Self-efficacy as an evaluation measure for programs in support of online learning literacies for undergraduates

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Abstract

This study evaluated an intervention for building undergraduates’ technological literacies for higher education in support of use of the learning management system and desktop applications. Self-efficacy scores between a control group and a treatment group were compared. Relationships between scores and demographic/experiential variables were also analyzed. The study failed to find (with limited strengths) significant differences between control and treatment. Differences between exempted and control students were found. Relationships between age, gender, and experience with online learning were rejected; however, a relationship between experience with computers and scores was not rejected. For treatment learners, mastery experience and physical/emotional response to task performance were stronger self-efficacy sources than were verbal persuasion and vicarious experience. Results indicated that design might be improved by increasing sources of verbal persuasion and vicarious experience. The study also highlighted a need to monitor students’ diverse backgrounds with technology.

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1. Introduction

This article reports on a study to investigate the broad question: Are intervention programs an effective means to increasing learner success in the virtual environment? This problem is important given the global trends toward increased participation in higher education, with increased use of Internet-based Learning Management Systems (LMSs) as a means to meet the demands of increasing numbers of learners, from increasingly diverse life and geographic circumstances. Increased reliance upon computing and communications technologies in future higher learning is inevitable. Institutions hope that these tools will support and enhance the effectiveness and efficiencies of their learning operations and seek to provide the new knowledge and skills needed to survive and thrive in their new technological environments (McDonald, 2004). If such programs can contribute to increased self-efficacy for learners as they negotiate the new task domain of virtual learning, learners are increasingly likely to persevere and achieve their higher education goals in complement with the institutions’ technologies. This suggests that an intervention’s impact upon commencing learners’ online learning self-efficacy may be a key to its effectiveness. Understanding where self-efficacy beliefs originate, including understanding the
effectiveness of interventions to support academic/technological task performance, can be aided by identifying the sources of self-efficacy information. This study examined how measurements and other data related to the self-efficacy construct can be practically applied towards continuous curricular program improvement in higher education. To understand the usefulness of self-efficacy measurements in program evaluations, a quasi-experimental study was conducted to evaluate the effectiveness of the technology skills curricular intervention alongside related experiential and demographic variables.

The use of online course management systems to support both face-to-face and distance delivery of learning has become widespread in higher education (Bollag, 2001; Willoughby, 2003). Many universities have recognized, for reasons of equity and to reduce attrition, they should help undergraduate students to adapt to their new technologies through curricular interventions (McDonald, 2004). As these intervention programs proliferate in an environment with tight fiscal realities, they are difficult to evaluate, and their impact is yet to be established. Self-efficacy, an important corollary of social cognitive theory, has been shown by numerous researchers (Bandura, 1997; Miltiadou & Savenye, 2003; Young-ju, Bong, & Choi, 2000) to be a valid measure related to increased probabilities that individuals will successfully perform required tasks in computing and academic domains.

Northern University (a pseudonym, NU), a higher education institution caught up in these general trends to support their students toward learning success, has instituted the Curricular Intervention for Computing (CIC) within the Academic Literacies (AL) course, aimed to build performance skills required for use of computing and Internet technologies that are now part of the University’s learning environment. Although this intervention has been in place for two years, and there have been general evaluations of the Program of Curricular Interventions (PCI) within which AL course is located, to date there have been no targeted evaluations on the outcomes of the increasingly critical CIC. Reasons for the lack of a specific evaluation may be that evaluation studies are expensive and time consuming, and that such studies also involve consented differential treatment of learners to increase validity of subsequent findings. Strategies to counter such obstacles are needed in order to continually evaluate and refine programs such as the CIC. In response, this study investigated the construct of self-efficacy as a possible solution which mediates time, cost and ethical constraints of ongoing evaluation of programs aimed at building undergraduate literacies in important domains. In this study the specific self-efficacy construct is online learning self-efficacy, and the specific performance domain is online learning.

2. Self-efficacy and evaluation

The importance of self-efficacy is becoming increasingly understood, proceeding from earlier research into behaviorism and agency theory (Pajares, 2002). Self-efficacy research explains much about how and why individuals perform differently at various tasks within a range of complex environments including academic and computing performance domains (Miltiadou & Savenye, 2003). Self-efficacy is defined as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainment (Bandura, 1997, p. 3).” Self-efficacy beliefs are constructed from four principal sources of information: “enactive mastery experiences that serve as indicators of capability; vicarious experiences that alter efficacy beliefs through transmission of competencies and comparison with the attainments of others; verbal persuasion and allied types of social influences that one possesses certain capabilities; and physiological and affective states from which people partly judge their capableness, strength, and vulnerability to dysfunction (Bandura, 1997, p. 79).” Documenting relationships between self-efficacy and performances should also enable practical evaluations of higher education programs intended to support individual learners towards successful higher learning.

2.1. Self-efficacy literature

Bandura’s self-efficacy is a key construct within social cognitive theory. It has shown potential for wide application in learning and development situations. It takes full account of external physical and social structures as well as internal cognitive and development processes. It is a cognitively and socially derived construct aligned closely with social constructivist theoretical traditions. Social cognitive theory is acknowledged as a “grand theory” (Zimmerman & Schunk, 2002) and Bandura’s work is recognized as “uniquely broad in scope” and having “moved psychological thinking away from previously limited conceptions in which learning required overt actions (American Psychological Association, 2004).” This scope has been widely fertile in spawning research across many important domains. The research it spawned has
provided numerous suggestions for the construction of learning interventions. However, to date this knowledge has not been applied to practical program evaluations.

