

Teacher Professional ICT Attributes

A Framework

Outcomes, Guidelines, Instruments and Processes

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BRIEF: To provide a study to the Western Australian Department of Education on the:

1. characteristics of effective learning and quality pedagogy as they relate to ICT integration; and
2. stages of progress by teachers as they move towards quality pedagogy as it relates to ICT integration.

Companion Document

This framework is based on a review of the literature on the progression of teachers in their integration of ICT in learning and teaching processes.

Quality Teaching And Learning Practice With Information and Communications Technologies (ICT): a review of the literature.

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CONTENTS

PURPOSE AND GUIDELINES.....	4
KEY FEATURES AND ISSUES TO BE ADDRESSED	4
TEACHER PROFESSIONAL ICT ATTRIBUTES FRAMEWORK.....	5
CONTEXT OF THE FRAMEWORK	5
OVERVIEW: STRUCTURE OF THE FRAMEWORK.....	7
DETAILS OF THE FRAMEWORK.....	8
SUPPORTING CONSTRUCTIVIST LEARNING ENVIRONMENTS	14
INSTRUMENTS TO USE WITHIN THE FRAMEWORK	15
LAYER ONE INSTRUMENT: TYPE OF RESPONSE.....	16
LAYER TWO INSTRUMENT: TYPOLOGY OF ICT UPTAKE.....	17
LAYER THREE INSTRUMENT: STAGES OF DIALOGUE.....	19
FRAMEWORK PROCESSES	22
SCHOOL PLANNING FOR ICT TO SUPPORT LEARNING AND TEACHING	22
DEVELOPMENT OF STUDENT ICT LITERACY	23
USE OF LEARNING AND INFORMATION MANAGEMENT SYSTEMS	23
DEVELOPMENT OF SCHOOL ICT POLICY AND PLANNING	23
DEVELOPMENT OF STAFF ICT CAPABILITIES	23
SYSTEM SUPPORT AND DIRECTION	23
TEACHERS DECISION-MAKING ABOUT THE USE OF ICT	24
A TOOL TO SUPPORT TEACHER DECISION-MAKING.....	25
GETTING STARTED	26
GLOSSARY OF TERMS & ACRONYMS.....	27

Purpose and Guidelines

This document presents a framework of ICT integration to support student learning in schools. It includes an outcome for teachers, guidelines, instruments and processes involved in this integration. The aims and purposes of the framework are:

- (1) To describe quality pedagogy in the use of ICT to effectively support student learning in schools.
- (2) To assist teachers in planning to integrate ICT into learning environments.
- (3) To describe progress by teachers as they move towards quality pedagogy as it relates to ICT integration.
- (4) To assist teachers in the development of their own practice in the use of ICT to support student learning.
- (5) To provide a tool for teacher dialogue for ICT integration with good pedagogy. This provides topics or questions that describes concerns teachers may have.

Key Features and Issues to be Addressed

Any framework must include key features that address a number of issues. The framework needs to:

- focus on student learning and what the teacher inputs into creation of the learning environment not what technology they use and how often they use it.
- incorporate the reasons for using ICT: computer literacy, support of pedagogy, increased productivity.
- consider the context for implementation of ICT support: phase of schooling (underlying principles), area of the curriculum, etc.
- distinguish between individual, school, and system factors to focus on the individual teacher. i.e. an individual teacher may not have much control of the quantity of access to ICT students have.
- be inclusive of a range of relevant, well supported world views.
- acknowledge the complexity of teaching.

NOTES

- (1) The aim of the framework is to support, describe and promote good practice in the use of ICT in learning and teaching in schools, not to describe good teaching. It is believed that good teachers always aim to look for better ways of doing things and therefore their use of ICT should support this. In itself using ICT does not make a teacher better.
- (2) Research has shown that teacher-class combinations should be judged in terms of use of ICT not teachers in isolation. This means that for most secondary teachers a number of assessments would be required as they are likely to be involved with classes that vary considerably.

This framework must be positioned within a broader framework for the implementation of ICT in schools to connect it with students, learning environments, school and system organizations.

Teacher Professional ICT Attributes Framework

The framework focuses on teachers but sits within a context of schools and school systems. In terms of the use of ICT this context could be described in terms of a range of dimensions that would include a *Teacher Professional ICT Attributes* dimension. It is this dimension that is addressed by this framework.

Context of the Framework

A review of the literature has led to the suggestion of five dimensions: Students, Learning Environment Attributes, *Teacher Professional ICT Attributes*, School ICT Capacity, and School Environment. These are listed below with possible components of each dimension given in brackets.

