ATT

**IN THE IB DIPLOMA**

**A Literature Review of Teaching Practices for Effective Learning**

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**June 2013**

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**ATT in the IB Diploma**

**Introduction**

All the Unit Planners teachers use to design units of learning for both MYP and the DP are based on the inquiry cycle. It is through the Unit Planner that the aspirations of teachers are developed into classroom learning experiences for students.

sustained inquiry

principled action

critical reflection

The Unit Planners encourage teachers to take a three stage approach to planning:

Stage 1: Inquiry - establish the purpose of the unit through formulating concept based inquiry questions

Stage 2: Action – design inquiry based teaching/learning experiences for students

Stage 3: Reflection - look back on the teaching experience, reflect on the success of the unit and consider what changes they might make next time to the unit in terms of the planning, process and impact of the inquiry.

**Inquiry appears to be both the preferred method of design and the preferred method of instruction in the Diploma.**

This idea is reinforced in the guidance for teaching practice found in the **DP – from Principles to Practice**:

“The learner profile stresses the importance of inquiry. Students are expected to develop their natural curiosity, together with the strategies and skills needed to become autonomous lifelong learners. Students are also expected to think for themselves so that they can approach complex problems and apply their knowledge and skills critically and creatively to arrive at reasoned conclusions or answers.

Diploma Programme courses specify a large amount of content, with the area of study often defined in considerable detail. It is the way in which content is presented in class that is critical.

What is essential is that each student is actively engaged in classroom activities and that there is a high degree of interaction between students and the teacher, and also between the students themselves.

Learning should focus on meaningful questions and contexts and the voice of the learner is considered to be as important as the voice of the teacher. The teacher is viewed as a supporter of student learning, rather than a transmitter of knowledge

Overemphasis on lecturing is incompatible with the aims and principles of the Diploma Programme. Teachers should use a variety of different approaches at different times, employing a mixture of whole‑class, group and individual activities that are representative of the learner profile.”

And again in **Towards a Continuum of International Education:**

“The IB learner profile states that IB learners strive to be “inquirers”, describing the process as developing natural curiosity together with the skills needed to enable them to become autonomous lifelong learners.

Inquiry involves an active engagement with the social and physical environment in an effort to make sense of the world, and consequent reflection on the connections between the experiences encountered and the information gathered. Inquiry involves synthesis, analysis and manipulation of knowledge. Structured inquiry describes the strategies and supports that teachers use to facilitate student inquiry that is purposeful and productive.

Depending on the context, students are expected to explore significant issues by formulating their own questions or seeking the answers to prescribed ones. All three programmes expect students, in an age appropriate way, to be able to:

* design their own inquiries
* assess the various means available to support their inquiries
* proceed with research, experimentation, observation and analysis that will help them in finding their own responses to the issues and in solving problems.”

**The most important question for DP teachers then is how to design teaching practice to produce effective inquiry learning, given the quantity of important information in each subject area which needs addressing, the pressure of ongoing formative assessment and the culminating measure of a student’s academic performance being an examination-based summative assessment?**

One problem with this is that the teaching methods required to bring about the process of inquiry learning are not well defined in the IB literature.

These literature reviews, both ATL and ATT, are an attempt to find out what research shows are clear processes, practices and techniques needed by teachers to make inquiry learning work in their classrooms to achieve the aspirations of IB teachers and students as set out in the Learner Profile.

**Hattie – ‘Visible Learning’**

The most comprehensive analysis of factors affecting student learning ever undertaken was by John Hattie of Auckland University in New Zealand published as ‘Visible Learning’ (2009). This study was a synthesis of 800 meta-studies of 52,637 papers, including results from more than 200 million students worldwide, from early childhood through to adult education. What were identified by Hattie were 138 factors which influenced student learning which were then divided up into 6 domains depending on the source of influence: School, Student, Teacher, Teaching, Curricula and Home.

