

Developing Students' Academic Literacy and Mathematical Self-Efficacy through Multi-media Learning Resources

Mary Deane
Centre for Academic Writing (CAW), Coventry University

Peter Samuels
sigma Centre for Excellence in Mathematics and Statistics Support, Coventry
University

Gareth Williams
Mathematics and Statistics Department, The Open University

Abstract

The availability of resources to support students in Higher Education (HE) has increased significantly in recent years (MacArthur *et al.*, 2008). This arguably reflects a growing demand, particularly in relation to the range of academic literacies tertiary level students are expected to acquire (Lea and Street, 1998). In particular, adaption to contemporary learners' preferences has led to a shift from textbooks to more accessible resources such as web pages, downloadable leaflets and video clips (Prensky, 2001). It has been recognised that developing learners' literacies can help to reduce dependence on learning support tutors, and that instruction in critical thinking and writing is most effective when grounded in the relevant contexts (Gottschalk and Hjortshoj, 2004).

This paper reports on collaborative development at two UK HE institutions of contextualised, accessible resources in academic writing and mathematics study skills (Bean, 2001; Kahn, 2001). The initial development of single sheet paper and online leaflets in generic academic writing competencies is outlined and evaluated (Griffin, 1982). The subsequent development of similar mathematics study skills resources is then described. Current work to develop more contextualised academic writing resources is outlined, along with future plans to develop mathematics study skills resources in other media.

More broadly, this paper explores relationships between writing development, mathematics support, and learner autonomy (Lillis, 2001). It investigates the provision of physical and virtual learning spaces to enhance students' success, and promotes a collaborative model of supporting students' discipline-based study. It will interest policy makers concerned with the student experience, retention, and Widening Participation.

1. Introduction

Many academics in HE are faced with the challenge of providing students with supplementary support beyond the learning and teaching material associated with a module or course. There are various reasons why students benefit from learning development that is connected with, but provided outside of modular studies. Although the issues are diverse, three have been chosen for analysis in this paper.

First, some students appreciate the stimulation of extra learning material, particularly if they aspire to achieve high grades at university. Secondly, certain students benefit from material that takes a different approach or gives more detailed guidance, particularly when they are struggling with particular aspects of a course. Thirdly, many students whose first language is not English value additional resources to guide them in adopting the discourse and conventions associated with their chosen discipline.

It is useful to reflect upon how specialists in Mathematics support and writing development can collaborate to meet these three challenges with a view to identifying common strategies for resource development (MacArthur *et al.*, 2008). By exploring common themes for educational developers working in these two fields, the authors aim to contribute to the growing body of work on the range of literacies students are required to master to succeed within Higher Education and in professional spheres. The two case studies offered in this paper concentrate on recent mathematics support provided by **sigma**, the Centre for Excellence in University-Wide Mathematics and Statistics Support and the Centre for Academic Writing (CAW) at Coventry University.

The purpose of juxtaposing reflections on the production of resources in these two contexts is to find ways of collaborating to support students and develop a more systematic and effective approach to learning development. The shared goal of staff based in **sigma** and CAW is to design resources to foster students' critical thinking and academic writing (Gottschalk and Hjortshoj, 2004). The following two sections contextualise the development of resources in academic writing and Mathematics Support. The paper then examines key characteristics of contemporary tertiary level learners and explores the provision of learning resources at Coventry University. Specific resources produced by CAW and **sigma** are then examined, before identifying key issues and future directions for resource development.

2. Academic Writing

The mission of the Centre for Academic Writing (CAW) at Coventry University is to provide staff development in the teaching of writing and writing consultancy for academics, especially to support research and publication activity. In addition, CAW's remit with undergraduate and postgraduate students is to encourage individuals to adopt scholarly practices and develop a self-directed approach to research and writing.

Since CAW was established in 2004, students have requested handouts on a range of key topics such as planning assignments, revising, editing, and producing specific genres like written reports. In response to this demand, a range of paper-based handouts were developed in 2006 and these were uploaded to the virtual learning environment for students to download, and disseminated via CAW and key venues such as the University Library, **sigma**, and the Student Centre. The goal of these supplementary resources is to encourage student autonomy by offering insights into the processes and practices of academic work and helping students to understand the requirements of British tertiary level study.