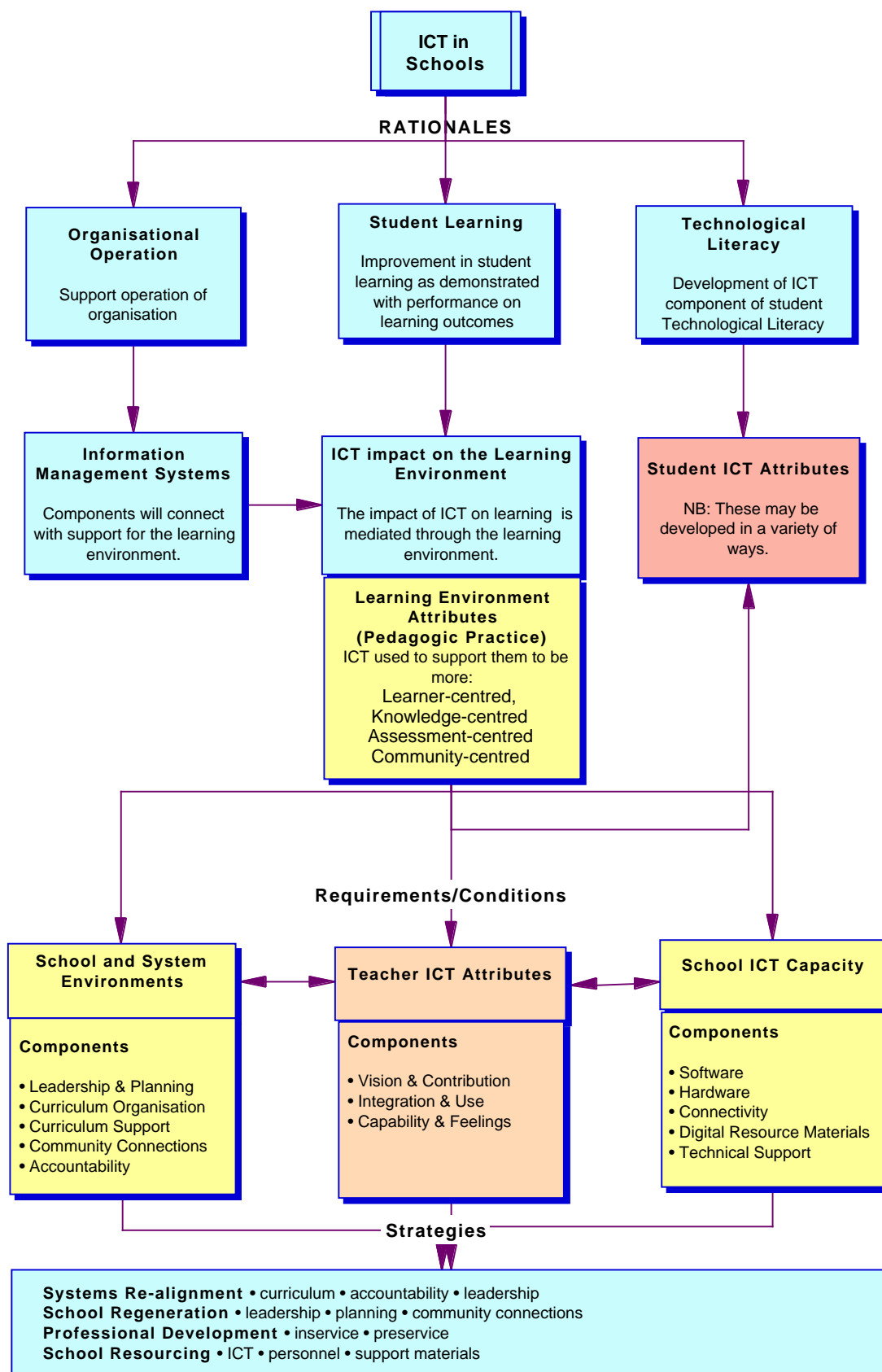
1. **Students** [ICT Capability, Engagement, Achievement of Learning Outcomes]
2. **Learning Environment Attributes (Pedagogic Practice)** [Learner-centred, Knowledge-centred, Assessment-centred, Community-centred]
3. **Teacher Professional ICT Attributes** [Vision & Contribution, Integration & Use, Capabilities & Feelings]
4. **School ICT Capacity** [Hardware, Connectivity, Software, Technical Support, Digital Educational Resources]
5. **School Environment** [Leadership & Planning, Curriculum Organisation, Curriculum Support, Community Connections, Accountability]

NOTES

- (i) The Engagement and Achievement of learning outcomes components of the Students dimension would be subsumed within the Learning Environment dimension.
- (ii) The Students and Learning Environment Attributes dimensions inform (feed into) the Teacher Professional ICT Attributes.
- (iii) The Teacher Professional ICT Attributes dimension informs (feeds into) the School ICT Capacity and School Environment dimensions.

This document aims to develop the *Teacher Professional ICT Attributes* dimension of the overall framework. However, frameworks would need to be developed for the other dimensions.

A schematic representation of the relationship between these dimensions and their relationships to the rationale for the use of ICT in schools is provided in the following diagram.



Overview: Structure of the Framework

This *Teacher Professional ICT Attributes* dimension may be described by one outcome that may be taken from a set of teacher professional attributes outcomes. The framework is structured around this single *Teacher Professional ICT Attributes* outcome using the following set of concepts:

- Layers to describe the outcome in increasing detail
- Stages of progression in the demonstration of this outcome
- Instruments to collect data on the demonstration of, and progression within, this outcome.
- Processes within which to apply the instruments and address the connection between the framework and context.

Outcome	The teacher exploits the characteristics of ICT to support the learning of students by, effectively integrating the use of ICT, wherever appropriate, into constructivist learning environments, and contributing to relevant learning communities.
Layers	This outcome is described in four layers. <ol style="list-style-type: none">1 Overall outcome.2 Components – Vision & Contribution, Integration & Use, Capabilities & Feelings.3 Elements – each component has a number of elements.4 Pointers - each element has a number of pointers.
Stages	Progression in the outcome is described in five stages: Inaction, Investigation, Application, Integration, and Transformation.
Instruments	There is a tool for each layer and connected with the levels of demonstration. Each tool may have a number of forms depending on the purpose of its use. <ol style="list-style-type: none">1 Type of Response {based on a validated instrument}2 Typology of ICT Uptake {based on a validated instrument}3 Stages of Dialogue {needs to be validated}
Processes	There are sets of processes associated with the use of the instruments and addressing the context of the framework. The sets most directly connected to the <i>Teacher Professional ICT Attributes</i> dimension are the “School Planning for ICT to support learning and teaching” and the “Supporting Teacher’s Decision-Making” sequences.

This framework is not trivial, but it is no more complex than the Curriculum Framework, with the layers allowing various levels of investment in the processes. It is multi-faceted and flexible enough to be used by individuals, groups, schools or educational organizations.

Details of the Framework

Firstly, the structure of the framework will be outlined in terms of the layers and stages, then the stages of progression will be elaborated for three layers, followed by links to instruments, guidelines and processes.

Outcome Described in Four Layers

	Description and Components
LAYER ONE – Overall Outcome	The teacher exploits the characteristics of ICT to support the learning of students by, effectively integrating the use of ICT wherever appropriate into constructivist learning environments, and contributing to relevant learning communities. Note: It is envisaged that this would be one outcome taken from a set of outcomes for General Teacher Attributes.
LAYER TWO – Components of Outcome	Vision & Contribution [V & C] Integration & Use [I & U] Capabilities & Feelings [C & F]
LAYER THREE – Elements of Components	Each element describes more specifically aspects of a component of the outcome as it may relate to the teacher and his/her skills, work practices and beliefs. [V & C] – Purpose, Focus, Rationale, View of ICT, Contribution to Communities [I & U] – Frequency of Use, Implementation Strategies, Type of Activities & Pedagogy, Tasks for Applications, Assessing, Relevance, Connection with CF Outcomes. [C & F] – Potential, Roles, Source of Direction, ICT Skills, Affective Response, Concerns.
LAYER FOUR – Pointers for Outcome	THESE HAVE NOT BEEN DEVELOPED They would be related to the context for the teacher.

