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The design and development of study materials to facilitate skills development in recognising statements in academic text.

This paper outlines the strategies employed in the design and development of study materials for building learner competence in recognising and differentiating among statements in academic text. This specific skill represents one aspect of the broader capability of unpacking complex academic information, which appears to be a challenge for a growing number of higher education students, in particular those belonging to the mature cohort. Drawing on prior knowledge from personal engagement with academic texts, the author developed a draft instructional framework around three statement-types, namely facts, assertions, and generalisations. Based on feedback obtained from peer review of the draft framework, an in-depth analysis of the statement-types was conducted. This analysis entailed matching dictionary/thesaurus definitions of each of the three with relevant segments of text drawn from a selection of journals. This exercise led to a fuller conception of each statement-type and the development of a more fleshed out instructional framework. The first of the three statement-types was also changed from 'facts' to 'facts and factual information'. This fleshed out framework provided the basis for the development of the study materials, which comprise a series of slide (power-point)-sound presentations with accompanying assessment exercises, and which are organised within an online study environment. Issues receiving special attention in the paper included cognitive task analysis as an alternative instructional design strategy when the focus is on building schemata as well as the pros and cons of utilising embedded versus generic materials for skills training.

Keywords – mature learners, learning skills development, information literacy, cognitive task analysis, embedded vs. generic approaches

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Introduction

The decades spanning the latter part of the twentieth century and the beginning of the twenty first have witnessed a steady increase in enrolment in post-secondary and higher education, accompanied by a growing diversity within the student population. A significant proportion of those entering may be described as mature adults. Many are likely to be entering this higher level of study with lower qualifications than their younger counterparts who would have spent an additional two years at secondary school and obtained qualifications that are deemed more appropriate for matriculation into higher education. This cohort of students is also likely to be the primary target for online and distance offerings as institutions turn to the ICTs to extend their reach beyond the boundaries of a physical campus.

Hunte (2010) in her profiling of distance students in the University of the West Indies found that they were mainly female, and largely fell within the age range 20-39, with a mean of 30 years. They were returning to formal education following a hiatus after secondary school, were likely to be in fulltime employment, and to be either sole or joint income earners of their households. Hunte's study also showed that the majority were responsible for dependents, ranging from one to five per student. In terms of socio-economic status, she found that while there was a slight increase, over a previous study, in the number of middle-income earners in the cohort, there was still "a fairly substantial number of low-income earners accessing higher education via distance education" (p. 105).

Mannay and Wilcox's (2015) comment about a similar cohort in the Welsh context can easily apply to the target group in Hunte's study. They contend, "Non-traditional students face complex psychological and structural barriers to accessing and completing higher education" (p. 50). They state further,

... ideas of what it means 'to be a student' are largely governed by discourses of the traditional young middle-class student. Consequently, educational and institutional policy is often geared around an expectation that working class, mature and non-traditional students need to 'fit-in' with middle class ways of being ...". (p. 51)

The effect of the demographic factors outlined above is compounded when viewed in relation to other developments impacting the sector, for example, the ever-increasing amount of information that can be accessed both online and offline. According to the Australian and New Zealand Institute for Information Literacy "The key characteristic of the post-industrial 21st century is that it is information abundant and intensive". It cautions further, "Sheer abundance of information and technology will not in itself create more informed citizens *without* a complementary understanding and capacity to use information effectively" (2004, p.3). In this regard, it defines an information literate person as one who can,

Classify, store, manipulate and redraft information collected or generated
Incorporate selected information into their knowledge base

Use information effectively to learn, create new knowledge, solve problems and make decisions. (p.3)

In reporting on the findings of its 2012 Survey of Adult Skills, the Organisation for Economic Cooperation and Development (OECD) provides an even higher level of attainment. Participants from the two highest-scoring countries were said to be able to “perform multiple step operations to integrate, interpret or synthesize information from complex or lengthy texts that involve conditional and/or competing information ...” (p. 8).