CAW provides resources for writers in all disciplines at all levels, but this presents a challenge because writing conventions differ across the disciplines (Lea and Street, 2006). A particular problem in designing writing development resources is acknowledging that the academic discourses conventionally used in disciplinary contexts are distinct whilst providing guidance that is useful for writers across the disciplines. Writing specialists at CAW view the development of generic resources as only the first phase of resource development, leading to the production of materials tailored for writers in specific disciplinary contexts. The latter is a complicated and time-consuming endeavour, so with this longer-term aim in mind, CAW runs a concurrent programme of 'Writing in the Disciplines' (WiD) initiatives whereby writing specialists collaborate with academics in the disciplines to support student writers in more embedded and specific ways (Monroe, 2002; Monroe, 2003). For instance, Samuels and Deane have collaborated to help doctoral candidates in the field of Mathematics Education to write and submit scholarly journal articles (Samuels and Deane, 2008).

3. Mathematics Support

Mathematics and Statistics Support is a term used mainly in UK Further Education (FE) and HE to describe the provision of supplementary forms of teaching and resources for mathematics (including statistics) learning across institutions in addition to the main teaching provision. According to (Beveridge, 1997) and (MathsTEAM, 2003: 3) common forms of Mathematics Support are:

- Bridging courses
- Computer-aided learning
- Diagnostic testing (normally at university entry, and normally followed by other forms of follow-up support)
- Drop-in centres
- Workshops
- Numeracy classes
- Paper-based open learning materials
- Peer study support
- Tutoring
- Videos
- Websites (which may also include some of the above types of resources)

Two other important terms here are Mathematics Support Centre and Mathematics Learning Centre: these refer to a drop-in centre room from which other forms of Mathematics Support may also be provided.

The main reason for the emergence of Mathematics Support provisions is the "mismatch between students' mathematical confidence, knowledge and skills at university entry and those required in order to commence their degree courses" (Lawson et al., 2003: 5). A secondary reason for its emergence is the "increasing breadth of variation of mathematical and statistical competences of students entering the same university courses" (Samuels, 2007b: 107). As lecturers tend to target the average (or slightly below average) student ability, this means that not only 'at risk'

students with poor entry skills require supplementary support, but support also needs to be provided for brighter students who are not sufficiently challenged (Croft and Grove, 2006).

In 2005, HEFCE made a massive investment in teaching and learning in UK HE through the 5 year CETL programme (HEFCE, 2004). One of the 74 successful bids was the **sigma** CETL in University-Wide (i.e. both specialist and non-specialist) Mathematics and Statistics Support, based at Coventry and Loughborough Universities (Carpenter *et al.*, 2006). Most of the current developments in Mathematics Support in UK HE are taking place through **sigma**. Its main aim is to develop mathematics and statistics support and to incorporate innovative approaches to teaching and learning that address the widely differing curricula and individual needs of different students. Its activities are being underpinned by a systematic programme of educational research.

sigma is making a substantial investment to enhance existing provision in the two Universities and to address proactively the needs of those who can benefit from the support available. Its activities include:

- Extended and enhanced drop-in centres at the two universities;
- A Statistics Advisory Service offering individual Statistical Support for final year project students and postgraduate students (Smith and Gadsden, 2006);
- A Proactive Teaching Programme comprising of several Mathematics teaching interventions at both Universities which target 'at risk' students within large cohorts (Lawson *et al.*, 2006); and
- An investigation and development of innovative uses of technology in Mathematics Support, such as the use of classroom communication systems and educational computer games, known as serious games (Samuels, 2007a).

4. Characteristics of Contemporary Tertiary Learners

Prensky coined the term Digital Natives to describe contemporary learners born after about 1980 (Prensky, 2001). He describes Digital Natives in the following way:

Today's students – [from primary school to university] – represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. Today's average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, email, the Internet, cell phones and instant messaging are integral parts of their lives.

It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently

from their predecessors. These differences go far further and deeper than most educators suspect or realize.

(Prensky, 2001: 1)

According to a summary of recent research studies carried out by JISC (JISC, 2007), the main characteristics of contemporary learners' approaches to new technologies are:

Learning in a digital age - Using technologies in all aspects of their studies, today's digital learners rarely see e-learning as a separate or special activity. They are adept at blending personal and institutionally owned technologies with traditional approaches to learning in ways that are unique to them.

Communication and networking – Technology supports a continuum of social interaction, increasing learners' ability to network with their peers and communicate with their tutors.

Concerns – Some learners find difficulties with asynchronous communication, others indicate a need for more assistance with the technologies they use in assignments, and the digital divide remains a potent concern.