Bandura (1997) defined self-efficacy as distinct from self-esteem: “Perceived self-efficacy is concerned with judgments of personal capability, whereas self-esteem is concerned with judgments of personal worth” (p. 11). The logic of this distinction is that an individual need not consider her/himself capable at all things to maintain a sense of self-worth. Key determinants of self-efficacy have been shown as participation in guided mastery experiences, vicarious experience, verbal persuasion, and physiological and affective states (Bandura, 1997, p. 19). Bandura stressed that none of these sources were in themselves diagnostic of self-efficacy, and that each one impacts reciprocally, in different strengths under different situations upon the other in contributing to an individual’s assessment of efficacy. Ultimately Bandura summed up the process of thinking as the complex interactions between “antecedent,” “consequent,” and “cognitive” regulatory systems (p.191). Antecedent systems include the environmental and experiential conditions that preceded the behavioral situation. Consequent systems are composed of the effects following a behavior, and cognitive systems include the awareness, insights and thinking of the individual before, during, and after, the behavioral situation. These interactive subtleties are more easily understood when explained as the results of “triadic reciprocal determinism” (Bandura, 1997). Referring to Fig. 1, it is shown that there are three determinants — behavior (B), internal personal factors (P), and the external environment (E). The bi-directional arrows indicate that the dynamics between these factors are emergent, in that they may influence each other at different times and in different sequences, rather than simultaneously. So, the bi-directional arrows do not imply constant or equal strengths, and this is the key to social learning theory’s explanatory weight under diverse circumstances and for diverse individuals. (Bandura, 1997, p. 6) explained that “relative influence will vary for different circumstances”, and further that this structure and dynamic allow for an inferential utility. Because of the time lag in the operation of the three sets of factors, it is possible to gain an understanding of how different segments of reciprocal causation operate without having to mount a Herculean effort to assess every possible interactant at the same time (Bandura, 1977, p. 6).

Much research has been done based on Bandura’s framework and using his methodologies for eliciting measures of self-efficacy (Bandura, 1997; Miltiadou & Savenye, 2003; Pajares, 1996; Zimmerman, 2000). Zimmerman noted that “Self-efficacy beliefs have been found to be sensitive to subtle changes in students’ performance context, to interact with self-regulated learning processes, and to mediate students’ academic achievement” (Zimmerman, 2000, p. 89).

Bandura’s framework has been extended to specific fields within the milieu concerning academic performance and the use of computers and other technologies (Anson, 1999; Brosnan, 1998; Forsyth & Archer, 1997; Jackson, 2002; Liu, Lavelle, & Andris, 2002; Madorin & Iwasiw, 1999; Murphy, Coover, & Owen, 1988; Raghuram, Weisenfeld, & Garud, 2003; Randall, 2001; Smith, 2001; Torkzadeh & Koufteros, 1994; Torkzadeh and Van Dyke, 2001; Young-Ju et al., 2000; Zeldin and Pajares, 2000). Self-efficacy scales consist of Likert items which allow the participant to report the strength of their positive perceptions about their abilities to perform behaviors successfully. Levels of self-efficacy have strong validity to specific task domains. The literature contains many studies which have validated self-efficacy scales for task domains academic performance (Pintrich & De Groot, 1990; Zimmerman, 2000), computing (Brosnan, 1998), and Internet use (Torkzadeh & Van Dyke, 2001). These studies also investigated participants’ attributes, looking at factors of gender, ethnicity, and age, and experience in the domain. To date, the online learning self-efficacy measurement has only looked at online learning efficacy relationships to nominal participant categories such as age (McCabe & Margolis, 2001), gender (Zeldin & Pajares, 2000), and ethnic background (Kuforiji, 1999). In their meta-review of work done to date on self-efficacy, locus of control, and attribution, Miltiadou and Savenye (2003) acceded that all three constructs had shown to be important within the

![Fig. 1. Triadic reciprocal determinism (Bandura, 1997, p. 6).](image-url)
academic domain and suggested the need for the type of study being reported here, noting “More research is needed in the context of the online environment to predict student success and lower attrition rates.”

Their paper reviewed studies covering six motivational constructs. Comparative to these other established constructs, either self-efficacy has proven to have a higher causal value in association and comparison, or the non-efficacy construct is applied generally without referring to a specific task domain. Order of causality is the key to the utility of self-efficacy, in combination with inferential techniques, as an evaluative measure. Rather than placing outcomes which occur post-performance in a priori position, the true a priori influence is an individual’s judgment of their ability to perform the task, as judged before attempting performance. The current study was undertaken to evaluate one of many proactive interventions intended to improve learner performance in the online learning environment. It explores the usefulness of self-efficacy to evaluate the value of the whole class of support interventions and strategies in use in higher education.

2.2. Evaluation literature


It is interesting that recent evaluative studies concerned with online learning and learning with technology are nowhere near as numerous when compared to the abundance of studies, as cited above, which have investigated individual cognitive and social implications of online learning. There is a general need to leverage the knowledge gained through research into online learning by applying it to program evaluation. Some of the fewer examples of such studies are concerned with process perspectives (Albaek, 1998) which include technology evaluation case studies described from the perspectives of students (Richardson & Turner, 2000) and lecturers (Joyes, 2000), and both lecturers and students (Williams, 2002). The participant-centered approach is consistent with the current trends of wide advocacy of constructivism (Jonassen, Peck, & Wilson, 1999) where the term learner-centered is widely used.

In addition, other writers offer evaluation frameworks for evaluating various technologies. The case described by Richardson and Turner (2000) was concerned with evaluating a Virtual Learning Environment (VLE), WebCT. They proposed the model where the student sits in the center and interacts with environmental elements including a) learning strategies, b) reading process, c) cultures, d) tutor attributes, and e) learning materials. These elements are not inconsistent with social cognitive theory’s (Bandura, 1997) reciprocal determinants, behavioral (B), Personal (P), and environmental (E) dynamics.