Whichever standard one chooses to adopt, two issues emerge. First, the capability required for engaging in this level of intellectual activity goes beyond those required for reading comprehension. Secondly, one wonders whether learners in post-secondary and higher education should be expected to develop these higher-level competencies in the process of performing discipline-related tasks. Given the profile discussed earlier, mature adult learners are not likely to be adequately prepared for this level of intellectual activity. This scenario appears to suggest a need for focused training in handling complex academic information.

The Problem

The specific situation that provided the impetus for developing materials to enhance the competency of mature students for handling complex academic information arose out of the assessment of assignments submitted by postgraduate students in a Caribbean higher education institution. One category of assignments required students to generate their own content, based on topics provided, while for another required them to source literature on topics provided and write annotations on the materials sourced. While the first entailed more comprehensive writing than the second, both categories of assignments required students to activate skills in accessing information from existing material.

In relation to the first category, following are excerpts taken from the general feedback to students on their performance on two assignments of a given course.

Extract from feedback on Assignment # 1

- *If, as was the case in Question # 1 of Assignment 1, you were asked to say whether Peters’ theory treated the student as the object of the teaching-learning transaction whereas Wedemeyer’s saw the student as the subject, you need to do the following:*
 - *Carefully select the segments of content from the literature and/or the course materials that you will use to support the position you will take eventually. ...*
 - *For each selected segment, use a few sentences and **show how** the selected segment provides the support for your position. Look inside the segment of content and make the link between the meaning it conveys and the position you are attempting to link it to.*
- *It is not enough to simply describe or explain what the literature says and follow that up with a sentence stating the position you are taking. ...*

Extract from feedback on Assignment # 2

Advantages and disadvantages of using ICTs in poverty eradication

*Some very useful ideas emerged here and it was clear that many of you had done some good research into the role and function of ICTs. You must be careful though not to simply let yourself take an approach to your essay that may be largely directed by the literature you are consulting. What is required here is not simply a discussion on the advantages and disadvantages of the ICTs, but a look at those pros and cons **in relation to poverty eradication**. That link needed to be very clear and in many cases it was not. Some of you did not make the link at all while others dropped in the phrase 'poverty eradication', but it was just that – a mere mention.*

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2011.

A few observations are pertinent here about the feedback provided. First, two noted factors accounted for the weaknesses noted in the students' assignment, one of which was interpretation of the topic; another was an inability to discern where and how linkages were to be made. Alongside and intertwined with these was an inability to interpret and use content from other sources appropriately.

The second category of assignments was designed to have in-coming students prepare annotated bibliographies. Students, working in groups of two, were required to select one of three essay topics and produce an annotated bibliography comprising four annotations to inform the writing of an essay on the selected topic. They were not expected to actually write an essay. This exercise was intended to provide students with the opportunity to source, select and extract information relative to an essay topic, and thereafter prepare a shortened account to demonstrate their competence in undertaking the task.

Based on content analysis of a select set of the bibliographies, the following was one of the conclusions drawn about students' performance on this activity:

A third area of interest emerged in what appeared to be a strategy to ensure the relevancy of the content of the annotation. [S]ome students seemed to be making a conscious effort to ensure that their output was consistent with the requirements of the essay topic. In short, they wanted to ensure that they were 'answering the question'. [T]his sometimes meant the direct transfer of key terms from the essay topic into the annotation ... This superficial approach meant that the annotation itself was not able to reflect the essence of the source material on which it was based. (Kuboni, 2012, p. 230)

What this conclusion suggests is that, even though the students may have made an appropriate selection of material, they appeared to be limited in their ability to extract relevant details, and even if they did, were having challenges in organising those details appropriately for

constructing the annotation. One can argue that students are limited in their capacity to handle complex academic information.

Whatever point of the spectrum one chooses to identify appropriate information literacy skills for the Caribbean post-secondary and higher education, whether closer to those identified by the Australian and New Zealand Institute or to the upper level standard attained by some participants of the OECD 2012 Survey of Adult Skills, it is evident that there is a gap to be addressed among Caribbean mature students if the scenarios described above are considered.

