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Can indicators on school websites be used to determine the level of ICT integration and ICT leadership in schools?

Carmel Maio-Taddeo
University of South Australia *carmelina.maio-taddeo@unisa.edu.au*

As schools continue to invest resources into the integration of Information Communication Technologies (ICTs), many are also utilizing the Internet as a medium for promoting and marketing their facilities and educational programs to prospective families. Tailored and personalised school websites provide a wide range of information for members of the school community and for any interested members of the public. As a preliminary stage of a larger scale research project, guidelines and evaluation criteria have been formulated to determine if website content and design can be used as an indicator of either novice or expert ICT leadership within a school, and in addition if it reflects the level of ICT integration.

Information communication technologies (ICTs), ICT integration, school websites, novice, expert, ICT leadership

INTRODUCTION

An increasing number of schools are investing considerable time and resources into the development and maintenance of school websites, in order to promote their school and communicate not only with their school community, but also with members of the public. However an examination of school websites reveals that the quality of the websites, both in content and design vary significantly between schools. Leask (2001) acknowledges that "A good school website will reflect the development of ICT within the curriculum and support the school's ICT activities and policies." The actual extent to which school websites do reflect ICT integration and school leadership is of broad interest to parents, the community and policy makers. One of the aims of this paper is to discuss the type of content and the elements of school website design that may contribute to the development of functional, engaging and informative websites. Examination of school websites was also conducted to determine if evidence of ICT leadership and integration existed on school websites and if effective criteria could be established that measure these aspects. This investigation was predominately exploratory in nature, with the intention of acquiring an understanding of the type of content and design viewed on school websites, in order to enable the synthesis of criteria discussed in the novice expert literature with the criteria discussed in the literature on ICT integration and leadership.

DESIGN OF THE STUDY

The research presented here is part of an initial stage of a larger scale research project investigating the impact and influences of leadership styles and management strategies on transformative ICT integration, using the methodology of novice-expert contrast. "Comparing experts with novices makes it possible to specify how experts and novices differ in understanding, storing, recalling, and manipulating knowledge during problem solving" (Bruer, 1993). One source of evidence and information collected has been drawn from school websites, as they are

readily accessible, and have enabled preliminary investigations to be conducted to further dimensionalise the novice expert contrast. General preliminary analysis of school websites in the area of ICT leadership and ICT integration has led to the identification of four categories.

Category 1: Those websites whose main purpose is to disseminate information.
School websites in this category tend to:

(a) provide a general overview of the school's curriculum policies and a brief explanation of facilities; the information reflects mostly what one would expect in a school prospectus;
(b) no interactive elements or engagement with the audience is evident.

Category 2: Those websites whose main purpose is to inform and communicate.
Schools in this category provide features on their websites such as:

(a) external access to school's infrastructure (e.g. by school Intranet);
(b) correspondence by Email;
(c) communication by means of chat rooms, blogs, and message boards.

Category 3: Those websites whose main purpose is to inform, communicate and entertain.
Schools in this category:

(a) provide features on their websites such as video, animation, graphics, pod casts, and virtual tours;
(b) exhibited students' work, where there is very much recognition of the importance of engaging and entertaining the wider school community as an audience.

Category 4: Those websites whose main purpose is to inform, communicate, entertain and showcase innovation.
Schools in this category:

(a) describe and promote innovative concepts in education, innovative design both in the structure of their website and in the structure of their educational organization and overall innovative practices, processes and implementation not only of ICT but of education in general;
(b) demonstrate an understanding not only of the potential of ICT in education, but also of the educational philosophies required to support integration that reflects expertise in ICT integration and ICT leadership.

Preliminary analysis suggests that schools in Categories 1 and 2 demonstrate a novice approach to ICT leadership and ICT integration on their website, while schools in Categories 3 and 4 demonstrate an expert approach to ICT integration and ICT leadership on their website. From the initial analysis a total of 15 novice and 15 expert schools in the area of ICT leadership and ICT integration were chosen by categorising school websites. Other considerations in the selection process included the geographic location of the schools; schools were selected to represent each region in the Adelaide metropolitan area: northern, southern, eastern, and western. One school in a rural setting was also selected for both the novice and expert group, although findings for this group might not be entirely generalisable, the inclusion of rural schools was deemed valid as it might provide indicators and issues not considered or evident in schools from metropolitan areas.