Joyes’ (2000) lecturer-centered case study was concerned with the broad effort to implement learning delivery using technology across several UK universities. He put forward a process map for evaluating the VLE which included (a) familiarization with the technology, learning materials and other institutional factors; (b) identification of issues; (c) interviews and ongoing dialogue with stakeholders; (d) tracking of ongoing issues in the environment; (e) identifying and assembling relevant quantitative data; and (f) producing the evaluation report.

Williams (2002), inspired by Ehrmann, recommended asking the right questions to the right people: “Ehrmann (1995) suggests we ask, ‘Has [the] educational potential [of courses and programs using learning technologies] been realized in improved outcomes?”

In summarizing the learning technology evaluation literature considered in respect of this present study, it is possible to make several interesting observations. First, the constructivist orientation is apparent as the predominant approach is process-orientated. Second, in respect of the writers considered, the process approach presupposes that qualitative methods are usually most appropriate. The last observation is that, given the abundance of learner-centered quantitative methods available in cognitive and learning psychology, there is scant application of that considerable body of knowledge to evaluation of technology as it impacts the learner. This is not to imply that the qualitative data are not significant, and should not feature in certain evaluations, or not be used in conjunction with available quantitative methods. Evaluation is complex (Oliver, 2000) and accordingly should be availed of a range of methods under a range of circumstances.

2.3. History of program evaluation of PCI

In the case of the present study, the PCI program, within which AL course containing the CIC (treatment) resides, has already been the subject of a “top-down” (Albaek, 1998) evaluation. The CIC has received implicit (Barbier,
evaluation on its establishment and with each iterative change during the last four years the AL course has been delivered. It has also been evaluated spontaneously (Barbier, 1990) through anecdotal feedback. There have been previous instituted (Barbier, 1990) evaluations commissioned by NU concerned with the entire AL Program. Demarteau’s (2002) criteria for instituted evaluation includes “the use of well defined instruments and methodology; socially authorized persons to conduct it; and formalized results to be used” (p. 457). Previous evaluations have left the methodologies and instruments to be better defined. The aim of this study, then, was to improve upon the methods and instruments used in the previous instituted evaluations. Online learning self-efficacy provides an opportunity to measure the program at the more granular level of the CIC. A key driver for this present study was to improve on the sophistication of instruments and methodology used, in support of a more effective evaluation process.

The present study focused on evaluating, at the level of the CIC, the socio-demographic factors and situational pedagogic factors, in line with the approach taken by NU’s 2002 evaluators for evaluating the PCI as a whole. In order to accomplish this, it was necessary to identify a strategy which accommodates the description of the learning activities of the CIC as an independent variable in order to test for a relationship to described outcomes. A methodological solution for such an evaluation became apparent on realization that the desired outcomes of the CIC have a proxy from within the framework of Social Learning Theory, in validated measurements of online learning self-efficacy. Through quasi-experimental measurement, the self-efficacy output variable might be tested for a relationship, with the treatment of the CIC. In addition, if a relationship existed, it could be further explained by looking at the sources of self-efficacy and the extent to which they are present in the CIC. The need to seek more malleable measures points to self-efficacy as a measure that, if based on well-constructed sales, offers evaluation information which may be less effected by rapid technological changes and less threatening and cumbersome to administer and analyze.

3. Applying research methods to evaluation

This study set out to test an innovative method of evaluating a program’s impact upon online learning and related computing literacies by using the self-efficacy construct as an output measurement. The choice of evaluation method was based on the logic that the self-efficacy construct shows strong relationships to individual performance outcomes at specific tasks, and has been widely researched in numerous and relevant task domains (Bandura, 1997; Miltiadou & Savenye, 2003), and has shown to be a valid measure related to increased probabilities that individuals would be able to successfully perform required tasks. This study was to utilize static group comparison, causal comparative, and descriptive statistical methods to address the problem and research questions, as detailed below.

3.1. Methods used in current study

The research methods and design (see Fig. 2) considered not only the impact of the treatment under examination; it also needed to identify the impact of potentially confounding variables. Self-efficacy can be derived from four known sources: mastery experience, vicarious experience, verbal persuasion, and physiological/affective states. These sources are experiential, and it was of interest to measure independent levels of experience across known categories, such as previous experience with computers, or previous experience with online learning. Also, an individual’s experience may be pre-determined by demographic factors. Research into self-efficacy in computing and academic domains has shown this to be the case, in particular with regard to demographic variables of gender (Young-Ju et al., 2000; Zeldin & Pajares, 2000) and age (Bandura, 1997; Lankard, 1999; McCabe & Margolis, 2001). Therefore, in framing its research questions, the study also considered the relationships of four other variables with the measures of self-efficacy. Membership in either group was non-random, as a result of the individual circumstances of the participant, including how long they have been studying at NU and the availability of other courses required for various individuals’ chosen programs. It may have been preferable to impose stricter experimental control (Leedy & Ormrod, 1999, p. 238) and to measure online learning self-efficacy from participants selected randomly from total NU student population. However such a sample could not be feasibly accessed.

Static group comparative method allows for the comparison of two groups in cases where random assignments to groups are not feasible. The study aimed to determine whether or not the use of such self-efficacy scales would
be a practical mode of program evaluation, which can be utilized for continuous program evaluation in the future, where sufficient planning and lead time will be in place to provide more controlled study conditions, of which results might be more generalisable. Causal comparative is a more sophisticated research method for such circumstances where it is not possible to randomize assignment to treatment and control groups (Ary, Jacobs, & Razavieh, 1990; Gall, Gall, & Borg, 2003). It is included in this study to mediate internal validity problems of relying solely upon static group comparison. It also provided analysis concerned with statistical relationships between the independent variables (gender, age, previous computing experience, previous Internet experience, and previous online learning experience) and the dependent variable, online learning self-efficacy as scored using the instrument. Descriptive analysis was also used. The instrument contained items that fit into both explanatory and descriptive classes of survey research (Ary et al., 1990, p. 407).