Progression Described in Five Stages

These stages of progression are described in more detail for each layer later in the document.

	Description of Key Difference(s)
Inaction	At this stage there is a general lack of action and/or interest.
Investigation	At this stage the teacher has developed an interest in using ICT with students and is beginning to act on this interest.
Application	At this stage the teacher is regularly using ICT with students and knows how to do so competently and confidently.
Critical Use Border	
Integration	At this stage the use of ICT becomes critical to the support of the learning environment and the opportunity for students to achieve learning outcomes through the learning experiences provided.
Transformation	At this stage the teacher is able to take on leadership roles (formal or informal) in the use of ICT and be knowledgably reflective on its integration by themselves and others.

LAYER ONE: Stages of Progression of Demonstration of the Overall Outcome

Five stages of progression of demonstration of the outcome are proposed. The *Inaction* stage is only elaborated in this layer and not the other layers.

Inaction	Not active in the integration of ICT into the classroom. Makes no allowance for the use of ICT in the classroom. Does not deliberately consider the use of computers for any learning activities. May consider that the use of ICT is not relevant to their teaching or not necessary to enhance student learning. May allow some students to use computers if they choose to do so, particularly at home or at the library, but may feel unwilling or uninterested in changing what seems successful. May actually use ICT for personal and professional support tasks or may feel threatened or inadequate in the use of ICT. Not interested in being involved with relevant learning communities, or may regard them as divisive, undermining or simply unjustified.
Investigation	Seeks out ideas for the use of ICT and begins to try some learning activities based on the capabilities of computers. Usually implements an activity and strategy as directed by another teacher. Directs the activity requiring all students to do the same thing. Has concerns about own adequacy and experience in using ICT and therefore must be dependent on other teachers and support personnel. May be defensive or sceptical, and seeks explicit, unequivocal support. May wish to request hardware or software items but have little input into relevant learning communities.
Application	Routinely applies ICT to activities within the classroom usually as an enhancement without being critical to the operation of the learning environment. Routinely applies ICT to activities within the classroom but at times may do so inappropriately. The use of ICT is usually an enhancement to the activities but is rarely critical to the implementation of the learning activity. Has some concerns about own adequacy and experience in using ICT but is addressing these concerns. May feel less dependent and even criticise previous support systems as they overtake them. Likely to request hardware or software items and want some input into school ICT planning and may want to become involved with relevant learning communities.
Critical Use Border	
Integration	The characteristics of ICT are exploited wherever possible to critically support outcomes-based learning with students in constructivist learning environments. The use of ICT is clearly connected with Curriculum Framework outcomes. Computer applications are used whenever they can achieve the teaching-learning objectives of the teachers and students more effectively than by other means. Many learning experiences would either not be possible or be inadequately provided without the use of computers. Teacher has few concerns about own adequacy and experience in using ICT and constantly addresses any concerns. Capable of operating independently but will seek advice and help when required. Major contributor to school ICT planning and the use of ICT within relevant learning communities.
Transformation	Continually considers changes to own practice and programmes to incorporate more of the potential of the use of the computers and takes a leadership role in collaborating with others in the use of the computers in the classroom. Has no serious concerns about own adequacy and experience in using ICT. Capable of operating independently and interdependently in collaborating with others. Takes an active leadership role in the evolution of the application of computers to the processes of learning and teaching within the school. May take a leadership role in the use of ICT within relevant learning communities.

LAYER TWO: Elaboration of the Stages of Progression for Components of the Outcome

Vision & Contribution	Investigation	Application	Integration	Transformation
<p>Regards ICT as an object and rather incomprehensible. Accepts that it has some uses but has reservations. Considers student ICT literacy needs. Little contribution to school ICT planning. Largely unaware of how or whether their teaching will change.</p>	<p>Treats ICT as an instrument. Agrees they have a place in teaching and learning. Considers student productivity and engagement in use of ICT. Some contribution to school planning mainly to request items. Has undifferentiated and even confused but changing views on their changing teaching role.</p>	<p>Uses ICT as a tool to address multiple learning outcomes. Considers opportunities for students to use ICT to demonstrate learning outcomes. Consistently contributes to school communities and planning both in terms of engagement and policy. Expects their learning approaches to develop as ICT integration grows.</p>	<p>Envisages and uses ICT as catalyst to appropriately support all learners in a collaborative way. Considers the two-way relationship between learning and ICT use. Is a leading contributor to school communities and planning in the use of ICT. Envisages and can discuss multiple learning roles all of which are changed by ICT integration.</p>	
<p>Integration & Use</p> <p>Addresses survival issues with ICT. Concerns are rightly with own mastery and learning as they attempt to divide and conquer ICT uptake. Attempts easily replicated activities with simple learning outcomes Interested in how other teachers use ICT but unlikely to adapt ideas without significant support.</p>	<p>Engages in relatively limited and local thinking about ICT, so that ambitious proposals sometimes undermined by technical issues. Is teaching rather than learning oriented, perhaps with traditional methods being applied to ICT. Routinely applies ICT to some activities with students. Develops or adapts activities with realistic outcomes if supported enough.</p>	<p>Has directed, focussed ICT thinking about integration into learning outcome activities. Is both teaching and learning oriented and can function independently when necessary. Their use of ICT is critical and targeted at achieving teaching-learning objectives more effectively than by other means. Able to identify outcomes which are not being well met and address them, both in their own work and peers.</p>	<p>Has progressed to where their ICT thinking, usage and integration has become second nature. Is learning oriented, with obvious signs in their class environment of being student-focused, assessment focussed and community focussed as well. Is a provider of support, ideas and leadership with ICT integration and uptake within their learning community</p>	
<p>Capabilities & Feelings</p>	<p>Feels lack of control over self and situation. Perceives novelty of ICT, may even regard it as a threat. Needs substantial support to progress. Regards own teaching style as basically satisfactory, but is willing to extend their repertoire.</p>	<p>Frustrated by control issues but improving. Desires autonomy, independence. May resent or even refuse support as they perceive it to be insufficient or inconsequential. Disappointed or surprised with focus on teaching & learning issues rather than issue about ICT.</p>	<p>Begins to feel in control, comfortable with ICT. Independent of old support needs and even able to provide substantial support to others in some areas. More accepting of differences between team members. Becoming determined to support others as they attempt to follow a similar path.</p>	<p>Feels in control of situation using ICT. Is willing to give, share and develop ICT ideas and practices with others. Is able to provide support for others at variety of levels and circumstances, including utilizing students' contributions.</p>

LAYER THREE: Stages of Demonstration of Elements of the Outcome

The Teacher Professional ICT Attributes outcome is further elaborated for the stages of demonstration using a number of elements for each of the three main components of the outcome: Vision & Contribution, Integration & Use, Capabilities & Feelings.