School size was also taken into account, with the schools selected grouped into those that had student enrolments less than 150 students, schools with student enrolments between 150-300 and schools with student enrolments above 350. The sample group contained schools from education systems across South Australia, namely five novice and five expert schools from The South Australia Education Department, five novice and five expert schools from Independent sector and five expert and five novice schools from The Catholic Education Department. It is important to note that this selection process has been considered and applied in order to achieve a broad representative sample. The intent of this stage of the research project is not to make comparisons between schools, regions or systems, but rather to identify the elements associated with ICT

integration and leadership that are pertinent to novice and expert schools, irrespective of their size, geographic location or affiliation with a particular education system.

THE NOVICE-EXPERT CONTRAST METHOD

The novice-expert contrast method was selected for the initial stage of the research project as it provided a basis for comparative analysis between the two groups. It also enabled the testing of constructs such as survey instruments developed later in the research project. In addition it provided a means by which to identify and categorise those skills, qualities, attitudes and strategies utilised, demonstrated and practised by experts that could potentially be transferable to other school contexts, in order to assist with the wide scale improvement and progress in ICT integration and leadership. The process might also help to explicitly identify and address the needs of schools that were classified as novice in the area of ICT leadership and integration and to provide subsequent support for schools in this category, targeting the identified needs and areas requiring improvement. Research and literature including Leinhardt, (1989); Sternberg and Ben Zeev, (2001); Schunk (1991); Bruer, (1993); Hogan, Rabinowitz and Craven (2003) that compared the characteristics and traits of novices and experts was analysed and considered. Examination of the research and literature provided a basis from which to develop understandings of the practices and metacognitive processes experts and novices undertook when completing tasks and problem solving. The information extracted from previous research and literature that addressed issues associated with novice and expert has been applied to the task of developing criteria for the selection of the sample group for the novice expert contrast.

When considering the qualities, skills and attitudes attributed to experts in any given field Sternberg and Ben Zeev, (2001) identified that experts utilised their knowledge base, this required not only having the knowledge but also applying knowledge as required and analytical thinking, namely being able to analyse problems even if the field was unfamiliar.

Particularly pertinent in the field of ICT, is the rate at which innovative technologies are introduced onto the market and their complexity. Experts exhibit creative thinking, which is characterized by the application of innovative skills and approaches to tasks and finding creative ways of gaining people's attention. Experts also exhibit practical thinking, strategies and skills whereby skills and knowledge are processed and applied to situations and tasks in a logical and methodical way in order to achieve outcomes.

Schunk (1991) wrote, "compared to novices, experts possess more declarative knowledge, have better hierarchical organisation of knowledge, recognise problem formats more easily, monitor their performances more carefully and understand the value of strategy uses." Bruer (1993) explained that expert chess players saw patterns and relationships between pieces and long-term consequences of actions. Anderson and Leinhardt (2002) discussed that "experts' performance can be differentiated by the reasoning in which they engaged." They further elaborate explaining that experts frequently knew the solution instantly, or had mastered strategies for arriving at a solution. In contrast, novices and pre-service teachers were not able to resolve promptly the problems; they had fewer strategies to draw on and could not construct functional rules to help resolve the issue.

When considering the qualities, skills and attitudes attributed to novices in any given field Hogan, Rabinowitz and Craven (2003) argued that novices "tend to focus on short-term plans, tend to generate highly scripted and mentally well-rehearsed instructional strategies." Novices also tended to not be as well prepared for unanticipated situations and have less complex schema and often provide less alternatives in any given situation. Glass, Kim, Evens, Michael and Rovic (1999) found that "novice tutor dialogues were less organized, so that effort needs to be tried again in a different way." The authors also discussed the difficulties of explaining the "novice tutors' transcripts using the same style of goal structure" used for the expert tutors. Daley (1999)

found that "novices and experts identified different organizational factors that facilitated or hindered their learning. Experts were able to articulate systemic issues that affected their learning, whereas novices identified disparate individual issues." Bransford, Brown, and Cocking (1999) discussed the value of understanding expertise, acknowledging that it provided information about thinking processes and approaches to problem solving.