3.2. Research design of the study

Research questions, participants and setting, treatment, instrumentation, assumptions and limitations were as outlined below. Research Questions and Related Null Hypotheses are shown in Table 1.

3.2.1. Participants

Participants were NU undergraduate students. Students served by NU come from a diversity of backgrounds. Cultural background variables include discrete and mixed profiles of indigenous, European, and Asian ancestry. Age profiles are broad, with a significant percentage of students older than 25 years. Experiential variables pertaining to computing and communications technology are diverse. Physical locations are also diverse with broad
variation in the access to computing and communications infrastructure available at different sites where learners undertake their studies. NU serves the higher education needs of students dispersed widely throughout Northern Australia, where the average population density is less than four persons per square mile. NU also provides higher education to overseas students, both onsite and via distance learning. Consequently, NU has an incoming student base that reflects diversity, perhaps to a greater degree than many universities in major population centers. This diversity is seen in terms of age, cultural background, and past access to computing and communications infrastructure. The range of descriptors in higher education student profiles in terms of age, gender, and socio-cultural background is broadening in Australia, much the same as in the United States and globally (Australian Vice Chancellor’s Commission, 2001, p. 47). The LMS in place at NU is typical of those currently being used and implemented at universities and other post-secondary institutions worldwide. Its primary function is to provide access to resources and facilitate communications organized around a particular set of educational objectives, or unit of curricula. The population consisted of the undergraduate students of NU. The non-random sample consisted of 460 students enrolled in an elective of the PCI. Of those enrolled, 50% were women and 50% were men. The sample frames for this study were nonrandom; however, a considerable size of sample participants was available with treatment and control groups available to be surveyed under the same conditions. It was known that approximately half of these had completed the CIC, and the other half were yet to complete that course which contains the treatment. Some students had been exempted from the CIC and AL course by demonstration of required learning outcomes. Students self-reported their status regarding this independent variable.

3.2.2. Treatment

The treatment for this study was the curricular intervention for computing (CIC) which is in place to support learners toward successfully using the LMS includes instructional content and activities for using the LMS as well as word processing, spreadsheet, and presentation software applications. All students are required to complete a course entitled Academic Literacies (AL) upon commencement of their studies. However, as the requirement was introduced retroactively for many students, there are significant numbers of students well advanced in their undergraduate programs, who have not completed the required course. Enrollments in the program exceed over

| Table 1 |
| Research questions and hypotheses statements |

Research Question 1: What are the differences, as measured by a validated instrument, the TOIS (TOIS) in online learning self-efficacy, between students who have completed Curricular Intervention for Computing CIC (treatment) and students who have not completed CIC (control); between students exempted from completing CIC (exemption) and students not completing CIC (control); and students having either completed or exempted from CIC (treatment plus exemption) and students not completed CIC (control)?

**H01a:** There is no significant difference between the mean TOIS scores of students who have completed the CIC (treatment) and students who have not completed the CIC (control).

**H01b:** There is no significant difference between the mean TOIS scores of students exempted from completing the CIC (exemption) and students who have not completed the Computing Component of CIC (control).

**H01c:** There is no significant difference between the mean TOIS scores of students who have either completed or been exempted from completing the CIC (treatment inc. exemption), and students who have not completed the CIC (control).

Research Question 2: What are the relationships between independent variables of age, gender, previous experience with computers, and previous experience with online learning and the dependent variable of online learning self-efficacy?

**H02a:** Mean age shows no significant relationship to online learning self-efficacy.

**H02b:** Gender shows no significant relationship to online learning self-efficacy.

**H02c:** Previous Computing Experience shows no significant relationship to online learning self-efficacy.

**H02d:** Previous Online Learning Experience shows no significant relationship to online learning self-efficacy.

Research Question 3: How, as reported by learners, does the curricular intervention for computing provide the four theoretical sources of self-efficacy: mastery experience, vicarious experience, verbal persuasion, and physiological/affective state?

HO n/a for descriptive analysis.
1000 students per academic year. A team of two course coordinators (one for face-to-face students and one for distance students), over 10 tutors, and five librarians are involved in developing and delivering the content, and assessing students’ work through both face-to-face and distance education modes. The AL course is run over a 13 week semester, during which weeks 3 through 7 are devoted to the curricular intervention for computing (CIC). The CIC is worth 20% of assessment in the AL course, and includes practical exercises in using the LMS as well as marked assignments to develop skills and confidence to work with word processing, spreadsheet, and presentation software applications.