The 10 **Teaching** factors which showed the highest effect sizes in positively influencing student learning were, in order:

1. **Providing formative evaluation**

*“Feedback to teachers on what is happening in their classroom so that they can ascertain “How am I going/” in achieving the learning intentions they have set for their students, such that they can then decide “Where to next?” for the students” (pg. 181).*

1. **Comprehensive interventions for learning disabled students**

*“A combined direct instruction and (learning) strategy instruction model was an effective procedure for remediating learning disabilities” (pg. 217)*

1. **Reciprocal teaching**

*“Each student takes a turn at being the “teacher”, and often the teacher and students take turns leading a dialogue concerning sections of a text” (pg. 203).*

1. **Feedback**

*“Feedback is most powerful when it is from the student to the teacher......when teachers seek, or are at least open to, feedback from students as to what students know, what they understand, where they make errors, when they have misconceptions, when they are not engaged – then teaching and learning can be synchronized and powerful”(pg. 183).*

1. **Spaced vs mass practice**

*“It is the frequency of different opportunities (to learn) rather than merely spending “more” time on task that makes the difference to learning” (185).*

1. **Meta-cognitive strategies**

*“Higher order thinking which involves active control over the cognitive processes engaged in learning” (pg. 188).*

1. **Problem solving teaching**

*“...involves (students) in the act of defining or determining the cause of the problem; identifying, prioritizing and selecting alternatives, for a solution .... designing an intervention plan, and then evaluating the outcome (pg. 210)*

1. **Teaching strategies**

*“The teaching of (learning) strategies covers a wide ambit of methods and has among the higher effect size....”(pg. 200)*

1. **Cooperative vs individualistic learning**

*“Both cooperative and competitive learning are more effective than individualistic methods (pg. 212).*

1. **Study skills**

*“Study skills interventions are programs that work on improving student learning..........it is necessary to combine the study skills with the content to have an effect on the deeper levels of understanding”(pg. 189).*

Amalgamating all Hatties top 10 teaching factors into one learning experience is not easy but if teachers were to:

1. Develop metacognition in students
2. Teach skills and strategies for learning including problem solving skills – with special provision for learning disabled students
3. Have students learn in groups both cooperatively and competitively
4. Change teaching strategy frequently, and
5. Seek feedback from students regularly on how effective their learning is and what they do and do not yet understand

Then it would seem that most of his top points are covered.

These practical suggestions go some way towards achieving the requirements set out for teachers in the IB documents quoted but do not encompass fully what is meant by ‘Inquiry Learning’ within the IB context.

**Teaching Practices**

As far back as 1894 there is record of a distinction being made between inductive and deductive teaching methods or practices. William A Keener, in seeking to validate *case study analysis* as a teaching method in law education wrote:

”the teaching of law by the study of cases is but the application to the study of law, of a

method that has been almost universally accepted in other departments of education”

( Keener, 1894, pg. 709).

He was referring to what he called the ‘inductive’ method of teaching.

In contrast to *deductive* teaching methods which begin with principles, theory and facts and work towards applications, *inductive* teaching methods begin with real world examples, observations, case studies, situations or problems and process the information available to find patterns, ideas, concepts, formulae, theories, and facts.

“As the students attempt to analyse the data or scenario and solve the problem, they

generate a need for facts, rules, procedures and guiding principles, at which point they

are either presented with the needed information or helped to discover it for themselves”

(Prince & Felder, 2006, pg. 123).

What Prince and Felder are describing as inductive teaching methods seem to fit the IB interpretation of ‘Inquiry Learning’ very closely.

The common features that all ‘inductive teaching’ methods share are that they are:

- learner centred

- constructivist

- active

- embedded in real world context

- driven by questions

- developed through feedback

- often involving group-work – requiring collaboration and cooperation skills

- requiring responsibility from students

- methods which promote the development of the skills of effective learning

- methods which promote deep learning and higherorder thinking skills

(Prince & Felder, 2007)

As such these ‘inductive’ methods satisfy virtually all the criteria for teaching methods set out in all the IB documents surveyed to date including the most recent:

Teaching in IB programmes is:

* based on **inquiry**
* **f**ocused on **conceptual understanding**
* developed in local and global **contexts**
* focused on effective teamwork and **collaboration**
* **differentiated** to meet the needs of all learners
* informed by **assessment** (formative and summative)

(**Towards a Continuum of International Education**, 2013)

**Differentiation** is covered (from Hattie’s work) by making sure the teaching method promotes the development of the skills of effective learning for all learners especially any learning disabled students.

Being **informed by assessment in the formative sense** is covered through the mechanism of feedback being a prime driver for progress through any inductive learning experience.

**Conceptual understandings** will be determined to a certain extent by the focus of the syllabus but most teachers will have enough pedagogical flexibility to develop the content of any syllabus through concepts.

The only thing that is not covered is being **informed by summative assessment**.