Investigations into the novice expert literature reveals that some of the characteristics displayed by experts are evident irrespective of the context or setting, for example an expert in a medical field may share similar traits with a computer game expert, such as the systematic approach to problem solving and the organisation of schema. Similarly characteristics displayed by novices are evident irrespective of the context and setting, for example a novice teacher shares similar traits to a novice engineer. This suggests that the characteristics displayed by both novices and experts can be applied to different contexts and settings. This is supported by research conducted by Anderson and Leinhardt (2005) who concluded, "that similar observations and conclusions concerning expertise can appear in very different subject areas". As a result a selection of novice and expert indicators have been extracted from the literature and referred to during the preliminary selection process of the sample group.

GENERAL CONSIDERATIONS IN DEVELOPING INDICATORS OF EXPERTISE IN ICT INTEGRATION AND LEADERSHIP

An important linkage in expert novice literature to ICTs is the widely used four types of ICT integration, first proposed in the influential Making Better Connections study (Downes 2002).

> Type A: Encouraging the acquisition of ICT skills as an end in themselves.
>
> Type B: Using ICTs to enhance students' abilities within the existing curriculum.
>
> Type C: Introducing ICTs as an integral component of broader curricular reforms that are changing not only how learning occurs but also what is learned.
>
> Type D: Introducing ICTs as an integral component of the reforms that alter the organization and structure of schooling itself.

'Type A' indicates a relatively basic approach (novice approach) to the integration of ICT in comparison to 'Type D' which indicates a relatively complex and confident approach to the integration of ICT (expert approach)

The content on school websites was analysed and indicators, including the type and provision of ICT facilities provided for students and the wider community of the school, were examined in order to determine the approach to ICT integration adopted and practised by the school community, and the priority given to the integration of ICT. Examination of school websites was also conducted to determine if policies, content, and practices described on the website supported a particular type of integration. For example, some websites explained ICT as a curriculum area taught specifically by an ICT specialist teacher in a computer pool, then the likelihood is that the type of integration would be closer to a Type A or Type B than the more expert levels of Type C and Type D.

Other indicators such as clarity of purpose, clear plans and directions for current and future integration of ICTs, and information value and relevance can be applied to school websites. It is relevant to determine if the purpose of the website is evident and clearly identifiable and if the school portrays not only its strengths, but also its intentions with regards to future development of ICT. Private School Resource Exchange Program (PREP), (2006) explained that "good school website reflects the needs of prospective families, students, faculty, administrators, parents, alumni, and friends of the school". And that "Each constituency needs to be represented and catered for in the vision, design and content of the website". The inclusion by schools, of content

on their websites that addresses the needs of the wider school community and demonstrates evidence of consultation with various members of the school community indicates an intention to provide an informative relevant website. Investigations into school websites help to determine if information value and relevance is evident on either or both novice and expert school websites, and if it can then be considered an indicator of an expert or novice in the area of ICT integration and ICT leadership.

Furthermore, in the process of evaluating websites in general some of the criteria suggested by Schrock (2006) and Beck (2006) were considered relevant and were applied to the task of formulating the selection criteria for determining expert and novice school websites. The criteria included:

- *Currency*: How current is the content and is there evidence that the content is regularly updated?
- *Bias and Objectivity:* is there any bias or sponsorship evident? Is information provided in an objective manner?
- *Authority:* Who is responsible for providing the information on the website? What are the credentials of the author? Can the credentials be verified?
- *Coverage of Content:* Is the information superficial or does it comprehensively address what it claims to address?
- *Website Design:* Is the site easy to navigate, appealing and is information easy to locate? Are there any broken links?
- *Accuracy:* Is the information provided accurate and reliable?

INDICATORS OF EXPERTISE IN ICT INTEGRATION AND LEADERSHIP

In developing the indicators for novice expert school websites, consideration was given to the four types of ICT integration outlined in Making Better Connections study (Downes, 2002) and the evaluation criteria suggested by Schrock (2006) and Beck (2006). These indicators were then synthesized with criteria identified in the novice expert literature, in particular the criteria identified in Leinhardt, (1989); Sternberg and Ben Zeev, (2001); Schunk (1991); Bruer, (1993); Hogan, Rabinowitz and Craven (2003). The aim of the process was to develop a comprehensive list of indicators, formulated by marrying the novice expert literature with the literature available on ICT, in order to assist in the identification of novice and expert school websites.