Project Objective

While the learning-skills deficit discussed above includes both skills related to the production of content as well as those relevant for accessing and using information, the decision was taken to focus on the latter. Consequently, handling complex academic information was identified as a broad skills-set requiring intervention. Based on a review of a random selection of academic literature, this broad heading was further broken down into four sub-skills, namely

- Recognising and differentiating among statements in academic text
- Identifying strategies for conducting analysis
- Tracing the path from analysis to evaluation
- Identifying linkages in the text

The project being reported on was undertaken to design and develop study materials relative to the first of these subskills. Moreover, even though the problem emerged from an observation of postgraduate students, it considered appropriate to make the intervention at the undergraduate level.

Literature Review

Ultimately, the goal of all learning is to broaden one's knowledge base. Consequently, it can be argued that there is a close reciprocal relationship between how one views learning and one's conception of knowledge. When considering statements in academic text, one is dealing with content that is external to the learner and which requires the individual to draw on his/her mental resources to process the information embedded in that content. In this regard, one holds that the view of knowledge most applicable in this context is what one philosopher has conceptualised as *scientific knowledge*. One contends further that a cognitivist outlook on learning can best inform the approach one takes in assisting the learner to develop strategies for engaging with that content in a manner that allows for efficient and meaningful expansion of the knowledge base.

Scientific knowledge

The notion of scientific knowledge used here has its origins in the work of the philosopher Karl Popper. In differentiating his conception of knowledge from that of other philosophers, Popper (1968) takes a strong position against subjective viewpoints and argues strongly for an objective

orientation. In this regard, he advances his notion of the three worlds of knowledge, namely the world of physical objects, the world of states of consciousness and thirdly, the world of objective contents and thought. In emphasizing his focus on the third, he contends that even though human thought plays a role in generating these contents, there is a point at which they (the contents) assume an existence that is independent of their origin. He expands as follows:

While knowledge in the sense of 'I know' belongs to what I call the second world, the world of subjects, scientific knowledge belongs to the third world, to the world of objective theories, objective problems, and objective arguments. (p.335)

He states further,

Knowledge in this objective sense is totally independent of anybody's claim to know; also it is independent of anybody's belief, or disposition to assent; or to assert, or to act. Knowledge in the objective sense is *knowledge without a knower*; it is *knowledge without a knowing subject*. (p. 335).

Another attribute embedded in Popper's understanding of knowledge is that it is grounded in the principles of deductive rather than inductive reasoning. For Popper, observations only have meaning when there is a frame of reference that the observer brings to the act of observing. Thus he contends,

[T]he belief that we can start with pure observation alone, without anything in the nature of a theory, is absurd ... Observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem. And its description presupposes a descriptive language. (2002, pp. 61-62).

It should be emphasized that there is no attempt here to promote Popper's conception above that of any other philosopher. Rather the position taken here is that the scientific, objective perspective that he advances provides an appropriate framework to support the building of skills for managing large amounts of complex content that students in post-secondary and higher education must study. While acknowledging the role of authors in the creation of their works, one contends that there is value in viewing the content of these works as scientific knowledge, detached from the mind of the author, and available for rigorous and systematic scrutiny based on criteria that are generic and applicable across the board. Moreover, it is envisaged that enabling students to recognise and draw on *a priori* factors in guiding the process of observation and examination of the content, can be expected to assist them in building transferable skills.

Building schemata

Many theorists and practitioners would argue that engaging with and manipulating the content of text is an act of learning that is best understood through the lens of cognitivist theories which emphasize how the human mind receives, organizes, stores and retrieves information (Ertmer and Newby, 2013). For some, ideas surrounding the role and structure of memory in information processing are rooted in the concept of schema. Sweller (1994) explains, "A schema is a cognitive construct that organizes the elements of information according to the manner with which they will be dealt" (p.296). Then, drawing on the work of Bartlett, who is widely recognized as the originator of the concept, he continues,

[W]hat is remembered is only partly dependent on the information itself. Newly presented information is altered so that it is congruent with knowledge of the subject matter. Knowledge of subject matter is organized into schemas and it is these schemas that determine how new information is dealt with. ...