Which is significant because it is absolutely true that all teaching *is* informed by summative assessment.

Simply put, if a grade on a summative assessment is the main measure of a student’s success then the teaching techniques and strategies chosen by teachers will be those that they think will give their students the greatest chance of achieving their best possible results in that summative examination. That’s what good teaching is. And if that summative exam requires a knowledge of facts and theories but not an understanding of their derivation or their practical application or example in today’s world then the teaching will reflect that reality. Conceptual, contextualised, collaborative, inquiry based teaching will only be favoured by teachers when DP summative assessments require conceptual, contextualised understandings, developed collaboratively and inductively, as answers to examination questions.

Within the IB, assessment review is always a part of the regular process of curriculum review. Several subjects (Business Management, Philosophy, Global Politics, TOK, Biology, Chemistry, Physics, Design Technology, Visual Arts, Theatre) have been recently reviewed and both the subject matter and the summative assessments have been made somewhat more conceptual. All subjects are in some phase of their review cycle (see below) and over time, in line with current ideas of conceptual, inquiry based learning, will all be changing their summative assessment requirements to suit.

# DP curriculum development and review cycles

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subject** | **New course materials** | **First teaching of new syllabus September/January** | **Last assessments of old course** | **First assessments of new course** |  |
| **Group 1—Studies in language and literature** | | | | | |
| *Language A1* | N/A | N/A | Nov 2012 | N/A |  |
| *Language A: literature* | 2011 | 2011/12 | Nov 2012 | May 2013 |  |
| *Language A: language and literature* | 2011 | 2011/12 | Nov 2012 | May 2013 |  |
| **Group 2—Language acquisition** | | | | | |
| *Languages A2* | N/A | N/A | Nov 2012 | N/A |  |
| *Language B* | 2011 | 2011/12 | Nov 2012 | May 2013 |  |
| *Language ab initio* | 2011 | 2011/12 | Nov 2012 | May 2013 |  |
| *Classical languages* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| **Group 3—Individuals and societies** | | | | | |
| *Business management* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Economics* | 2018 | 2018/19 | Nov 2019 | May 2020 |  |
| *Geography* | 2016 | 2016/17 | Nov 2017 | May 2018 |  |
| *History* | 2015 | 2015/16 | Nov 2016 | May 2017 |  |
| *ITGS* | 2018 | 2018/19 | Nov 2019 | May 2020 |  |
| *Philosophy* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Psychology* | 2017 | 2017/18 | Nov 2018 | May 2019 |  |
| *Social and cultural anthropology* | 2016 | 2016/17 | Nov 2017 | May 2018 |  |
| *World religions* | 2018 | 2018/19 | Nov 2019 | May 2020 |  |
| **Group 4—Sciences** | | | | | |
| *Biology* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Chemistry* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Design technology* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Physics* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Sports, health and exercise science* | 2012 | 2012/13 | Nov 2013 | May 2014 |  |
| *Computer science* | 2012 | 2012/13 | Nov 2013 | May 2014 |  |
| **Group 5—Mathematics** | | | | | |
| *Further mathematics SL* | N/A | N/A | May 2013 | N/A |  |
| *Further mathematics HL* | 2012 | 2012/13 | N/A | May 2014 |  |
| *Mathematical studies SL* | 2012 | 2012/13 | Nov 2013 | May 2014 |  |
| *Mathematics SL* | 2012 | 2012/13 | Nov 2013 | May 2014 |  |
| *Mathematics HL* | 2012 | 2012/13 | Nov 2013 | May 2014 |  |
| **Group 6—The arts** | | | | | |
| *Dance* | 2019 | 2019/20 | Nov 2020 | May 2021 |  |
| *Film* | 2017 | 2017/18 | Nov 2018 | May 2019 |  |
| *Music* | 2017 | 2017/18 | Nov 2018 | May 2019 |  |
| *Theatre* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| *Visual arts* | 2014 | 2014/15 | Nov 2015 | May 2016 |  |
| **Core** | | | | | |
| *Creativity, action, service* | 2015 | 2015/16 | Nov 2016 | May 2017 |  |
| *Extended essay* | 2016 | 2016/17 | Nov 2017 | May 2018 |  |
| *Theory of knowledge* | 2013 | 2013/14 | Nov 2014 | May 2015 |  |
| **Interdisciplinary subjects** | | | | | |
| *Environmental systems and societies* | 2015 | 2015/16 | Nov 2016 | May 2017 |  |
| *Literature and performance* | 2011 | 2011/12 | Nov 2012 | May 2013 |  |

**The Challenge**

The real challenge for this work is to be able to show teachers that it is possible to use inquiry methods of teaching and still achieve the objectives they desire for their students and the students’ summative grades that they are used to. Even within subjects that have not yet been redesigned from a conceptual point of view.