VISION & CONTRIBUTION

	Investigation	Application	Integration	Transformation
Purpose	Uses ICT for limited purposes in terms of learning and teaching.	Uses ICT to increase student productivity and engagement.	Uses ICT to provide opportunities for demonstration of learning outcomes.	Uses ICT to transform the learning opportunities for all students.
Focus	Focus is on using the computer.	Focus is on the tool and the students' use of the tool.	Focus is on learning outcomes that is driving the use of ICT. ICT becomes invisibly woven into learning and teaching.	Focus is on learning, the individual needs of students and the roles of students and teachers.
Rationale	Aim is for students use computers to develop ICT skills.	Aim is for students to use computers to develop skills and improve the quality of their output.	Aim is for students to use computers extensively to support their learning, and construct their own knowledge.	Aim is for students to use computers extensively to support their learning styles and pace, and construct their own knowledge.
View of ICT	ICT viewed as an object to be learned about.	ICT viewed as an instrument or tool to complete specific tasks.	ICT viewed as one set of technologies that may support learning processes.	ICT viewed as a catalyst for rethinking the educational goals of the classroom
Contribution to Communities	Little contribution to school planning for ICT or to ICT learning communities.	Some contribution to school ICT planning. Attempts to connect on an individual level with relevant communities.	Consistent contribution to school planning for ICT and involved with communities.	Leading contribution to school planning for ICT and relevant learning communities.

INTEGRATION & USE

	Investigation	Application	Integration	Transformation
Frequency of use	Used rarely (once a week at most, mainly in laboratory) and mainly for individual student use.	Regular use for some kind of activity (at least once a week) with some group work support.	Routine use, infused and natural, at teachable moments for both individual and group work. Often classroom based.	Routine use, infused and natural, at teachable moments for independent, interdependent, individual and group work.
Implementation strategies	Tends to employ only one ICT implementation strategy, typically teacher directed and in a laboratory.	Employs 2 or 3 ICT implementation strategies effectively either in laboratory or classroom.	Employs a range of ICT implementation strategies effectively in laboratory and classroom. Selects appropriate strategies.	Employs an appropriate ICT implementation strategy effectively with each use of computers. Assists others in the implementation of appropriate ICT strategies.
Type of activities and pedagogy	Activities are inconsequential, not specifically connected to learning outcomes, and tend to focus on skills and product appearance.	Range of activities using a limited set of teaching strategies with which the teacher is familiar. The software used tends to determine the activities or the teacher follows an example provided by another teacher.	Range of activities connected with a range of appropriate teaching strategies and learning skills aligned with CF pedagogic practices. Activities are determined by the needs of students to demonstrate learning outcomes.	Activities will often be interdisciplinary and collaborative with other professionals using strategies aligned with CF pedagogic practices. Activities designed to develop learning outcomes through a range of learning skills often project-based.
Tasks for applications	Students will be given some 'one-off' tasks to complete on the computer.	Students will be given a range of tasks to complete on the computer.	Students complete tasks using ICT which are practical, motivating accommodate differences, and where the ICT is critical to success.	Students complete tasks that will both build on the current experience and challenge all students.
Assessing student learning outcomes	Does not incorporate student use of ICT within assessment framework but may assess 'one-off' tasks.	Assesses some tasks completed using ICT and links these with learning outcomes.	Incorporates student use of ICT within authentic and ongoing assessment framework.	Facilitates the use of ICT to support authentic assessment and contribute to ongoing assessment within a framework.
Relevance of ICT to content	Use of ICT does not tend to match or model real world applications.	Attempts to facilitate the use of some ICT real world applications.	Facilitates appropriate use of ICT to match or model real world application.	Facilitates appropriate use of ICT to enable students to observe and practise the actual processes, products, skills and values expected.
Connection with CF outcomes	Is aware that the CF outcomes encourage the use of ICT.	Main concern is with students selecting and using ICT. May connect this with achievement in some CF outcomes.	Considers and is able to explain how their facilitation of ICT use contributes to achievement of relevant CF outcomes.	Always considers the relationship of student use of ICT to achievement of CF outcomes when facilitating the use of ICT and supporting other teachers.

CAPABILITIES & FEELINGS

	Investigation	Application	Integration	Transformation
Understanding of potential uses	Is aware of some of the potential of ICT.	Developing an understanding for the range of potential.	Sound knowledge of the potential of ICT to contribute to learning and teaching.	Understands potential of ICT in terms of its two-way relationship with learning and teaching.
Roles of teacher and students * student independence to the extent developmentally possible	Teacher is dependent on other teachers or support personnel and feels it necessary to be the focus of control. Students are expected to rely on the teacher or support personnel.	Teacher is increasingly self-reliant but calls on "able others" when required. Students are expected to become increasingly self-reliant* but still to mainly rely on the teacher.	Teacher is able to facilitate the use of ICT independently but calls on "able others" when required. Students are encouraged to become independent* in using ICT.	Teacher is inter-dependent and encourages, and expects to collaborate with students, and cooperate with "able others" (students and staff)*.
Source of direction	Teacher is directed in use of ICT by an example provided by another teacher.	Teacher directs use of ICT and permits students to contribute.	Teacher encourages student negotiation for use of ICT with teacher providing scaffolding.	Teacher promotes and expects student negotiation for use of ICT with teacher providing scaffolding.
ICT skills	Basic skills: At best teacher possesses only basic operation, basic word processing, email, and web-searching skills.	Range of skills: Teacher possesses skills in general operation, word processing and other generic tools, email, and web-searching.	Advanced skills: Teacher possesses transferable skills that permit use of any software with access to help and tutorial functions.	Teacher possesses a comprehensive set of ICT skills and contributes to the development of advanced skills for others.
Affective response	Feels lack of control over self and situation. Perceives novelty of ICT, or threat.	Begins to feel in control, comfortable with ICT. May be negative about what other teachers do and of the support system, leading to conflict.	Feels confident and in control of situation using ICT. Accepting of differences in use of ICT with others.	Willing to give, share and develop ICT ideas and practices with others.
Concerns	Concerns are with own ICT mastery and learning.	Concerns are with student mastery and the management of ICT.	Concerns are with the outcomes for students of the use of ICT.	Concerns are with the outcomes for students and school community in the use of ICT.