Schemas can (also) be used to explain most of the learned, intellectual skills that people exhibit.

...

Schemas provide the basic unit of knowledge and through their operation can explain a substantial proportion of our learning-mediated intellectual performance. (pp.296-297)

Wagoner (2013) introduces another dimension of Bartlett's conception of schema that should be noted. He contends that Bartlett did not view memory as an isolated mental faculty but as a situated activity "bringing together multiple processes to act in the world (p.555). Thus, according to Wagoner, Bartlett was distancing his perspective from those that saw memory primarily as a vehicle for storage and retrieval. Specifically, according to Wagoner, Bartlett shared the view of one of Bartlett's contemporaries, who held that:

... schema is a holistic and constantly revised record of one's position, which provides the baseline for one's next movement ... Schema is a kind of active and continuously revised memory, rather than one put away into storage only to be retrieved at a later time (p.559).

Many theorists concur that a focus on the cognitive brings into play the role of the metacognitive in supporting and facilitating cognitive activity. For example, Livingston (2003) asserts,

Metacognition refers to higher order thinking which involves active control over the cognitive processes engaged in learning. Activities such as planning how to approach a given learning task, monitoring comprehension and evaluating progress toward the completion of a task are metacognitive in nature

Direct explicit instruction

Also influencing the approach to the design of the study materials was the perspective of two other theorists who advocated direct instruction in circumstances similar to the one in which the project was implemented. Ludwig-Hardman and Dunlap (2003), in describing their approach to the provision of learner support services in higher education, commented as follows:

To be successful, learners need the skills required for effective online learning and those skills need to be explicitly taught and supported. (pp. 2-3)

Later in the article, they recommend the use of scaffolding strategies to provide maximum structure and support in the early stages of learning, and gradually handing over responsibility to the students as "they master the skills needed to engage in higher cognitive functioning" (p. 4).

Even more to the point is the position taken by Clark, Kirschner and Sweller (2012) who make a case for ‘direct explicit instruction’ rather than ‘partial guidance’ when teaching ‘new content and skills to novices’ (p. 6). The authors make this assertion in the face of what they regard as the failure of minimally guided approaches that have persisted over decades under different names, for example discovery learning and inquiry-based learning. They stress that explicit instruction facilitates the development of long term memory, which they describe as “that big warehouse of things ... that we know”, and which they contrast with working memory described as “a limited mental ‘space’ in which we think” (p.9). They expand as follows:

We are skilful in an area if our long-term memory contains huge amounts of information or knowledge concerning that area. That information permits us to quickly recognize the characteristics of a situation and indicates to us, often immediately and unconsciously, what to do and when to do it. ... In short, our long-term memory incorporates a massive knowledge base that is central to all our cognitively based activities. (p. 9)

Given the profile of the mature learner described earlier, one contends that a teaching-learning strategy that seeks to facilitate the building of schemata, the activation of appropriate metacognitive strategies, and utilises direct explicit instruction warrants consideration in the design and development of these materials.

Design and Development

As earlier indicated, the objective of this project was to design and develop study materials to assist mature students in post-secondary and higher education in building skills for recognising and differentiating among statements in academic text. The development of the study materials was based on an instructional design framework that broadly adhered to the principles and procedures of cognitive task analysis (to be discussed more fully later). The materials were developed for offering in *Moodle*, the web-based learning management system. This choice was made given the benefits to be derived by the learner, from studying in a technology-enhanced learning environment (Wang, 2008).