To achieve significant change in teaching methodologies teachers need to be convinced that guided inquiry learning and teaching which emphasises not only subject matter and ideas but also a student’s developing ATL skills, is at least as efficient and effective in the achievement of academic goals as traditional methods of teaching.

**Inductive, Inquiry-based Methods of Teaching**

There are many different teaching techniques that could be used as inductive methods including problem-based learning, experiential learning, case-based learning, discovery learning, as well as Socratic dialogue, SPIDERweb Discussions™, on-line learning and blended learning. It is in the processing of the information within the classroom that the distinction is made. Simply put, deductive methods move from the theory to the example and the teacher tends to provide most of the instruction and most of the information, inductive teaching methods on the other hand, move from the example to the theory and students are much more heavily involved in generating their own understandings.

Inductive methods as a whole seem to satisfy all the requirements set out in IB teaching guides and will help develop the student’s attributes as defined by the Learner Profile.

1. **Inquiry Learning**

Inquiry learning and teaching takes many forms, Structured Inquiry, Guided Inquiry and Open Inquiry (Staver and Bay, 1987), Teacher Inquiry and Learner Inquiry (Wideen, Mayer-Smith, & Moon, 1998), Process-Oriented-Guided-Inquiry-Learning, POGIL (Lee, 2004) to name but a few.

As a specific teaching technique rather than a field of endeavour this form of teaching has been mostly developed in Science education to help students learn the process of scientific inquiry through them being involved in an inquiry themselves.

“In inquiry-based learning students are presented with a challenge (such as a question

to be answered, an observation or data set to be interpreted, or a hypothesis to be tested)

and accomplish the desired learning in the process of responding to that challenge”

(Prince & Felder, 2007).

The key steps in this form of Inquiry Learning are:

1. Engaging with a scientific question
2. Participating in design of procedures
3. Giving priority to evidence
4. Formulating explanations
5. Connecting explanations to scientific knowledge
6. Communicating and justifying explanations

(Quigley, Marshall, Deaton, Cook & Padilla, 2011)

The conditions necessary for inquiry learning to be a success in the classroom are teachers motivated and enthusiastic enough to promote questions rather than supply answers and a shift in the responsibility for learning from teachers to students (Oliver-Hoyo, Allen & Anderson, 2004).

The use of inquiry learning has been found to augment meaningful learning (Linn & Hsi, 2000) and produce deeper understandings (Farrell, Moog & Spencer, 1999), produce significant improvements in academic achievement and analytic abilities (Shymansky, Hedges, & Woodworth,1990), promote critical thinking and competence in laboratory skills and improve problem solving ability (McReary, Golde & Koeske, 2006).

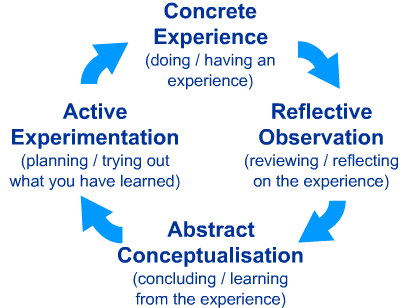
1. **Experiential Learning**

“Experiential education refers to learning activities that engage the learner directly

in the phenomena being studied” (Cantor, 1997)

Experiential learning is a type of inquiry learning often structured around site visits, field trips, work experience placements, practicum, exchange programmes and project and service learning but it can also occur within a normal classroom environment. All that is really required is for students to be enabled to learn from their own experience by following the following four steps in order.

Largely attributed to David Kolb (1984), the 4 phases of the experiential learning cycle are:



It is probably most common in experiential learning to start with the Concrete Experience phase but it is not necessary to do so. Effective, inductive, inquiry-based learning can happen for any students starting anywhere on the cycle as long as they take responsibility for finding the information they need and take an active role in planning out each stage themselves. If all four stages are made very clear by teachers then effective learning will occur each time the student’s progress once around the full cycle.

Experiential learning is most powerful when the experience is something new for the student, where there is challenge and action and where the reflection step is well set up and thoroughly applied.