3.2.3. Instrument

The instrument used in this study was designed to gain data from the participants enrolled in the AL course who volunteered to complete the instrument early in the semester, and contained the items from the Tennessee Online Instruction Scale (TOIS) developed by Randall and Petty (Randall, 2001). The TOIS measures levels of self-efficacy of learners engaged with online instruction (this study used the term “online learning” in preference to “online instruction.” The reason for this that the theoretical framework self-efficacy resides within constructivist/cognitive schools of theory, rather than the behaviorist tradition, from which the term “instruction” emerged). In addition to the TOIS items, the instrument had items concerning age, gender, ethnicity, and previous experience with online learning and computing technologies. Participants in the treatment group also were asked to report their perceptions concerning which of the four sources of self-efficacy (mastery experience, vicarious experience, verbal persuasion, and affective state) they recollected were most affected by the CIC. In the original development of TOIS self-efficacy items Randall (2001) followed Bandura’s (1997) guidelines with the exception of using a 7-point-scale rather than a 100-point or 10-point-scale as recommended by Bandura, arguing that this made the instrument more usable, and such an adaptation was consistent with other authorities on psychometric testing. Randall described development steps, including generating an initial 120 items, and reducing these to a pool of 65 items based on advice from online student and teacher experts. He ensured face validity by generating the original items based on literature concerned with online instruction and social cognitive theory, and further reviewed the instrument by subject matter experts from each of those fields. After this phase, the total items were reduced to the present 40. Pilot testing with a group of 30 students indicated item clarity and acceptable total reliability coefficients for item groups of: a) online course activities, b) self-regulation, c) collaboration, d) communication, and e) learning methods/preferences. The overall internal reliability of Randall’s pilot test was .98, using Cronbach’s $\alpha$. In his main study the factor analysis showed the best fit from emergent factors from the items to be a) Internet/technology behaviors, b) collaborative behaviors, and c) individual behaviors. The TOIS needed to be validated with the new population in the current study. A pilot study was completed with a small sample of undergraduate students enrolled in an elective course of the PCI at the end of Semester 1, 2004. The instrument was administered using the survey and quiz functions of the University’s learning management system (LMS). Although it was possible to administer the survey items through the “Survey” function of the LMS, data analysis at the individual participant level was not part of the system’s design. To resolve this in the main study, the survey items were reformatted into the “Quiz” function of the LMS. This did allow for access to the data by individual participant, however, the pilot data were processed using printouts and transferred to an Excel spreadsheet. The number of pilot respondents was 12, a response rate of less than 10%. Given difficulties with obtaining and processing data in the pilot study, alternative strategies for administration and manipulating the required data would be necessary. The pilot reliability of the TOIS (items $N=48$, participants $N=12$) was $\alpha=.965$, consistent with $\alpha$ values reported by Randall (2001). During the pilot it arose that several students had received exemptions from the CIC for their AL course, so the instrument’s item to identify whether the participant is a member of treatment or control populations was modified to provide the third class of those exempted from the requirement.

3.2.4. Assumptions and limitations

Assumptions were that participants came from a range of backgrounds, ages, urban, suburban, and remote locations that may influence self-efficacy in different ways. It was assumed that students participating in the study would provide honest responses to the items on the instrument. In terms of limitations, the control and treatment sample were not assigned to participants chosen randomly from the total population of NU undergraduate students. Therefore, the study must be regarded and interpreted as a quasi-experimental design. Also, students may have had different instructors, taken their CIC in different delivery modes (distance/face-to-face), have taken other technology courses, and hence presented with different levels of online learning self-efficacy.
4. Results

In the main study, the instrument was administered to students enrolled in a large (approximately 450 students) core elective within the PCI at NU. The composition of students to be enrolled in this course during Semester 2, 2004 provided the opportunity to measure self-efficacy levels within both control and treatment groups. It was envisioned by the AL program developers that students should complete the AL course in their first term of study. However, the fact that many students began their undergraduate programs prior to the establishment of the AL as a mandatory course had serendipitously provided useful quasi-experimental conditions for conducting this study. The control group consisted of the students yet to complete AL course. The treatment group contained students who had previously completed AL. A small group of students had been exempted from completing the CIC. The LMS email function within the course website was used to send students a hyperlink to survey information, an informed consent form, and the instrument, which were hosted online in a secure online survey database. An error during the survey upload process rendered one of the survey items unintelligible. Data from this item were not included in the reporting and analysis. The response rate was 32% (110/342). Participants were able to opt out of completing items. Two blank surveys were excluded from analysis. Another with only one item response was excluded, leaving an adjusted response rate of 31% (107/342). Several other instruments were incomplete, with at most six items left undone. Reliability of the TOIS items for the actual study (items \(N=39\), participants \(N=107\)) was \(\alpha=0.965\), a similar level of reliability was found when the Randall (2001) administered them to electrical instructors.

4.1. Data analysis procedures

Analyses included: (a) tests for significant differences between control, exemption, treatment and exemption plus treatment in online learning self-efficacy; (b) tests for correlation between factors of age, gender, cultural background, and previous experience with computers, and working with an online course management system and levels of online learning self-efficacy in both the control and treatment groups; and (c) analysis of CIC self-efficacy sources (mastery experience, vicarious experience, verbal persuasion, and affective state), as reported by participants as contributing to changes in their self-efficacy levels.

4.2. Results for analysis

Of the 107 responses available for analysis, there were 42 who had not completed the CIC (control group), 53 whom had completed the CIC (treatment group) and 12 whom had received an exemption for the CIC (exemption group).

Before proceeding to hypothesis testing, exploratory data analysis was undertaken, in order to identify existence of any extreme cases impacting upon the sample means of TOIS score values for each group. One extreme score (OLSE = 3.6 vs. \(M_{OLSE}=5.46\)) was identified. In the treatment sample, stem and leaf plots also identified one extreme score (OLSE 2.74 vs. \(M_{OLSE}=5.58\)). The exemptions sample contained no extreme scores (\(M_{OLSE}=4.88\)). The outliers identified in the control and treatment groups are not “influential” (Triola, 2001, p. 531), given the number of participants and are excluded in the hypothesis testing.

Also, histograms were generated to confirm normal distributions prior to the hypothesis testing (Dancey & Reidy, 2004). Given that the distributions all approximated the normal distribution curve, means were compared using the parametric \(t\) statistic rather than the nonparametric Mann–Whitney \(U\) test (Gall et al., 2003). Another assumption, which was met for using the \(t\) statistic, was that sample distributions have approximately equal variances (Coakes & Steed, 2003; Dancey & Reidy, 2004). The 95% confidence level was used. Effect sizes, showing differences between means in standard deviations (Dancey & Reidy, 2004) denoted as \(d\), were also calculated.