Peer review of preliminary draft

Based largely on this author’s interpretation of language use in the academic literature, a draft instructional design framework was generated, primarily to determine whether the conception of statement in academic text was valid and whether fact, assertion, generalization were indeed dimensions of the concept. Following is a summary of key elements of the feedback received from two reviewers:

Reviewer A:

- Questioned why the term ‘factual statement’, as used in the draft; there was no need for the addition of ‘factual’.
- Also queried the phrase ‘factual statements that are not supported by evidence’; felt it was contradictory.
- Agreed with the view about students’ tendency to formulate own assertions and present them as if they were taken from the text.

- Added that students need to know how to develop their own assertions.

Reviewer B:

- Noted that, from the perspective of science, facts may be true at one point, and not true at another, in light of emerging evidence.
- Questioned what constitutes evidence.
- Returning to the issue of a ‘fact’, noted that, in the study of academic literature, what one looks for are statements/conclusions/inferences/claims that are logically derived or have reputable backing. One does not seek to identify ‘facts’.
- Acknowledged an intention in the draft to distinguish among statement/fact/claim/generalization/assertion and felt that this was an appropriate exercise.

All queries raised will be dealt with at the appropriate juncture in the rest of the discussion.

Rationale for skills development in this area

Reviewer B’s comment about facts not being permanently true suggests that the basic rationale for skills development needed to be more clearly articulated. Specifically, the exercise was predicated on the premise that academic literature across disciplines in the social sciences, humanities, and some aspects of science and technology and technical-vocational studies, is constructed on a bedrock of language formats that apply across the board. Given the challenges uncovered earlier, it was felt that students needed to pay attention not only to the content of the materials studied but also to the language used for communicating that content. Their ability to make appropriate selections to inform the creation of their own work is hampered by their inability to recognize how function and content intertwine to yield the messages conveyed in the academic texts studied.

The intention of this skills development exercise is therefore not to determine whether an element of fact, for example, may or may not be accepted as true. Rather, it is to equip students with the skills to distinguish a fact from other types of language formats in the text. Evidence becomes a factor only to the extent that it contributes to the successful performance of the task of recognising what the author presents as a fact.

Review of the knowledge base underpinning the skills

The first step taken in revising and upgrading the framework was to clarify the content underpinning the skills and in that context address the misconceptions highlighted by the reviewers. This entailed matching dictionary/thesaurus definitions of each term (statement, fact, assertion, generalization) with relevant segments of text drawn from a selection of journals. This deductive-inductive approach was expected to yield the most appropriate interpretation of the core terms in this skills-development activity.

Based on that exercise, the following is an excerpt instructional design framework was generated for the overall concept

Statements in academic text

Learners should be able to

- *Understand that authors use language in different ways depending on the meaning to be conveyed.*
 - *Note that language use in academic text conforms to certain formats, notwithstanding differences in content. ...*
- *Acknowledge core characteristics of a statement, namely*
 - *It states something*
 - *It is not a question*
 - *It is not tentative*
- *Acknowledge three types of statements, namely*
 - *Facts and factual information*
 - *Assertions*
 - *Generalizations*

With regard to ‘facts’, it was felt that a case could be made for differentiating between simple facts and factual information. This differentiation appeared to be implied in some dictionary definitions of factual, for example

Of, relating to, or characterized by facts ¹

Then one notes the entry in Wiktionary, which describes a reference book as one that provides factual information.²

Based on these definitions and appropriate excerpts from the academic literature, the following was developed to support learning of the concept.