Each stage of the cycle can be seen as an unique ‘style’ of learning (McCarthy,1997) and as such, moving around the whole cycle can be very beneficial for students to process information both in utilising their strengths and in developing their weaknesses (Duley & Permaul, 1984).

The research into the effectiveness of experiential learning programmes shows improved test performance (Premi and Shannon, 1993) both real and perceived learning improvement (Rocha, 2000; Beaumie, Williams, and Dattilo, 2002) increased confidence (Manoque, Brown, Nattress, & Fox, 1999), enjoyment (Dedeke, 1999), awareness of connections between subjects (Grauerholz and Copenhaver, 1994)and group cohesion (Glass & Benshoff, 2002).

The downside of experiential learning is usually the logistics and the time required to design and set up a useful experience for students as well as the difficulties of measuring the experiential outcomes.

John Dewey summed it up well when he said “The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative” (1938).

1. **Problem-based Learning**

In problem based learning (PBL), students analyse and propose solutions to a real-world problem which is usually presented to them in an unstructured and often open ended manner. The students usually operate in teams or collaborative groups and work through a problem solving process to:

- define the problem precisely

- find out what they know and what they need to know

- decide how to proceed to find out what they need

- gather all the information – this can be provided by the teacher or not

- analyse all the information gathered

- create possible solutions

- work through the feasibility of each one

- narrow the possibilities down to their best, justifiable solution which may then be presented to the rest of the class and a whole class analysis of the possible solutions can then be undertaken.

( Prince & Felder, 2007)

PBL originated in medical education where it is still extensively used today but it has also found application in many other fields.

The main advantages of PBL over conventional teaching have been found to be improvements in information processing skill proficiency (Prince, 2004), increases in retention of knowledge over time (Dochy, Segers, Van den Bossche & Gijbels, 2003), and the development of a variety of skills including problem solving, reasoning, teamwork and metacognition.

The main disadvantages of PBL are the time and effort it takes for a teacher to find or create a relevant problem situation, the solving of which will reveal or exemplify the key learnings the teacher is wanting the students to take away.

1. **Case-based Learning**

In case-based learning students study “historical or hypothetical cases involving scenarios likely to be encountered in professional practice” (Prince & Felder, 2007, pg. 16). To these cases they then apply the disciplines of their field in a problem solving manner in order to resolve the important issues revealed. In contrast to PBL case studies can contain much more organised, structured and discreet data for students to work on and cases are often more similar to a student’s normal classroom work than a real world problem can seem to be.

Case studies are also much easier for teachers to use to make particular learning points as they can be carefully chosen to illustrate specific and important issues.

Case studies are most often used in law or business studies but can also be used in the sciences, engineering, media studies etc.

The advantages of case studies is that they relate classroom work to real life situations but in a closely controlled manner where the learning outcomes can be mostly well anticipated. The disadvantages are the same as most inductive learning methods, they take a long time to find and prepare all the information necessary for the student to reach the conclusion the teacher hopes for.

The use of case studies has been found to help students see issues from multiple perspectives (Lundeberg, Levin & Harrington, 1999), to improve students reasoning and problem solving skills and to significantly improve student retention of information (Fasko, 2003). The use of case studies has even been credited with improvements in student attitudes and attendance (Lundeberg & Yadav, 2006).

1. **Discovery Learning**

Discovery learning is an inquiry based approach where students are given questions to answer, topics to research, situations to investigate or a set of observations to explain, they are also given objectives to achieve and sometimes time limits within which to achieve them. They may be provided with resources or access to a source of resources and they work in a largely self directed manner to achieve the goals.

This method can involve group work and/or individual work and can involve the teacher in directing students fully, partially or not at all depending on the teacher.

The obvious difficulties with this method are achieving the goals the teacher wants within the time limit available in normal classes and making sure that all students ‘discover’ the essential learning outcomes to the depth that is required. From the students point of view this method can also be problematic if some students have much higher proficiency in self-regulated learning or research skills than others which will affect their motivation for the learning and also make the results very variable.

The advantages of the method are in the motivation of the confident and skilful students and the development of the skills of research and self-regulated learning in the other students.