In this study the TOIS scale continued to show high internal consistency (Randall, 2001) when extended to the population of undergraduates at NU and provided a reliable base on which to capture an output measure for this study. Research questions investigated concerned: a) the impact of the intervention upon online learning self-efficacy measures; b) the impact of other covariates upon online learning self-efficacy levels; and c) sources of self-efficacy impact, according to social cognitive theory, as reported by students who had completed the CIC.
4.2.1. Research Question 1

The independent t tests data (see Table 2) showed that Research Question 1 was answered with a failure to reject the null hypothesis, in other words, that the data do not show that the treatment group mean varies significantly from the control group means.

The study found that the mean online learning self-efficacy (OLSE) scores of the treatment group (those who have completed the CIC) did not vary significantly from the control group (those who have not completed the CIC). Although this study did not reject hypothesis H01a regarding the impact of the treatment, the statistical power of the procedure used to obtain this finding was quite small and the difference in mean OLSE scores of the control and treatment groups was \( \frac{.0926788}{.10} \). Given the design and power of the study, this apparently negative impact of the CIC on the outcome measure of OLSE will be regarded cautiously in making recommendations. This study rejected H01b concerning exempted students (no treatment) vs. the control group. The direction of the rejection was unexpected, in respect of an expectation that the exemption policy would be hoped to exempt only students who already could register OLSE scores at a level on par with those who had already completed the CIC, and, by extension, higher than those who had the “benefit” of the CIC intervention experience. Although the number of participants in the exemption group was small (\( n = 12 \)) the statistical power of the test was relatively strong. Still, any action to revise the exemption policy based on this finding would be premature. However, it does indicate an opportunity to carry out further research to ensure that an exemption policy is achieving the desired outcome at NU, and that students who would benefit from the CIC intervention are not excluded from that opportunity. This study did not reject hypothesis H01c, concerning differences between combined treatment and exemption groups vs. the control group. This is not surprising, given the weight of participants in the treatment group (\( n = 52 \)), where H01c was not rejected, was much greater than that of the exemptions group (\( n = 12 \)) where H01b was rejected. Testing this “combined” hypothesis was important, as it examined the acuity of the assumption that students exempted should be equivalently prepared to succeed in online learning as students who have had the benefit of completing the CIC.

4.2.2. Research Question 2

Research Question 2 showed that the null hypothesis of no significant relationship between age and online learning self-efficacy was not rejected. Also for the covariates gender, and experience with online learning the null hypotheses of a relationship with online learning self-efficacy were rejected, while a null hypothesis of the relationship between experience with computers and online learning self-efficacy was not rejected. Females reported higher mean OLSE scores than males. There was a positive relationship between previous computing experience and OLSE. Previous online learning experience also indicated a positive relationship with OLSE. Conditions for linearity required for ANCOVA analyses were met for all covariates except for age.

The ANCOVA analysis (Table 3) therefore does not include age. Because age could not be included in the ANCOVA, a measure of bivariate relationship was used to test for correlation. The results (Table 4) from the hypotheses tests for answering RQ2 indicate no relationship between age, gender, and previous online learning

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Table 2
Results of hypothesis testing for Research Question 1

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean OLSE score</th>
<th>Mean difference</th>
<th>Fail to reject/reject H0?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment vs. control</td>
<td>53</td>
<td>5.58226</td>
<td>-.0926788</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>Exemptions vs. control</td>
<td>12</td>
<td>4.878417</td>
<td>.55871310</td>
<td>Reject H0</td>
</tr>
<tr>
<td>Treatment plus exemption vs. control</td>
<td>65</td>
<td>5.43273</td>
<td>.0328245</td>
<td>Fail to reject</td>
</tr>
</tbody>
</table>

Table 3
ANCOVA results

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>( F )</th>
<th>Sig.</th>
<th>Partial ( \eta^2 )</th>
<th>Observed power (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>1.531</td>
<td>.219</td>
<td>.015</td>
<td>.232</td>
</tr>
<tr>
<td>Prev_comp</td>
<td>1</td>
<td>11.371</td>
<td>.001</td>
<td>.101</td>
<td>.916</td>
</tr>
<tr>
<td>Prev_OL</td>
<td>1</td>
<td>3.712</td>
<td>.057</td>
<td>.035</td>
<td>.479</td>
</tr>
<tr>
<td>Group</td>
<td>3</td>
<td>3.552</td>
<td>.017</td>
<td>.095</td>
<td>.772</td>
</tr>
</tbody>
</table>

Dependent variable: OLSE.
experience. However, the relationship between previous online learning experience and OLSE is only narrowly rejected \((p = .056)\). A relationship between previous computing experience and OLSE is indicated.