Supporting Constructivist Learning Environments

The use of ICT must support constructivist learning environments by supporting the processes of learning, teaching, and assessment. Constructivist learning environments are learner-centred, knowledge-centred, assessment-centred and community-centred. In Western Australia the processes of learning, teaching, and assessment that are designed to support such learning environments are encapsulated in the principles outlined in the Curriculum Framework. Therefore, the use of ICT must be linked to these principles as outlined in the Table below. These probably best align with **LAYER THREE** of the **Integration & Use** component but these principles underpin all teacher activity.

Curriculum Framework: Links with the principles of learning, teaching and assessment as outlined in the W.A. Curriculum Framework.

Principle from Curriculum Framework	Elaboration of Principle	Elements of "Integration & Use"
Opportunity to learn	ICT is used to enable students to observe and practise the actual processes, products, skills and values which are expected of them.	Relevance of ICT Contexts
Connection and challenge	ICT is used to connect with students' existing knowledge, skills and values while extending and challenging their current ways of thinking and acting.	Type of Activity
Action and reflection	ICT is used to provide more meaningful learning experiences and encourage both action and reflection on the part of the learner.	Type of Activity
Motivation and purpose	ICT is used to motivate and to make the purpose of learning experiences clear to the student.	Tasks for Applications
Inclusivity and difference	ICT is used to respect and accommodate differences between learners.	Tasks for Applications
Independence and collaboration	ICT is used to encourage students to learn both independently and from and with others.	Frequency of Use
Supportive environment	ICT is used to support the provision of school and classroom settings that are safe and conducive to effective learning.	Type of Activity
Assessment is valid, educative, explicit, fair and comprehensive.	ICT is used to provide valid information on the actual ideas, processes, products and values expected of students, make a positive contribution to student learning, and be based on multiple kinds and sources of evidence.	Assessing Learning Outcomes

Instruments to Use within the Framework

This framework is multi-faceted and flexible enough to be used by individuals, groups, schools or educational organizations. The layers allowing various levels of investment in the processes for you as the teacher using ICT in teaching and learning.

Although complex in nature, the framework will allow individuals, groups, schools or educational organizations to describe progress in *Teacher Professional ICT Attributes* to describe what quality pedagogy is in the use of ICT to effectively support student learning in schools; to assist teachers in planning to integrate ICT into learning environments; to describe progress by teachers as they move towards quality pedagogy as it relates to ICT integration; to assist teachers in the development of their own practice in the use of ICT to support student learning; and to provide a tool for teacher dialogue for ICT integration with good pedagogy.

The instruments outlined in this section are designed to be used within different layers of the framework for the “Teacher Professional ICT Attributes”. The instruments may be created in a variety of forms to match the purpose for which the data is being collected. The example instruments represent a number of such forms. These instruments would be best provided as either electronic templates or online interactive forms. They are designed to support teachers but may be used to inform school policy and planning. The framework and instruments need to be used within the context of sets of processes conducted by schools and/or systems. There are six sets of processes suggested for a school may take to support progress in the use of ICT that are provided as a guide once the instruments have been completed by teachers.

These instruments provide topics or questions that describes concerns you may have as teachers and where future investments in a school may be placed to support and promote good practice in the use of ICT in learning and teaching. The three instruments provided here have been given descriptive names to indicate the likely purpose and use of the instrument.

- 1 LAYER ONE INSTRUMENT - Type of Response instrument
- 2 LAYER TWO INSTRUMENT - Typology of ICT Uptake instrument
- 3 LAYER THREE INSTRUMENT - Stages of Dialogue instrument

LAYER ONE INSTRUMENT: Type of Response

LAYER ONE instrument provides a number of statements of the progression of the availability and potential of ICT to support learning and teaching. This tool could be used by you for self-reflection or with shared dialogue and/or observation with colleagues. There are five stages of progression of demonstration of the outcome, those being *Inaction, Investigation, Application, Integration and Transformation*. There is a critical use border between the Application and Integration levels.

LAYER TWO INSTRUMENT: Typology of ICT Uptake

LAYER TWO instrument allows you as the teacher to self-rate ICT uptake. This follows three steps in which you circle phrases in any column that appear to represent your situation; then identify and choose the most **common** level (column); noting variations from that level, saying how and why they occur, and how they contribute to your ICT ‘journey’.

LAYER THREE INSTRUMENT: Stages of Dialogue

LAYER THREE instrument allows you as the teacher, through shared dialogue and observation, to circle any of the descriptors which describe the level or quality of dialogue. The guiding questions allow you to look for direction, signs of progress or development. Each level of dialogue indicates a progression to the next level of demonstration of the outcome. There are five stages of progression of demonstration of the outcome, those being *Inaction, Investigation, Application, Integration and Transformation*

LAYER ONE INSTRUMENT: Type of Response

Refer to the layer one statements of progression on the teacher ICT attributes outcome. This instrument could be used for self-reflection or with shared dialogue and/or observation. It is based on the judgement of the type of response of a teacher to the availability and potential of ICT to support learning and teaching.

Administration:

- (1) Note in the table below evidence of actions that indicate a type of response consistent with the statements of progression on the teacher ICT attributes outcome
- (2) Make a judgement to select one of the stages indicating this with a tick.
- (3) Note down steps that could be taken to progress.
- (4) Note down any barriers to progression.
- (5) Note down the support requirements.

	Evidence of actions indicating type of response	Judgement (tick one)
Inaction		
Investigation		
Application		
Integration		
Transformation		

Steps to Progress

Barriers to Progression

Support Required

LAYER TWO INSTRUMENT: Typology of ICT Uptake

Administration: Self-completion or observation. Four steps: (1) Circle phrases, in any column, that appear to represent your situation, adding/circling any other phrases which seem relevant. (2) Identify and choose the most common stage (column). (3) Note any variations from that stage, say how and why they occur, and how they contribute to your 'journey'. (4) Complete the Steps, Barriers and Support Required boxes at the end.