**Summary**

The key features of all the inductive, inquiry based methods illustrated above are:

1. learning is constructed by a process which moves from real world examples to concepts, ideas, theories and facts
2. students are responsible for finding much of the information themselves and processing it to draw the important conclusions
3. students need to have good skills in research, self-management, collaborative learning, communication and thinking as well as problem solving

The disadvantages of all the methods mentioned so far is the time and effort required to set them up, the difficulties in teachers being sure that all students get all the most important ‘learnings’ and the increase in classroom time to cover the same content when compared to direct teaching.

The advantages of these methods are that by learning by inquiry students are developing better skills of inquiry which are the key skills of the self-managed, self-directed, self-regulated, lifelong learner who fulfils all the aspirations of the Learner Profile.

**Developing the Self-Regulated Learner**

“One source of the differences between the highest- and lowest-achieving children is the

degree to which they become self-regulators of their own learning”

(Biemiller & Meichenbaum, 1992).

“SRL [Self-regulated Learning] is defined as a goal oriented process, proceeding from a forethought phase through self-monitoring and self-control to self-reflection. SRL can foster

deep and meaningful learning as well as significant gains in student achievement”

(Pintrich, 2000, 2004)

“Students who are more cognizant of themselves as learners and who can better regulate

their own intellectual activity are more successful in learning, problem solving, and transfer,

and function better in overall academic capacity” (Vrieling, Bastiaens & Stijnen, 2010)

Self-regulated learners have learnt how to:

* + set learning goals
  + plan out their study
  + ask good questions
  + self-interrogate as they learn
  + generate motivation and perseverance
  + try out different learning processes
  + self-monitor the effectiveness of their learning
  + work to deadlines
  + reflect on achievement and
  + make changes to their learning processes where necessary

(Zimmerman and Schunk, 1989, Wolters, 2011, De Bruin, Thiede & Camp, 2011)

Self-regulated learners have greater levels of self-efficacy (Kistner, Rakoczy, Otto, Dignath-van Ewijk, Büttner, & Klieme, 2010), perform better on academic tests and achieve higher academic performance than students without those same skills (Shunk & Zimmerman, 2007).

To develop self-regulated learners teachers can either teach the skills mentioned above through ATL within their subjects or can adopt teaching methods which require the practice and effective use of these skills, or both.

When any student has reached the level of self-regulation of their own learning they are then ready for all forms of higher education, for the demands of a changing workplace, and for the world of work and enterprise. They have gained all the capabilities they need to be a lifelong learner.

**Teaching for Self-Regulated Learning**

Creating an SRL environment within the classroom is challenging for teachers but fortunately there is a large body of literature showcasing effective instructional strategies for developing self-regulation of learning in both primary and secondary classrooms Some of the most effective strategies are:

* direct instruction and modelling
* guided and independent practice
* reflective practice including all forms of inquiry learning
* process oriented instruction

(Dignath & Buttner, 2008; Cleary & Zimmerman, 2004; Lee, 2004, De Corte, Mason, Deppepe & Verschaffel, 2011).

The two most significant influences on the successful implementation of SRL in the classroom however are:

* the level of SRL skills in the students and
* the level of comfort and skill the teacher has in allowing SRL to occur in the classroom.

In the early ‘90s *learning functions -*  “psychological functions that have to be fulfilled for high-quality learning to take place” (Schuell, 1993; Simons, 1993) were identified and were classified into three groups, processing, affective and regulation functions – all of which have direct parallels with the cognitive, affective and metacognitive learning skills described in the companion document ATL in the IB Diploma. These learning functions were then found to be either ‘teacher initiated’ or ‘learner initiated’. Teachers were found to initiate learning functions either by “substituting the learning function for the learner (eg. provide overview of the material to be studied), or by activating the students to use a particular learning function (eg. encourage comparison through the use of questions).” Learner initiation of these same learning functions was found to occur either when activated by a teacher (as in the second case above) or when no teacher direction, influence or help was available or forthcoming (Vermunt & Verloop, 1999).