In regard to the variable (treatment and control groups), taking into account the partial effects of these covariates examined in RQ2, the influence of the grouping variable \((F=3.55, p = .017, \eta^2 = .095)\) is significant, appearing to explain 9.5% of the variance. If the RQ1 null hypothesis statement was to be reformulated and tested using ANCOVA instead of the static group comparison means test (i.e. there is no significant relationship between the mean TOIS scores of students who have completed the CIC and students who have not completed the CIC), this study would have a 77.2% chance of rejecting a false condition of the null hypothesis. Research Question 2 was tested using four hypothesis statements for examining relationships of a) age; b) gender, c) previous experience with computers; and d) previous experience with online learning with levels of OLSE. This study did not reject H02a (age). The age distribution of participants, although it included participants across all age categories, was noticeably skewed toward traditional aged (under 20, and 20–25 year-old) students, so a more conservative non-parametric statistical procedure was used. The slope of the line of best fit was flat. This age distribution shows that the population of undergraduate students at NU, although diversified in terms of age, continues to be dominated by younger students. This may be important in other areas of concern for the operations of NU, however, in this study, the age factor does not point to differences in OLSE scores. This result diverges from earlier literature on age demography (Walsh, Gazala, & Ham, 2001, p. 282) of computer and Internet use which indicated a negative relationship. With regard to age and self-efficacy, Bandura’s (1997) discussion of self-efficacy in advancing age indicates that not only will fewer older people be using the Internet, but, also, the rate of growth in older age groups will be slower, since there are few similar peers displaying Internet behavior for older people to model (p. 98). These findings support later literature (Cole, 2003, p.21) which shows the negative demographic relationship to be dissipating quickly as computing and Internet technologies gain greater acceptance and dissemination across all age categories. It was notable in this study that of the 110 participants volunteering to complete the survey instrument, nearly two-thirds were female. This study did not reject H02b (gender) using the \(t\) test to compare mean OLSE scores. However, the ANCOVA analysis did indicate a significant relationship between female gender and higher OLSE scores. That finding was that gender explained 15% of the variation when included in an ANCOVA model alongside previous computing experience, previous online learning experience, and completion of the CIC treatment. The trend toward increased adoption by females of computing and Internet technologies is consistent with recent literature indicating that females are using these technologies in equal numbers as males (Cole, 2003, p. 21) although differently (Jackson, Ervin, Gardner, & Schmitt, 2001) and to advantage (Herring, 2003) in managing diverse functions including home-based careers and higher education participation made possible by increasingly more flexible approaches to work (Raghuram, et al., 2003) and study (Allen & Seaman, 2004) becoming available. This study rejected hypothesis H02c (previous computing experience). In the ANCOVA analysis, this variable explained just over 10% of the variance in mean OLSE scores, and the test obtained high statistical power. The impact of previous experience, in this case with the use of computers, has been shown in other studies (Brosnan, 1998; Murphy et al., 1988) to be important to levels of self-efficacy. Previous experience, if successful, provides mastery experience as a source of self-efficacy (Bandura, 1997). In a diverse population, it is likely that part of the diversity will be expressed in varying levels of previous computing experience, and indeed, in this study, the self-reported scale of experience with computers returned by participants completing the survey reflected the normal distribution. This study also rejected hypothesis H02d (previous online learning experience). In the ANCOVA, this variable explained 3.5% of the variance in mean OLSE scores, within a test with only moderate statistical power. Again, as with the covariate of previous computing experience, previous online learning experience provides opportunities for participants to have gained mastery experience in the task domain under consideration. The smaller explanatory contribution of this factor may be due to the fact that online learning self-efficacy requires that the learner has positive expectations about only succeeding with the use of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig ((z = .05))</th>
<th>Fail to reject/reject H0?</th>
</tr>
</thead>
<tbody>
<tr>
<td>H02a Age</td>
<td>.6</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>H02b Gender</td>
<td>.22</td>
<td>Fail to reject</td>
</tr>
<tr>
<td>H02c Previous computing exp</td>
<td>.001</td>
<td>Reject</td>
</tr>
<tr>
<td>H02d Previous online learning exp</td>
<td>.057</td>
<td>Fail to reject</td>
</tr>
</tbody>
</table>
technology (Internet/technology factors), but also in the combination of computer use with the other salient factors (Randall, 2001) of online learning, including collaborative factors and personal factors. In summary, the findings of this study regarding Research Question 2 suggest that demographic variables may predict online learning self-efficacy in a more transitory way than experiential variables. Although there is literature supporting recent phenomena of efficacy with technology and online learning varying by gender and/or age, such results may not hold over time, having more to do with the patterns of diffusion and adoption of technologies through society. On the other hand, the experiential variables showing positive influence are consistent with social cognitive theory, in particular with the proposition that mastery experience may be one of the stronger sources of self-efficacy in a particular task domain (Bandura, 1997; Smith, 2001).

4.2.3. Research Question 3

Research Question 3 showed that learners reported that mastery experience and physical/emotional response to task performance were stronger sources than were social sources of vicarious experience and verbal persuasion (Table 5). Contextual data collected during the study were also presented.

Means and standard deviations were computed and compared in descending order. Mastery experience (me) provided the highest mean (M=5.37, SD=1.77), next highest was emotional/physiological state (ep) (M=4.31, SD=1.54) followed by verbal persuasion (vp) (M=3.81, SD=1.69), and lastly vicarious experience (M=2.92, SD=1.75). Descriptive analysis for answering Research Question 3 revealed that in recalling experiences of completing the CIC, learners report that mastery experience and physical/emotional response to task performance were stronger sources than were social sources of vicarious experience and verbal persuasion. Research Question 3 is related to social cognitive theory in the instance of the curricular intervention for computing (CIC), the treatment variable of this study. Mastery experience demonstrates the greater impact on self-efficacy, as reported by participants as they recalled the treatment. In terms of the study, mastery experience was recalled as the greatest influence on learning, followed by participants’ affective/physical states, then followed by verbal persuasion, and lastly by vicarious experience. In general, the predominance of mastery experience is consistent with what is expected from social cognitive theory (Bandura, 1977, 1997). Although there has been some indication that females may respond more strongly to verbal persuasion than males (Zeldin & Pajares, 2000), this did seem to mediate the results of this study, where data were provided by a set of participants which were predominantly female. It is notable that the two more highly ranked sources from this study (mastery experience and affective/physical state) are more independent of the social context which is indicated for good practice in online learning (Graham, Cagiltay, Lim, Craner, & Duffy, 2001). In terms of the CIC intervention, the question of design, and whether or not there could be better use of collaborative and communications strategies which would provide sources of vicarious experience (through observing others) and verbal persuasion (encouragements from other students and tutors) must be asked. An alternative design may or may not indicate whether mastery experience is predominant as a feature of the self-efficacy construct or owing to the design of an intervention.