Benefits – Learners also find significant advantages in using technology. These differ according to the individuals' perspectives, but increased choice, ease of access to information and control over when and how they learn are highly valued.

(JISC, 2007: 4-5)

Whilst not all learners can be characterised as Digital Natives, most teaching and learning interventions are not designed with their needs in mind. It is therefore believed that there is significant scope for designing study skills resources which attempt to cater for their needs. In particular, short multi-media accessible online resources are promoted as being more appropriate than textbooks for contemporary learners.

5. Academic Writing resources

This section analyses three sample resources provided by CAW for undergraduate students as part of a three-part series of handouts called 'the writing process.' The focus for analysis is whether these resources might help students become more self-directed and successful at academic writing. Also under consideration are the ways in which these resources could be useful for students aspiring to achieve highly in academic assignments. In addition, it is important to consider whether students struggling with an aspect of academic writing might benefit, and to ask whether students whose first language is not English would find them useful. Overall, the goal of the learning development resources produced by staff at CAW is to encourage students to reflect upon how they approach academic assignments and

become more effective in managing their time and finding appropriate scholarly resources.

The concept of writing as a process informs CAW's writing guidance, but it is acknowledged that there are many different ways of conceptualising the stages of a composition process. It is also acknowledged that each writer develops a unique approach to managing the writing process through practice and by reflecting on feedback. For instance, one resource suggests:

Just as every person has a unique fingerprint, no two approaches to writing are the same. Your university career is the opportunity to discover the most effective writing methods for **you**.

(Writing Process 3: 2)

As CAW's resources cater for students in a range of disciplines the advice is consistently given to consult Assignment Briefs:

Begin by reading the assignment guidelines your tutor has provided and any general writing advice given in your module and course handbooks. Next, re-read the assignment brief or title and circle key words.

(Writing Process Steps 1 & 2: 1)

The foci are the specific requirements of an Assignment Brief, which foregrounds the authority of lecturers in the disciplines. This attention to the expectations of modular tutors is a feature throughout CAW's writing resources:

Consider what content **knowledge** you are required to demonstrate, and which **writing and thinking skills** (e.g. summarising, defining, applying, analysing, critiquing, evaluating, synthesising). To do this, look again at your assignment brief or title, and consult the marking criteria and learning outcomes in your assignment brief or module handbook.

(Writing Process Steps 1 & 2: 1)

The purpose of this particular passage is to support students who are struggling to see beyond the surface requirements of a specific written assessment. Yet, as mentioned above, the text is carefully chosen to also signal to highly motivated students where they might focus attention in order to maximise their performance in written assignments. A theme running throughout CAW's resources is to consult guidelines from module tutors, "Learning objectives are usually stated in your handbook and in the assignment criteria, but if you are unsure, ask your tutor." (*Writing Process 3: 3*). CAW's learning development resources are designed to assist not only home students, but also those who are unfamiliar with the culture of UK HE. For instance, this resource offers the suggestion:

Also **plan ahead** so that you can make use of time during seminars or office hours to discuss your plan with your tutor.

Do not expect the tutor to be available to answer questions outside the contact time you have been allocated.

(*Writing Process 1 & 2: 2*)

The guidance for student writers includes practical tips, such as this series of suggestions for generating ideas through writing activities:

- **Brainstorming:** Write down all of the ideas on a topic that come into your head, in any order.
- **Listing bullet points:** List your ideas in a linear fashion.
- **Webbing:** Group and develop your ideas for sections and paragraphs in the form of a 'spider' web or pattern notes.
- **Freewriting:** Write or type for 10 minutes without stopping on your topic. This will produce a 'stream of consciousness' paragraph from which you can extract one or two ideas to develop further through more freewriting, bullet pointing, or webbing.

(*Writing Process 1 & 2: 2*)

CAW's writing resources include a list of "useful sources" to encourage students to find more comprehensive or discipline specific material on academic writing. Each handout concludes with a checklist of questions prompting students to become increasingly self-directed and successful writers: "Can I ask a friend to compare my plan with the assignment brief and marking criteria to if anything is missing in my work?" (*Writing Process 1 & 2: 4*). The aim of this question is to encourage students to use peer writing support, which can be beneficial for writers working at all levels, and can help writers who are struggling to succeed as well as those aspiring to obtain impressive results.