With these findings in mind teacher regulation of student learning can be described in a continuum from *strong* through *shared* to *loose* regulation as described below:

**Regulatory styles of Teachers**

* **Strong teacher regulation**

- teacher controls all information, regulates student processing , answers all questions, clarifies, explains, summarizes

- student thinking at a minimum, teacher as maximum support

* **Shared regulation**

- teacher provides access to resources, skills training, questions, problem statements, concepts, ideas, learning outcomes

- students actively engage with information in order to answer questions, follow leads, solve problems

- students thinking engaged, teacher as guide and support

* **Loose teacher regulation**

- teacher’s only functions are supplying the learning objectives and assessing the students level of achievement against them

- student thinking at a maximum, teacher not involved in student thinking or learning at all

The style of teacher regulation when matched with the level of student self-regulation skills in a matrix identifies areas of congruence and areas of friction between teachers and learners.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Level of Student**  **Self-Regulation Skills** | **Style of Teacher-Regulation of Learning** | | | |
|  | Strong | Shared | Loose |
| High | Destructive friction | Constructive friction | Congruence |
| Intermediate | Destructive friction | Congruence | Constructive friction |
| Low | Congruence | Constructive friction | Destructive friction |

(Vermunt & Verloop, 1999)

**Destructive friction** occurs when teaching and learning regulation are mismatched to the point where the teaching strategy has a negative effect on the learning process, outcome or skill development of the student. This happens in two situations

1. when the student has the skills needed to regulate their learning to a much higher level than they are being enabled to by the teacher, and
2. when the student’s self regulation skill level is much below what is expected by the teacher.

**Constructive friction** occurs when the mismatch between teacher and student regulation has a positive effect on the learning process, outcome or skill development of the student. This happens in two situations:

1. when the teaching process focuses on helping the student develop their skills of self regulation, and
2. when the skills themselves enable a student, in the right environment, to self-develop those skills to a higher level

**Congruence i**s the third possible interaction state within this model and it occurs when the degrees of regulation of teacher and student are perfectly matched.

Of the three degrees of teacher regulation described above only within the situation of *strong* regulation is there no possible growth of the skills of self regulation within the learner. With both *shared* and *loose* teacher regulation there is opportunity for developing students’ skills of self regulation but only with *shared* regulation does that growth happen with the guidance and support of the teacher. In the *loose* regulation situation growth in students’ self-regulation skills can occur but only through the instigation and application of the student alone.

Adopting a *shared* regulation style in the classroom appears, within this model, to be an excellent means to achieve a growth in self-regulated learning skills within students, with the provisos that:

1. the self-regulation skill levels of the students are being constantly monitored, particularly to identify when any individual reaches a high level proficiency, and
2. independent study materials and resources are available for any such student to use once they reach demonstrable high level proficiency in self-regulation in order to progress their learning and avoid any possible destructive friction.

If the focus of teaching is on the development of the skills of self-regulated learning and the pedagogy employed is one of *shared* regulation of learning then the student will be enabled by their school learning experience to gain the skills needed to be a lifelong learner.

This can be achieved by the implementation of what has been called Process Oriented Instruction.

**Process Oriented Instruction (POI)**

“The aim [of process oriented instruction] is to teach domain-specific knowledge and

the learning and thinking strategies that students need to construct, change and utilize

their knowledge of the subject domain, in coherence” (Vermunt, 1995).

“When learning is conceived more as self-regulated knowledge construction than as

taking in already existing external knowledge, the role of teaching changes too, from

transmission of knowledge to supporting and guiding self-regulated knowledge

construction” (Lonka, 1997).

“Process-oriented teaching is teaching that facilitates independent learning, supporting

students to become proficient learners in the field concerned and preparing them for

lifelong learning” (Bolhuis & Voeten, 2001).

Three general information processing styles have been identified in the classroom:

1. *Traditional* *teaching* - where the emphasis is on the transmission of information, the teacher spends most of the time explaining the subject matter and the main activities expected from the student are listening and writing notes. The teacher does not engage much with students except to answer questions, assign tasks or give instruction concerning the learning process
2. *Activating* *teaching* - teaching that actively involves students in processing information where the teacher is asking questions, paying attention to student responses, giving feedback, stimulating peer interaction, giving learning task instruction, generating collaborative and cooperative activities
3. *Process-oriented instruction* – similar to *Activating* but with the focus of the teaching being placed on the strategies and techniques the students are using to process the subject information. The teacher ‘teaches’ learning skills by modeling, demonstration, creating skill-based tasks, monitoring performance, asking for feedback and helping build the student’s metacognitive awareness (Bolhuis, 2003).

The main problems with the *Traditional* teaching style are that there is little or no focus on how the student is processing the information, little deliberate development of learning, social or emotional skills and no practice of self-management happening in the classroom. This style does not specifically help students to improve their learning ability or to become independent self-reliant learners. They may still be able to do so, on their own, but they are not supported to do so within the classroom environment.