Factual information

Learners should be able to

- *Demonstrate an understanding of how factual information builds on and moves beyond a simple fact.*
 - *Locate the element of fact within a broader segment of text.*
 - *Locate terms, phrases within whole segment whose meanings are not directly linked to what was observed or experienced.*
 - *Dissect these terms, phrases to determine what they convey about the author’s treatment of the facts.*
 - *Regard this approach to language use as the author’s representation of the facts.*
- *Distinguish among four ways that authors use to represent facts, namely ...*

¹ www.collinsdictionary.com/dictionary/english/factual

² <https://en.wiktionary.org/wiki/>

Cognitive Task Analysis

The overall aim of building this instructional design framework was to assist mature learners to develop skills for recognizing and differentiating among statements in academic text. It is evident therefore that the intended outcome of the exercise was for learners to build and/or strengthen schemata to relative to the tasks associated with this skill. While ultimately, the output from the performance of the skills can be observed and measured in overt tasks, the focus in so far as instructional design is concerned is the building of capacity at the covert level. In that regard, the explanation of cognitive task analysis (CTA) provided by Chipman, Schraagen and Shalin (2000) and cited in Clark, Feldon, van Merrienboer, Yates and Early (2006) is to be noted. They state,

Cognitive Task Analysis is the extension of traditional task analysis techniques to yield information about the knowledge, thought processes and goal structures that underlie observable task performance. [It captures information about both ...] ... overt observable behaviour and the covert cognitive functions behind it [to] form an integrated whole. (p.1)

Citing Cooke (1994), the authors recognize three broad families of CTA techniques, one of which is the family of conceptual techniques “which produce structured, interrelated representations of relevant concepts within a domain” (p.2). Regardless of CTA method, the writers concur that most analysts use a five-stage process for conducting the analysis, namely

Collect preliminary knowledge
Identify knowledge representations
Apply focused knowledge elicitation methods
Analyze and verify data acquired
Format results for the intended application. (p.3)

While not adhering completely to the procedures laid out, the broad principles of CTA informed the approach to the design of instruction, as reflected in the two preceding excerpts from the framework as well as this one on Assertions.

Assertions

Learners should be able to

- *Recognize an assertion as a type of statement*
 - *Recall characteristics of statement.*
 - *Apply these characteristics to an assertion to see if they are embodied in that type of statement.*
 - *Identify similarities and differences between an assertion and a fact*
- *Identify an assertion in a segment of text.*
 - *Name attributes of an assertion, namely that it*
 - *Asserts, takes/expresses a position.*
 - *Is intended to convince reader ...*

- *Think of an assertion as a claim made by an author*
 - *Acknowledge that readers must contest all claims, ...*
 - *Acknowledge that authors must substantiate all claims, ...*
- *Locate details in a segment of text that are intended to support claims.*

Embedded vs. generic approaches to skills development

In converting the instructional design framework into study materials, the decision was taken to use literature from undergraduate teacher education programmes. This approach was adopted, in part, because of the objections normally raised against the use of generic materials, a main one being that they do not allow for efficient skills transfer. De Jager and Nassimbeni (2002) expressed their own concerns about the use of generic courses for developing information literacy skills. They noted,

[I]t was ... increasingly recognised that the skills required for information literacy might not necessarily be generic, but rather “highly dependent on context” and that, as the tools and ways of handling information are in a constant state of change and development, teaching information skills should be firmly embedded in subject knowledge. (p. 175)

One is uncertain whether the approach taken in this project meets the criterion of being “embedded in subject knowledge”, or whether the goal should be complete integration into the curriculum. This author is conscious of the factors favouring integration. However one is also aware that the skills themselves are a requirement across a wide range of disciplines, and this factor should also be included in the debate.

Media Design

The notion of providing explicit instruction was a main factor influencing the selection and design of media for developing the study materials. Two aspects of the design were intended to meet this criterion. First, power-point slides allowed for the use of graphics in presenting the content as well as for proper sequencing and structuring. Secondly, the slides were synchronised with an audio recording of an accompanying narration. Even though synchronised, the production did not allow for automatic advance of the presentation. Rather, the learner was given control of this function, so that he/she could determine the pace of his/her viewing.

Beyond the materials themselves, the design took further advantage of the multimedia capability of the *Moodle* environment to include a short video clip to introduce the unit of study as well as text-based instructions.

Conclusion

These materials are still to be evaluated. Such an exercise is critical to determining the reliability of the instructional design framework that provided the basis for the development of the study materials.

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