One way in which CAW's learning development resources negotiate the challenge of supporting writers in a range of disciplines is to highlight features of writing which are used in different contexts. For example, literature reviews are employed in a variety of disciplines in differing ways, but the fundamental skills necessary to review and critique sources are necessary for many writers to adopt. The handout on drafting strategies reveals, "A literature review requires you to demonstrate your knowledge of the literature on a topic, and also to review this research (think of a film review, which identifies key strengths and weaknesses)" (*Writing Process 3: 4*).

Another way in which CAW's learning development resources seek to support writers across the disciplines is to stimulate students to ask themselves questions as they prepare academic assignments for submission. For instance, as part of the resource that focuses on revising strategies, there are a series of questions designed to promote a self-directed approach to the writing process:

- Does the paper you are writing answer **all** parts of the Assignment Brief?
- Have you formulated a clear **thesis statement/statement of argument**?
- Have you included convincing **evidence** for each key point?
- Have you given a full **explanation** of each point?

- Have you ‘pitched’ your writing style appropriately for the intended reader of this paper?

(*Writing Process 4 & 5: 2*)

This section has considered how writing resources could be useful for highly motivated students as well as those needing supplementary support, including students writing in a second language. The aim of all CAW’s resources is to encourage reflection on effective writing processes by framing questions about the nature and purpose of academic assignments, and the next step in developing resources to support student writers is to extend into discipline-specific areas. This relies upon extensive collaboration between writing specialists and lecturers in the disciplines.

Currently, staff at CAW are working on a range of new resources including materials tailored for writers in specialised contexts and at specific levels. This work is part of a JISC funded Project to provide online writing support including virtual writing tutorials offering students feedback on assignments-in-progress. The Coventry University Online Writing Lab (COWL) Project began in 2008 and will be launched in 2010 to provide a range of materials and employ technological interventions to support student writers.

6. Mathematics study skills resources

Entering “study skills” into the Google search engine (Google, 2009) produces in excess of fifty million results. Taking a more traditional route, entering the same phrase in The Open University’s library catalogue (The Open University, 2009a) generates four hundred and sixteen results. These simple searches indicate that there is a wealth of resource, readily available to learners at all stages of their education.

Much of this resource is devoted to skills which are relevant to study in a generic sense. There is sage advice ranging from preparation of a suitable environment for study to time management, from exam technique to note-taking in lectures. However, in the first section we described a need for contextualised study skills resources – that is, material written with a specific academic discipline in mind.

The present section reports on a collaborative development between **sigma** and The Open University. The collaboration has so far developed a dozen single-sheet study skills leaflets, each contextualised in mathematics. The leaflets are available in both hard form and online as pdf documents.

Taking mathematics as an academic discipline, contextualised study skills resources do exist, but are far less common than their generic study skills counterparts. Texts such as (Northedge *et al.*, 1997) and (Kahn, 2001) offer contextualised study skills support in mathematics, and are being supplemented by online resources such as (The Open University, 2009a). Yet typing “mathematics study skills” into the Google search engine (Google, 2009) produces, typically, links to handouts of mathematics departments of individual HEIs, for instance (University of Cambridge, 2009). These

naturally discuss material relevant to the appropriate HEI (for instance, supervision arrangements) but are less relevant to students elsewhere.

There exist various online resources to support students of mathematics and other numerate disciplines. Often these are available freely, and are viewed as highly accessible by many students. Table 1 presents a summary of some such resources.

Reference	Description
(University of Cambridge, 2009)	A pdf document on mathematics study skills specifically relating to the University context.
(University of Hull, 2009)	A repository of resources which are mainly downloadable and printable and mainly content orientated but including leaflets on maths phobia and maths study skills.
(London School of Economics, 2009)	A single page website with advice on studying mathematics.
(The Open University, 2009b)	This site focuses on some core skills needed to succeed in studying mathematics (rather than focussing on mathematical content itself). The site is freely available but is aimed at Levels 2 and 3 mathematics undergraduates, without provision for lower level students.
(mathcentre, 2009)	A comprehensive site with sections for staff and students, feely available material including leaflets, booklets, exercises, video clips and external links. Material is largely focussed on mathematical content rather than associated study skills, and is aimed at post-16 mathematics help.
(mathtutor, 2009)	Strongly linked to (mathcentre), this site aims to bridge the gap between school and university, and offers video tutorials. These are available in DVD format or can be viewed (freely) online. The site also contains some resources for use with iPod technology. Again, material is largely focussed on mathematical content.
(University of Southampton, 2009)	A single page website on mathematics study skills divided into 10 sections.