Vision & Contribution

	Investigation	Application	Integration	Transformation
	<ul style="list-style-type: none"> uses traditional approaches with ICT eg rosters, worksheets; prefers closed tasks, topic-specific or easy-to-use software; challenging PD ideas are rarely implemented engages in minimal teaming and shares mainly for personal needs; would allow PD minimal or avoided often due to lack of time 	<ul style="list-style-type: none"> is starting to use ICT in multiple ways; can find PD complex, confusing; tends to add ICT on top of existing activities or as add-on to curriculum; will adopt others' activities with minimal or no adaptation, or may simplify an activity so much it loses value in an outsider's rating; may be self-focussed or less concerned for others; perhaps unwilling or unable to support others; often chooses individual activities over team ones 	<ul style="list-style-type: none"> has preference for structured/closed activities unless support available; may prefer to meet outcomes by look-up or searching activities rather than open-ended ones; starting to use mastery principles; willing to implement relevant PD ideas; can/does adapt ICT activities independently often chooses group activities, dialogue; may displace old feelings of dependence onto others including students; may be dismissive of outsiders or even defend own 'patch' 	<ul style="list-style-type: none"> uses ICT to address varied needs; able to integrate it into work seamlessly; designs activities to carry educational outcomes; chooses open-ended student tasks; ensures students take significant control; encourages team and collaborative tasks seeks out PD, groups for support, guidance, self-development; acts as role model; gives advice thoughtfully and without reservation; finds time to support others seeking guidance and help
Steps to Progress	Support Required			

Integration & Use

<ul style="list-style-type: none"> • is wary of ICT's flexibility, instability; questions own role; treats ICT as external-object to be examined, learned, taught about; cannot yet envisage ways to use ICT broadly; wonders about value of ICT for students • seeks explicit standards, single solutions, specific advice 	<ul style="list-style-type: none"> • comprehension of ICT use is slight, linear; able to verbalise integration of ICT arguments at unsophisticated level; occasionally confused about ICT and the outcomes achievable using ICT • may seek high level of self-understanding; may feel need to take increased responsibility for perceived lack of direction around them 	<ul style="list-style-type: none"> • places teaching and ICT issues at forefront; increasingly concerned for their students; ICT may not be transparent, but beginning to see it as multi-faceted tool with multiple application • can see ways to meet outcomes and standards with ICT; able to create tasks to meet needs; shares principles, often seeks broad rather than specific advice; confident enough to adapt most ICT activities to needs 	<ul style="list-style-type: none"> • is less concerned about absolute standards or fixed skills with ICT; may advocate value of self-determined, internal standards; believes that multiple perspectives about learning are acceptable and add richness to the learning setting • makes time to consider learning issues; aware that both they and their students are developing; aware of role model status; able to consider both student needs and software roles in activity design
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Capabilities & Feelings

<ul style="list-style-type: none"> • is hesitant, seeking support; challenged; disoriented even frustrated; may feel guilty or even ashamed at lack of progress • aware of students' issues but defensive; or willing but unable; acutely aware of lack of time; perhaps nervous, even sceptical; talks in monologue; • looks for support systems esp. friends with clear unequivocal guidance, known consequences; seeks stability during challenging times; may attempt to rally/support others 'in same boat' • lack of ownership; may feel uncommitted; isolated or undermined; unwilling to discard previous teaching skills without justification 	<ul style="list-style-type: none"> • is attaining sense as less dependent actor; may feel independent, autonomous; perhaps pioneering, "don't look down," excitement; but may feel forced, w/out choices, even resentful • may express negative feelings; argue and engage in conflict; or describe the support system as less/ unresponsive or confused, incompetent, inconsequential, restrictive • will share if it provides specific support or minimal pressures; doesn't demand or seek adherence to standards; aware of broader support systems than just friends • may regard as disorganized or unclear any focus on both learning as well as ICT, and wonders about the real focus of ICT usage. 	<ul style="list-style-type: none"> • is largely in control, more concerned for students than self; feels sense of achievement; pride, satisfied; self-acceptance and hence increasing acceptance of others in team • values team activities as mutually beneficial; able to cooperate with other teachers; less arguments, fewer individual activities • is less dismissive of other attempts; expects to give and receive support; appreciates immediate, descriptive feedback about progress; typically likely to feel a highly productive time for whole group/team • willing to discuss ways of meeting teaching and learning needs with both teachers and students; acknowledges changing perceptions about student learning with outcomes 	<ul style="list-style-type: none"> • feels that control issue less important or irrelevant; sees value in joint development with students/staff; thoughtful, often contented, competence unthreatened; confident; some pride; feels valued as ICT user/ model; fulfilled, even self-actualising; relaxed • is able to integrate others' perspectives on ICT with own; perceives and able to express a balance between self and others • is confident to help or support others, understands frustration of others; acts as co-learner; values individual and group simultaneously; maintains interpersonal relationships • likely to be determined to support others undergoing the same journey they themselves have started; less perturbed by criticisms which used to rankle them; perceptions increasingly based on learning not personal issues
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LAYER THREE INSTRUMENT: Stages of Dialogue

Refer to the layer three statements of progression on the teacher ICT attributes outcome. This instrument could be used for self-reflection or with shared dialogue. Each level of dialogue indicates a progression to the next stage of progression of the outcome.

Administration:

- (1) For each element of the teacher ICT attributes outcome consider the guide question(s) and write down any responses to these questions.
- (2) For each element circle any of the descriptors in LAYER THREE which describe the level or quality of dialogue. Use the guide question to help look for direction, signs of progress or development.
- (3) Make a judgement to nominate one of the stages. Stages are: 0=Inaction, 1=Investigation, 2=Application, 3=Integration, 4=Transformation.
- (4) Note down steps that could be taken to progress within this element. If no change is suggested then indicate the reason as either NR (ICT not seen as relevant) or OK (ICT use adequate at this stage).
- (5) Note down the support requirements below the main table.

VISION & CONTRIBUTION				
	Dialogue Question(s)	Stage	Response(s) to Questions	Steps to Progress (or NR or OK)
Purpose	What are the main purposes you want to use ICT for with your students?			
Focus	What are you focusing on at the moment in the use of ICT?			
Rationale	What is the value in having your students use a computer?			
View of ICT	How does ICT fit into your teaching overall?			
Contribution to Communities	How do you contribute to school ICT planning? What would you like to contribute? What involvement do you have with learning communities that use ICT?			