The following are website indicators formulated for identifying novice and experts in the area of ICT Leadership and ICT integration:

When evaluating the ability to **utilise knowledge base** the following indicators were considered.

(1) Was there evidence of school leadership applying knowledge of relevant pedagogies and innovative practices in their school setting?

(2) Had leadership demonstrated an understanding of relevant pedagogies for cohesive ICT integration? This could be evidenced in school policies, and in the general approach to schooling and education promoted and practised within the school context.

(3) Did the infrastructure described on the school website support transformative ICT integration?

When evaluating the ability to **think analytically** in various situations the following indicators were considered.

(1) Was there evidence that leadership have thought through potential issues that might arise in ICT integration?

(2) Had leadership provided possible solutions or discussed logical consequences for actions related to the integration of ICT?

(3) Was there evidence that leadership had anticipated future directions in ICT integration? For example did the school have wireless broadband or interactive whiteboards?

When evaluating the ability to apply **creative thinking skills** in various situations the following indicators were considered.

(1) Had leaders demonstrated a creative approach to ICT integration? For example were examples of innovative practices evident on the school website whether through students' work samples or by the design of the school's website?

When evaluating the ability to apply **practical skills** in various situations the following indicators were considered.

(1) Had leadership demonstrated that it had thought through the practical issues and implications of the way their school was portrayed on the internet?

(2) Was there logic and structure and a sense of cohesiveness and clear purpose on the website?

(3) Did leadership demonstrate innovative practical, achievable and manageable solutions to ICT integration?

(4) Had leadership demonstrated their personal self-efficacy in ICT on the school website?

(5) How much evidence was there that leadership had contributed to the school website?

When evaluating the ability to **plan effectively** for the long and short term the following indicator was considered.

(1) Did policies predominately address current ICT related issues with no evidence or discussion of future directions or was there clear evidence of short and long term objectives?

When evaluating the ability to **provide alternatives** in any given situation and evaluating the merits of each alternative the following indicators were considered.

(1) In the process of ICT integration did the school demonstrate a broad or narrow focus?

(2) Was the focus on one identified priority or were there multiple priorities organised in a manageable time frame?

(3) Did the ICT integration process reveal a cohesive approach?

When evaluating the **flexibility** and the willingness of leadership to deviate from the initial planned pathway the following indicators were considered.

(1) Was leadership supporting integration at a higher level (Type C and D) or at a basic level, (Type A and B)? Downes (2002).

When evaluating how **well prepared and organised** leadership is for unanticipated situations the following indicators were considered.

(1) Were ICT policies provided on the school websites?

(2) Were ICT policies comprehensive, did they reveal how thoroughly they had anticipated possible scenarios related to ICT integration?

When evaluating the **complexity of schemas** leadership developed in the area of ICT integration the following indicators were considered.

(1) Was there comprehensive coverage of issues related to the integration of ICTs?

(2) To what degree did ICT related decisions impact on the school community?

When evaluating the **currency** of the website content the following indicators were considered.

(1) Were current newsletters available?

(2) Was information about current school events available?

(3) Were past newsletters archived and still accessible?

(4) Was there evidence of maintenance? (e.g. updated information about current or future school events.

When evaluating the **coverage** (depth and organisation of information) of the website content the following indicators were considered.

(1) Were links to useful information, resources, and contacts provided?

(2) Was information available for parents?

(3) Was information available for students?

(4) Was information available for staff?

(5) Was information available for the wider community?

(6) Was the information provided for each of these groups relevant, current and organised in such a manner that was easy to locate?

(7) Were school policies available online? Were ICT policies available online? And if so did the website confirm the policy claims and content? Was the philosophy driving the integration process explained?

(8) Was the intended audience clearly identified? Had clear consideration been given as to what was being offered and for whom it was being offered? (Helmschrott, 2006)

(9) Did the information meet the needs identified by the target groups?

(10) Were there examples of students' work or regular contributions from various members of the school community?

(11) Was there a reason to return to the website on a regular basis? (Freyer, 1997)

(12) Was there access to the intranet on the school website? Were there any interactive aspects? How did the website engage the audience, blogs and Chat rooms?