Table 1: Some UK HE online mathematics support resources

7. sigma's collaboration with The Open University

7.1 History and rationale

Inspired by the leaflets produced by CAW, **sigma's** initiative to develop contextualised accessible, mathematics study skills resources began in 2007 by

identifying existing mathematics study skills websites in UK HE (as shown in Table 1) and contacting the site authors or named contacts along with other known researchers and developers in the field with a view to establishing a small development community (which later took the form of an informal steering group). This led to a dialogue with several developers at The Open University which developed into a formal **sigma** secondment proposal. The secondment involved Williams working with Samuels on a matched time basis.

The collaboration between **sigma** and The Open University came into being to serve a dual purpose. Firstly, it was an attempt to supplement the widely available content-based resources with contextualised study skills resources, accessible to HE entry-level students of mathematics or other numerate disciplines. Secondly, it was an attempt to promote self-efficacy in these students, so that they may become successful independent learners. In particular, a student's study can often be interrupted when he or she encounters difficulty at a time when a tutor is not available to provide physical support. By developing associated study skills, it is hoped that the resources resulting from the collaboration will help to overcome this barrier.

7.2 Identification of topics

In collaboration with the author of (Kahn, 2001), areas of particular student difficulty were identified. About a dozen suggestions for leaflets resulted which evolved into the list below.

- Creating examples
- Taking mathematics apart
- Proof – what is the game?
- Unpacking symbols
- Writing mathematics well
- Assessment
- Learning to do algebra
- Using diagrams
- Handling your emotions
- Approaching numeracy as an adult
- Mathematical problem solving
- Getting to grips with statistics
- Mathematical reading
- Using technology


The first eleven leaflets were produced by the Williams and Samuels. The leaflet on getting to grips with statistics was commissioned and developed by a colleague from University Campus Suffolk who is a member of the steering group. The last two leaflets have not yet been produced.

7.3 Content and aims of leaflets

Each resource produced was subject to the aims below.

- Contained on a single sheet of paper and also in an online format (pdf)

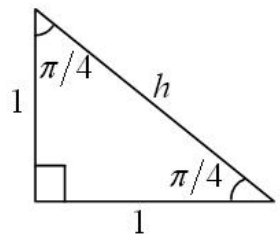
- Focussed on associated study skills, and not on specialised mathematical skills
- Grounded in context, with examples to demonstrate points being made
- Accessible to independent learners with activities to stimulate engagement
- To promote accessibility, each leaflet follows the same format, with visual icons to identify areas containing advice, activities, and examples. Figure 1 illustrates the style.



Example

Example: Determine $\sin(\pi/4)$, giving an exact answer.

One student produced:



Since the triangle is isosceles, both acute angles are $\pi/4$.


By Pythagoras' theorem, h has length $\sqrt{2} \approx 1.4142$.

Therefore $\sin(\pi/4) \approx 1/1.4142 \approx 0.7071$.

This solution is well reasoned, but fails to answer the question, which required an exact answer (and not approximations to four decimal places). Make sure your work is always **fit for purpose**.

Figure 1: Extract taken from the *Assessment* resource

In Figure 1, an example is provided to demonstrate that students need to **answer the question** to succeed in assessed work. The example consists of some mathematics (a combination of Pythagoras' theorem and elementary trigonometry). This serves to provide context, allowing students to see where their study skills must be applied. The resource does **not** attempt to teach students how to use Pythagoras' theorem or trigonometry.



Activity

Activity: Reading your work aloud will show whether it's written in flowing sentences. Read the following out loud:

- $y = f(x)$, $f(x) = (2x + 1)^2$, $dy/dx = 4(2x + 1)$.
- If $y = f(x)$, where $f(x) = (2x + 1)^2$, then using the chain rule, we find that $dy/dx = 4(2x + 1)$.

Which sounded better? Try reading some of your own work out loud. How does it sound?

Figure 2: Extract taken from the *Writing mathematics well* resource

Figure 2 shows another typical feature of the resources: the use of activities to engage the student. The resource makes no attempt at teaching differential calculus to the student, but provides an example in the context of differentiation. Moreover, in

case some students are de-motivated by calculus, the activity encourages the student to try the same thing with work of their own.