INTEGRATION & USE			
Frequency of use	Is there any pattern to your ICT usage? How often do your students use ICT? Do they work independently or in groups?		
Implementation strategies	What teaching strategies have you used, and do you use consistently where ICT is involved? How do you decide on the strategy you use?		
Type of activities and pedagogy	What activities have you used computers for in the last term?		
Tasks for applications	To what tasks have you applied computers during the last term? How have you determined those tasks?		
Assessing student learning outcomes	Have you assessed work that students have done with ICT? How has this been included with your overall assessment processes?		
Relevance of ICT to content	In what ways do you connect what the students do with ICT and the way ICT is used in our society?		
Achievement of CF overarching outcomes	In what ways does the use of ICT by your students support the demonstration of the CF overarching outcomes?		

TEACHER ICT CAPABILITIES & FEELINGS

Understanding of potential uses	What potential do you see for ICT to support learning and teaching processes with your class?			
Roles of teacher and students	What do you see as your main roles when using ICT with your classes? What roles do the students have?			
Source of direction for use	In what ways are students permitted to contribute to decisions about the use of ICT?			
ICT skills	What skills do you have in using ICT and what steps do you take to develop the skills you need?			
Affective response	How do you feel when you use a computer and when you support your students in using computers?			
Concerns	What concerns do you currently have for the way in which ICT is used to support learning and teaching?			

Support Required to Progress

[These may address barriers to progression on any of the elements discussed above.]

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Framework Processes

The framework and instruments need to be used within the context of sets of processes conducted by schools and/or systems. Broadly there are six sets of processes a school may take to support progress in the use of ICT:

- school planning for ICT to support learning and teaching,
- the development of student ICT literacy,
- the use of learning and information management systems,
- the development of school ICT policy and planning,
- the development of staff ICT capabilities, and
- the development of policy and planning for system support and direction.
- teacher's decision-making about using ICT.

The framework and instruments outlined by this project only directly relate to the first set of processes, the others are mentioned for completeness.

NOTE: These processes will NOT be fully developed in this project but the framework and instruments must be used within sets of processes.

School Planning for ICT to support learning and teaching

This set of processes should be fully developed to utilise the framework and instruments.

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|----------------------|---|
| (1) Targets | School community determines targets. Any of the layers may be used depending on the level of investment available. |
| (2) Teacher Maps | Each teacher maps his/her use of ICT to support learning with students. This may be in consultation with peers and/or leaders (e.g. co-ordinator). Use a version of one of the instruments. |
| (3) Compare | Compare teacher maps with the targets set in step 1. |
| (4) Support | In collaboration with knowledgeable others (e.g. co-ordinator) determine what challenges are inhibiting each teacher's progress and what support they require to progress. Use a version of one of the instruments. |
| (5) School Profile | Aggregate maps of all teachers in school to create a school profile. |
| (6) School Resources | Aggregate challenges and support requirements and compare with school and system resources |
| (7) School Plan | Create a school plan for progress that will include the development of: curriculum, teachers, ICT infrastructure, ICT and other policy and practice. |
| (8) Teacher Plans | Develop individual teacher plans for progress that may include professional development, professional support, ICT resource allocation, etc. |

Development of student ICT literacy

1. Set ICT literacy outcome standards for students (may be based on year level)
2. Create school ICT literacy plan.
3. In consultation, each teacher determines how to incorporate school plan with their programmes.
4. In consultation, each teacher determines their needs for support to implement ICT literacy plan with their programmes.
5. At appropriate times evaluate student ICT literacy outcomes and compare with required standards.

Use of learning and information management systems

While this would also relate to support for learning and teaching it may be best considered separately. Includes:

- provision of ready access to electronic educational resources
- support for evaluation and assessment
- support for classroom planning & management
- support for constructivist learning environments
- support of school and system administrative procedures

Development of School ICT Policy and Planning

This would be based on requirements generated by previous aspects. Includes:

- acquisition and maintenance of hardware and software
- provision of standards of operation and behaviour
- planning for the provision of adequate access for staff and students
- provision of professional development opportunities

This will be influenced by: staff characteristic factors (e.g. turn-over), leadership team capabilities, external support structures, etc.

Development of Staff ICT Capabilities

[Would be based on the needs of staff emanating from the previous aspects.]

Includes development of:

- knowledge of ICT and its use to support learning and teaching processes
- skills in the operation of ICT
- processes to implement ICT use to support learning and teaching processes
- attitudes conducive to the integration and implementation of ICT support for learning and teaching processes
- uses of ICT to support the teacher's own learning

System Support and Direction

[Would be based on the needs of schools and staff emanating from the previous aspects.]

This involves what the school system needs to do to support and direct schools and teacher.

Teachers Decision-Making About the Use of ICT

Teachers must make decisions about when and how to use of ICT to support appropriate constructivist learning environments. This will involve the following set of processes:

(1) Identify potential and intended outcomes

It is important to start with the intended or anticipated learning outcomes. During and after implementation it will be important to evaluate all the outcomes both in terms of information on the development of the students and feedback which may be used to improve implementation in the future. The relationship of computer support to the learning outcomes is identified by considering educational problems, the strengths of computer technologies, and productivity. Many educational problems are related to obstacles to learning and require good experience with the curriculum and knowledge of the students. Obstacles may relate to issues such as: lack of motivation, poor implementation of lower level skills, an impression that the content is irrelevant, little experience with the main concepts, poor communication and presentation skills, and so on. ICT support has been linked with cognitive, psycho-motor and affective outcomes, with particular emphasis on higher order cognitive outcomes.

(2) Select appropriate software/hardware

Fundamentally appropriate software is targeted at the educational problem(s), is directly related to the intended outcomes, is easy to use by the target students, is appropriate to the required tasks, and will operate adequately on the available hardware.

(3) Develop an implementation strategy

The success of any implementation will depend on the quality of planning. There are many parameters to consider in developing an implementation strategy. Fundamentally the implementation may be Whole-class, One-to-one or Group-work support. Parameters will include: location of hardware, student-computer ratio, organisation of access, task direction, operating instructions, and so on.