(13) Were curricular goals and plans for ICT integration evident on the website?

When evaluating the **authority** of the website content the following indicators were considered.

(1) Was it obvious as to who had contributed information, content to the website?

(2) Were there external links to resources? If so were the authors of these websites clearly identifiable and credible?

When evaluating the **quality of the design** of the website content the following indicators can be considered:

(1) Had a design template been adopted or was the design tailored to reflect the school community?

(2) Did the design reveal an innovative approach to promoting the school?

Although the above list was not exhaustive it did provide a reference, which suggested indicators that addressed a broad range of issues in the area of novice and expert in the area of ICT integration and ICT leadership.

GENERAL FINDINGS

The investigations into school websites revealed that school websites that demonstrated a **novice approach** to ICT leadership and ICT integration, as determined by analysis of the identified criteria tended to:

- display basic web design and at times an adaptation of a template (e.g. SINA or at times no website at all i.e. no online presence);
- provide a Category 1 website, (i.e. the main purpose being to inform its audience, for example school providing a home page only with contact details);
- contain broken links (e.g. either within the website or to external links);
- show no evidence of maintenance and not be updated (e.g. links only to outdated newsletters);
- describe infrastructure and setup to be of Type A (e.g. ICT teaching by a specialist teacher in a computer pool once a week);
- consist of contributions from a selected few (e.g. by leadership only);
- reveal policies that predominately address surface issues in the process of ICT integration;
- provide incomplete information on the school website (e.g. sentences not completed and blank spaces left)

The investigations into school websites revealed that school websites that demonstrated an **expert approach** to ICT leadership and ICT integration, as determined by analysis of the identified criteria tended to:

- share or pool resources across schools and systems (e.g. shared lesson plans);
- demonstrate proficiency at utilising innovative ICTs;
- experiment with innovative technologies;
- contain contributions from a large number of staff and the wider school community (e.g. class pages);
- promote the website as a community forum;
- demonstrate a clear attempt to meet the needs of the learning community, and demonstrate flexibility;
- reveal sound policies and clear future directions;
- reveal partnerships with the wider community;
- demonstrate an understanding of the various components and potential of ICT in education;
- provide comprehensive coverage of information- organised so that it is easy to locate and navigate.

- describe and provide evidence of a well established infrastructure;
- provide access to an intranet and provision for online communication;
- be appealing and interactive;
- reveal integration of innovative technologies (e.g. in students work samples);
- provide broad coverage of associated issues (e.g. safety, ethical considerations, and flexible learning).

CONCLUSIONS

Evaluation of websites revealed significant differences between the novice and expert groups. This included differences in the coverage of content on the website. Websites ranged from those that mentioned the existence of an ICT policy to websites that revealed innovative practices in the area of ICT integration both in their policies and in the design and structure of their website. Those websites that were categorised as experts did not necessarily display a level of expertise in all areas related to ICT integration and ICT leadership, but often demonstrated specific expertise in an area or two, (e.g. ICT facilities, website design). It was interesting to note websites that tended to fall in the novice category were more easily identified, some because there was no current website available and some because the main purpose was purely to inform. In comparison, expert websites were more difficult to identify (i.e. the aspects that indicated expertise were not as evident on the school website). The reasons contributing to this observation require further research.

The investigations conducted into school websites have raised the following important research questions.

(1) Does ICT leadership, or a lack of leadership, determine the development of school websites?

(2) Does a lack of funding and resources impact on the quality of school websites?

(3) What type of support structures and training programs can assist schools to develop further their school websites if identified as a priority?

(4) Do leaders feel that school websites reflect the schools attitudes towards ICT integration?

(5) Are school websites an indicator of the level of ICT leadership and ICT integration?

(6) What processes are required to make the transition from novice school website to expert school website?

(7) What external influences impact on the development of school websites? (e.g. the employment of professional website designers).

The preliminary allocation of schools to expert and novice groups will be further analysed in subsequent stages of the research project. This will provide additional measures of the novice-expert contrasts, with the broader aim of continuing to develop a deeper understanding of the thinking processes, attitudes and approaches both of novices and experts towards ICT leadership and ICT integration.

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