The *Activating* style achieves greater engagement of students, which helps to improve student motivation, levels of understanding and retention of information and may raise the degree of self-regulation of the students if learning exercises are designed to do so but if there is little focus placed on the strategies, techniques and skills of learning there will be little development of the attributes of independent or lifelong learning.

By using a *Process-oriented* approach in the classroom teachers can be engaged directly with the development of the student’s learning and self-regulation skills and be able to guide and help the students to improve both. POI is the approach that is needed to develop the metacognitive awareness necessary for the successful self-regulated learner but it is not a common approach.

In a 2001 study across 130 lessons delivered in six Dutch secondary schools (by observation in the subjects of foreign languages , Dutch, mathematics , science, social studies and arts), the time spent by teachers using each of these teaching styles was found to be:

* 30% transmission – teacher explains students listen, questions by teacher of students
* 40% activating – teacher getting students to process information through directed tasks, using student feedback to guide lesson
* 25% procedural and behavioural instruction
* 5% process focused teaching – teaching students to set learning goals, choose and execute learning strategies, diagnose and monitor the learning process (Bolhuis & Voeten, 2001).

For teachers, learning to move from a traditional subject focused style of teaching to a skills based, process oriented, style aimed at promoting self-regulation of learning by students will be great challenge but one which will yield excellent results in terms of student engagement and learning skill development.

Attempts to implement process-oriented teaching in schools, particularly in the Netherlands since 1999, have helped clarify six key principles underlying successful approaches. They can be read in any order, each is important and linked to the others. Teachers are advised to:

1. Focus on developing metacognitive awareness
2. Teach the cognitive skills important for knowledge development in your field using your content as subject matter
3. Treat learning as a social phenomena, with students observing, questioning, relating, engaging with others collaboratively and cooperatively to achieve results
4. Pay attention to the emotional aspects of learning, teach affective skills, fostering resilience, perseverance, effort, intrinsic motivation, positive attribution patterns
5. Develop reflection on both process (ATL Skills) and content (subject matter)
6. Move gradually from teacher regulation to student regulation of learning – help students to gradually acquire the competencies to regulate all aspects of learning:

- setting learning goals

- choosing and executing learning strategies

- diagnosing and monitoring the learning process

- self assessing

- evaluating learning results

(Bolhuis, 2003, Bolhuis & Voeten, 2001, Hattie et al., 1996, Hattie, 2009).

**Changing Roles**

The implementation of process oriented, skills based teaching will be a challenge for both teachers and students. The teacher’s role will become more facilitative and the student’s role more inquiring. Many students, especially those comfortable with or habituated by transmission teaching will find it difficult to adjust to a classroom scenario where they are expected to do the learning for themselves rather than be told what to learn. We can anticipate some student confusion and maybe even rebellion but if, as has been suggested, the change to self regulated learning is gradual every student should adjust successfully.

Teachers can expect to take on a number of different roles:

1. Teacher as diagnostician – in process-oriented instruction teachers have to develop skills in diagnosing students’ learning and thinking strategies to be able to match teaching and learning to avoid any destructive frictions
2. Teacher as challenger – teachers need to constantly challenge students to try out new thinking and learning strategies, to transfer learning strategies into different contexts, and to continually raise the level of difficulty of learning exercises to maintain growth in learning skill proficiency
3. Teacher as model learner – teachers need to demonstrate the learning and thinking strategies, techniques and skills for the acquisition and construction of knowledge within their subject domain so that students can get a clear picture of what is required
4. Teacher as activator – once students have a clear understanding of the method and use of particular learning strategies, the teacher can then activate that understanding by getting students to apply the strategies to their particular subject matter
5. Teacher as monitor – once students start to gained proficiency in self-regulation, the teachers role changes to one of monitoring the effectiveness of the strategies they are employing and helping maintaining the links to established learning objectives and assessment criteria
6. Teacher as process assessor – proficiency in learning skills needs to be regularly self-assessed by students or independently through psychometric testing or the use of self reflective journals and portfolios or tested in-situ by raising the level of difficulty of information to be processed and monitoring the strategy use

(Vermunt & Verloop, 1999)

If the aim of the IB Diploma is to develop all aspects of the Learner Profile within students by the time they leave school and if the mode of instruction is to be Inquiry Learning with an emphasis on developing effective ATL skills then the teaching methods in this review will be amongst those that can be chosen to bring about those objectives.

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