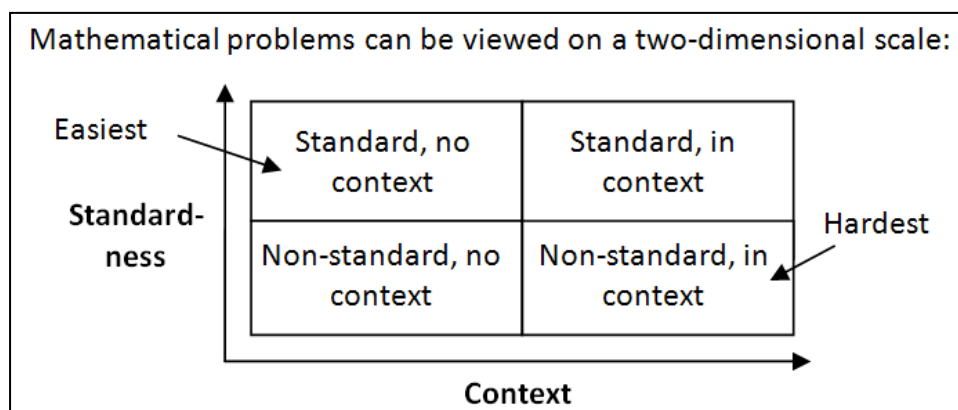


Figure 3: Diagram taken from the *Mathematical problem solving* resource

Figure 3 shows a final example. The resource is making students aware of the different styles of mathematical problems, and goes on to discuss skills for solving each. The resource aims to help students identify which skills to apply, appropriate to the style of problem, even if on a first reading they do not understand the mathematical content of the problem.

7.4 Production and trialling of resources

Williams and Samuels found the most productive way of writing the resources to be several short but intense face-to-face collaborations. Working in this way, each leaflet required approximately eight hours of concentrated effort. A sample of students at Coventry University was exposed to a selection of the resources in 2008. Feedback was generally positive and highlighted several key points:

- Students are unaware of the importance of contextualised study skills and hence may struggle to overcome associated barriers
- The visual icons were well received by some students but the majority did not feel strongly about them. Accordingly, their inclusion appears harmless.
- Students resisted engaging with the activities, but when pressed to do so, found they made valid points which the students had not previously considered. This serves to reinforce the importance of engaging activities, and also highlights the challenge persuading students to engage.

7.5 Availability and future directions

The study skills resources are currently available in draft format to members of the *maths-study-skills* JISCmail group. In order to access these materials you will need to do the following:

1. Go to the website for the list: www.jiscmail.ac.uk/math-study-skills
2. Select "Join or Leave MATHS-STUDY-SKILLS"
3. Enter your name and email address and select "Join MATHS-STUDY-SKILLS"

4. Wait for a confirmation email from a list owner
5. Register your email address with the JISCmail website - go to www.jiscmail.ac.uk and click on the "Register Password" option under the "Quick Links" heading on the left hand side of the page
6. Complete the form
7. Wait for the email confirmation (this should be sent very quickly)
8. Click on the link in the confirmation message
9. It may then take some time for JISCmail to realise that you are a member of the list so you could wait a while (e.g. overnight)
10. Go to the website for the list: www.jiscmail.ac.uk/maths-study-skills
11. Click on the files option on the right hand side
12. Download the leaflets you require

If you intend to use them with students please inform them of their draft status.

The future plans are to produce the remaining two leaflets (on mathematical reading and using technology), trial out the leaflets further, make them available from centralised web server and produce short (approximately 5 minute) video clips covering each leaflet.

8. Conclusions

This paper has analysed samples from a range of resources provided by CAW and **sigma** to enhance students' studies at Coventry University. It has considered how these resources might help students become more self-directed and successful. Concerning guidance for writers, the paper has shown how students can be supported to adopt scholarly practices and develop a more proactive approach to research and writing. In particular, CAW's materials encourage student autonomy by offering insights into the processes associated with academic work in the UK context.

The paper has examined how specific resources might help students become more proactive in approaching tertiary level study. The goal of both CAW and **sigma** is to encourage students to reflect upon how they approach academic work and become more effective in managing their time and resources. In particular, staff at both CAW and **sigma** are investigating the potential of technologies to enhance students' experiences of tertiary level study.

