflective technology have the potential to *increase* the personal motivation and drive of learners. On the other hand, badly designed educational technology courseware often has the reverse effect of alienating learners, which suggests the implicit benefits to be derived from harnessing appropriately designed and selected techno-pedagogy in a self-organised conversational learning environment. CILL is but one project example in this mega endeavor of combining technologies with pedagogy to enable the development of self-organised learners. With the advent of more new technologies, educators and trainers face the challenge of devising appropriate applications for harnessing these new technologies to add-value to the kind of learning that would prepare reflective learners for the critical and creative thinking

skills demanded by a knowledge-based economy. This is certainly the case for present-day Singapore that believes critical and creative thinking skills underpin the future success of its knowledge-based economy for the next millenium. The Ministry of Education in Singapore has recently embarked on several major educational policies that it believes are essential for shaping Singapore's creative learners for economic success in the knowledge-based market place of tomorrow. These major initiatives include an IT MasterPlan for improving IT facilities in every school and a radical policy called "Thinking Schools Learning Nation" (TSLN), which aims to integrate critical and creative thinking skills into the national curriculum. 'You can't forge ahead [in learning and facilitating] by sticking to existing routes'; so extols Audi's advertising campaign (1999). It is our contention that techno-pedagogy represents a new kind of educational practice. It encourages a learning environment that utilizes technology-assisted tools as an improved "reflective learning interface" within the S-O-L conversational paradigm. We believe that in order to integrate critical and creative thinking skills into the educational curriculum, Singapore, indeed all nations, would be well advised to consider some of the techno-pedagogic resources and solutions discussed in this article.

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