(4) Organise adequate access to computers

Computer hardware may be accessed in the classroom, in a computer laboratory or in a public area of the school such as the library. The hardware may be networked or stand-alone. The method of distributing the software (e.g. CD-ROM, on-line) needs to be considered. Available access may require changes to the implementation strategy.

(5) Manage the implementation

Successful implementation depends on good planning by the teacher, and the realisation of appropriate teacher and student roles. Planning needs to entail : integrating the application with learning strategies and other resources, preparing support materials, developing strategies for the management of hardware, software and students (e.g. providing access, timing). Teacher behaviours include: using the management strategies, monitoring student progress, guiding student learning, and coping with unforeseen problems. In addition appropriate student attitudes and behaviours need to be fostered.

(6) Evaluate the success

Reflection on the success of an implementation will feedback into the success of future applications and improve the implementation of the current application next time. Teachers need to evaluate the implementation in terms of the learning outcomes and whether the original problem been adequately addressed. Students could be involved in these processes and some consideration of problems or obstacles that surfaced is required.

A Tool to Support Teacher Decision-Making

	Support Required
<p>(1) Identify the potential and the intended outcomes State the opportunity/problem(s) for which a computer solution may be appropriate.</p> <p>State the outcomes that it is intended to target with ICT support.</p>	
<p>(2) Select appropriate software and supporting hardware</p>	
<p>(3) Develop an implementation strategy Whole-class OR One-to-one OR Group-work support Student:Computer ratio? Location of computers? Task(s) direction? Operating instructions?</p>	
<p>(4) Organise adequate access to computer processing Minimum number of computers? Minimum specifications?</p> <p>Peripherals required?</p> <p>[NOTE: Modification of implementation strategy may be required.]</p>	
<p>(5) Manage the implementation Method of monitoring progress?</p> <p>Off-computer backup activities?</p>	
<p>(6) Evaluate the success Evaluation of learning outcomes? Evaluation of ICT implementation? Has the original problem been adequately addressed? Have other problems or obstacles surfaced? Recommended improvements?</p>	

Getting Started

Computer use will impact significantly on classroom practices and teacher and student roles. In many cases to gain the benefits from computer use there is a need for major change in the classroom much the same as with any other major innovation. At the same time computer use should not be artificially contrived just for the sake of using a computer. It should fit naturally into the scheme of what teachers and students want to do i.e. solve problems for them. While there may be wide discrepancies between the 'ideal' state and the 'current' state it is more likely that a long-term approach of gradual change will be successful. Therefore if computer applications are to be integrated into the curriculum it is important to begin with the successful implementation of small innovations.

Start With Small Steps

The effective use of computers represents major innovations in education and therefore most of the current routines teachers have developed need modifying or replacing. Realistically it must be acknowledged that this is not going to happen in the short term and most teachers would prefer not to use computers if it entailed too many changes to their routines. Therefore teachers need to be encouraged firstly to implement computer applications that require little or no modification to their routines. Success may encourage trials of more innovative applications.

Teachers new to computer support should begin by concentrating on doing a little well, which may involve relatively simple applications. A number of straightforward applications can be used to solve logistic problems in the curriculum, that is things a teacher wants to do which are difficult due to practical constraints. For example, allowing students to construct a variety of graphs, showing students a graphic based concept or processing a large quantity of data. The more innovative sophisticated uses can be attempted later.

Appropriate implementation strategies for a teacher with limited experience in using computers to support learning may involve small group computer use, or allowing a few individual students to use an application for remedial or extension work. The implementation of these modes of use is relatively simple in terms of the management of students and computers. If a teacher wants all students to use the computer system then management problems are minimised by choosing one high quality application and allowing students to work in pairs.

Share or team up with one or two other interested people

You've heard that 'two heads are better than one'? Working with ICT in schools is a prime example of this principle of sharing. Sharing provides support and ideas as well as motivation to keep going thru the difficult sections. Share the results of your efforts and try other approaches that work.

Align efforts with school plans

Although it may be tempting to work independently of the rest of the school, it will be more productive to look for alignments between your efforts and the current school initiatives; this way school support will be more forthcoming and that is always a big help.

Learning like a journey to be travelled rather than a goal to be attained

It is the long-term aim that matters, and all journeys have their good and bad memories. Keep a diary of the journey that you can reflect upon – many teachers are amazed at their progress when they look back, and without a diary or reflective journal it is so much harder.

GLOSSARY of TERMS & ACRONYMS

Computer	Electronic machine, operated under the control of instructions stored in its own memory, that can accept data (input), manipulate data according to specified rules (process), produce results (output) and store the results for future use.
Computer system	Combination of hardware, software and personnel.
Constructivism	A theory to explain how people learn by making meaning of the experiences they have in the environment they inhabit.
Curriculum	The content (information and processes) that students are required to engage with and the medium used to engage with the content.
Curriculum Framework	Documents that describe curriculum goals and objectives for learning, and include direction for specific content areas, benchmarks, activities, and forms of evaluation.
Educational Technology	The use of any technology to support the processes of teaching and learning.
Hardware	The tangible components of a computer system.
HTTP	The protocol (set of rules for communication) used by the World Wide Web. Stands for: Hypertext Transfer Protocol
ICT	Information and Communication Technologies Almost always this is used to refer to computer technologies.
Internet	The interconnection of networks using the TCP/IP common protocol (set of rules for communication).
Learning Outcome	That which students may demonstrate from what they have learned. In the Curriculum Framework these are described as sets of outcomes associated with areas of learning.
Learning Technologies (LTs)	The use of any technology to support the processes of teaching and learning. However, in WA this has come to mean the use of ICT to support these processes.
Overarching Outcome	There are 12 overarching outcomes at the beginning of the Curriculum Framework that aim to direct the focus of all learning in Western Australian schools.
Pedagogy	The processes of teaching, particularly where the learners are children.
PDF	A format of document files often used for documents to be transferred over the internet. Referred to as Adobe Acrobat files and stands for: Personal Document Format.
Server	A computer used to provide services to a computer network. Examples are web servers and email servers.
Software	The electronic instruction files used by computer systems to complete tasks for a user (person).
TCP/IP	The protocol (set of rules for communication) used by the Internet. Stands for: Telecommunications Protocol/Internet Protocol
Technology Integration	Combination of all technology parts, such as hardware and software, together with each subject-related area of curriculum to enhance learning.
URL	The address of a file to be accessed over a network using protocols such as HTTP. Stands for: Universal Resource Locator