References

- Bean, J. C., 2001, *Engaging Ideas. The Professor's Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom*, San Francisco: Jossey-Bass
- Beveridge, I., 1997, Survey: Learning support for mathematics in FE and HE. *Mathematics Support Association Newsletter*, 6: 20-23
- Carpenter, S., Croft, A. C., Lawson, D. A. and Saunders, D., 2006, Developments in student support in mathematics and statistics. In Fifth IMA Conference on

Mathematical Education of Engineers, Loughborough, The Institute of Mathematics and its Applications

Croft, A. C. & Grove, M., 2006, Mathematics Support: Support for the specialist mathematician and the more able student. *MSOR Connections*, 6: 39-43

Croft, A. C. & Stevenson, J., 2004, mathcentre and mathtutor - national mathematics support at the school/university transition. *Mathematics TODAY*, October: 164-167

Google, 2009, <http://www.google.co.uk>, accessed 23/02/09

Gottschalk, K. and Hjortshoj, K., 2004, *The Elements of Teaching Writing: A Resource for Instructors in All Disciplines*, Boston: Bedford/St. Martins

Griffin, W. W., 1982, *Teaching Writing in all Disciplines*, San Francisco: Jossey-Bass

HEFCE, 2004, Centres for Excellence in Teaching and Learning: Invitation to bid for funds. Bristol, Higher Education Funding Council for England

JISC, 2007, "In Their Own Words: Exploring the learner's perspective on e-learning", HEFCE, Bristol

Kahn, P., 2001, *Studying Mathematics and its Applications*, Basingstoke: Palgrave

Lawson, D. A., Croft, A. C. & Halpin, M., 2003, *Good Practice in the Provision of Mathematics Support Centres*, Birmingham, LTSN Maths, Stats & OR Network

Lawson, D. A., Symonds, R. & Samuels, P. C., 2006, Proactive interventions in Mathematics and Statistics Support, CETL-MSOR Conference 2006, Loughborough, HEA Maths, Stats & OR Network

Lea, M. and Street, B., 1998, 'Student Writing in Higher Education: an Academic Literacies Approach.' *Studies in Higher Education*, 23(2): 157-72

Lillis, T., 2001, *Student Writing: Access, Regulation, Desire*, London: Routledge

London School of Economics, 2009, <http://www.maths.lse.ac.uk/studyskills.html>, accessed 23/02/09

MacArthur, C. A., Graham, S., and Fitzgerald, J., 2008, *Handbook of Writing Research*, London: Guilford Press

mathcentre, 2009, <http://www.mathcentre.ac.uk/>, accessed 23/02/09

MathsTEAM, 2003b, *Maths support for students*, Birmingham, LTSN MathsTEAM Project

mathtutor, 2009, <http://www.mathtutor.ac.uk/>, accessed 23/02/09

Monroe, J., 2002, *Writing and Revising the Disciplines*, Cornell: Cornell University Press

Monroe, J., 2003, (ed.) *Local Knowledge, Local Practices: Writing in the Disciplines at Cornell*. Pittsburgh: University of Pittsburgh

Northedge, A., Thomas, J., Lane, A. and Peasgood, A., 1997, *The Sciences Good Study Guide*, Milton Keynes: The Open University

Prensky, M., 2001, Digital Natives, Digital Immigrants, *On the Horizon*, 9(5): 1-2

Samuels, P. C., 2007a, Mathematics support and new technologies. *MSOR Connections*, 7(1):10-13

Samuels, P. C., 2007b, Mathematics support as a practical discipline, In Green, D. (Ed.) *CETL-MSOR Conference*, Birmingham, HEA Maths, Stats & OR Network

Samuels, P. and Deane, M., 2008, 'Academic Writing training for Mathematics Education PhD students'. *Maths, Stats, and OR Connections*, 8(3): 41-44

Smith, K. & Gadsden, R. (2006) **sigma** SAS rescuing projects. In Green, D. (Ed.) *CETL-MSOR Conference*, Loughborough, HEA Maths, Stats & OR Network

The Open University, 2009a, <http://voyager.open.ac.uk/>, accessed 23/02/09

The Open University, 2009b, <http://maths-study-skills.open.ac.uk/>, accessed 23/02/09

University of Cambridge, 2009, <http://www.maths.cam.ac.uk/undergrad/studyskills/text.pdf>, accessed 23/02/09

University of Hull, 2009, <http://www.hull.ac.uk/studyadvice/MathsResources/index.html>, accessed 23/02/09

University of Southampton, 2009, <http://www.soton.ac.uk/math/currentstudents/csstudy.html>, accessed 23/02/09