Qualitative data were available concerning the CIC and these provide context for the evaluative exercise RQ3 of collecting self-efficacy level and perceived source data, especially in terms of instructor-provided verbal persuasion information. The comments reflect a diversity of attitudes towards the intervention, and towards their own conceptions of readiness to use the required technologies in their higher education programs. They also indicate a lack of awareness about the exemption policy, with several comments indicating additional students may have sought exemptions if they had been aware of this opportunity.

Table 5
Results for Research Question 3 and descriptive statistics of sources of online learning self-efficacy

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>me</td>
<td>51</td>
<td>0</td>
<td>7</td>
<td>5.37</td>
<td>1.777</td>
</tr>
<tr>
<td>ep</td>
<td>52</td>
<td>1</td>
<td>7</td>
<td>4.31</td>
<td>1.541</td>
</tr>
<tr>
<td>vp</td>
<td>53</td>
<td>1</td>
<td>7</td>
<td>3.81</td>
<td>1.688</td>
</tr>
<tr>
<td>ve</td>
<td>53</td>
<td>1</td>
<td>7</td>
<td>2.92</td>
<td>1.752</td>
</tr>
</tbody>
</table>

me = mastery experience; ep = emotional/physical; vp = verbal persuasion; ve = vicarious experience.
5. Discussion

Several important trends underpin the need for evaluations studies such as this one, including a) continuously broadening access to higher education, b) increased pressures on higher education institutions to achieve measured positive outcomes with fewer resources, and c) pressures on individuals to adopt technologies in order to reach their higher education goals. In addition, there is a need to operationalize recent research findings into applied settings. Broadened higher education access means more diverse individuals are engaging with established institutions used to dealing with a traditionally more narrow profile of learner. At NU, this study found that the diverse circumstances and demographic backgrounds of undergraduates in terms of age and gender still contain a significant number of “traditional” students, who must pursue their goals in company with a notable number of individuals from a non-traditional profile. In terms of using technologies to learn, age was not a significant factor, while gender did differentiate efficacy, in the female direction. This gender differentiation is in a “non-traditional” direction. It also found that the intervention currently in use to support online learning self-efficacy reflects traditional instructional strategies, which do not leverage all of the sources of self-efficacy, over-relying on mastery experience and self-regulation of affective/somatic state. In terms of sources which may favor non-traditional learners, there is opportunity to improve the equity of the intervention and take advantage of vicarious experience and verbal persuasion as sources of self-efficacy.

The outcomes of the study indicate that efficiency suffered with a totally post hoc evaluation strategy. The validity of such a reactive strategy was less than might have been obtained with measures gained under stricter experimental controls. The evaluation instrument was cost-efficiently deployed and did demonstrate reliability. Clear opportunities exist to improve and build upon this study and its strategy of measuring domain specific self-efficacy as an output variable using the TOIS instrument. The TOIS instrument (Randall, 2001) is a useful model for developing instruments to examine other intervention programs targeted at other task domains.

In this study comments offered by students about the CIC demonstrate that NU does not yet have in place a policy which can accommodate such a diverse range of technological literacy levels as exists in its undergraduate student population. Other institutions are also struggling with this issue (McDonald, 2004; Peters, 2001; Winship, 2001). Contributing to this issue is the lack of knowledge and exemplars of efficient and effective measures which allow institutions to assess and reflect upon technological implementation and their strategies for supporting them for the benefit of individual as well as institutional benefit. Commonly deployed evaluation practices usually involve the engagement of third-party experts, and become an operation in themselves, something arbitrary and interruptive to the successful deployment of the intervention as envisioned, and uncomfortable for both those delivering and those meant to benefit from the intervention. Not only can such evaluation negatively impact upon the desired effectiveness of the intervention, it also requires additional resources without ensuring the benefits of the program have occurred. In terms of the impact on individuals meant to benefit from a program, such procedures may be most harmful or intimidating to those in the target group who are most in need of the intervention’s benefits. A further issue concerning the lack of foresight in building evaluation into the design of interventions is that any results from these arbitrary and interruptive interventions may suffer questionable reliability and validity, thereby creating further conundrums of accountability.

This study explored new strategies for evaluating an intervention to support undergraduate students to ensure they are equipped with needed abilities to function in the current technological contexts of higher education. It was designed to examine the practical utility of existing knowledge provided by many studies of the relationship between measures of self-efficacy and individuals’ performances in academic and computing domains.

5.1. Recommendations for future study

The outcomes of this study lead to a number of recommendations in categories of (a) theoretical considerations and suggestions for further study concerning self-efficacy in the domains of academic and technology performance; (b) theoretical considerations and suggestions for further study in the field of evaluating enabling interventions in higher education; and (c) practical recommendations for improvements and ongoing evaluation of the CIC at NU.

The most salient recommendation emerging from this study in category (a) concerns awareness and understanding of self-efficacy and gender. This study, given the high rate of response from female participants, demonstrates that current assumptions, concerning differences in male and female efficacy levels with technology, must be continuously revisited as technology uptake in society continues apace. Although female participation rates in higher education have grown to a point representative of the general population, progression of equal gender representation across areas of study, and into
postgraduate and academic ranks is still a problem, particularly in the Australian context (Carrington & Pratt, 2003). Recommendations for future study in this category are: (a) continuous monitoring of female participation, success, and other responses to technology as used in higher education operations, (b) continued work to extend understandings of how individuals of different genders respond to the sources of self-efficacy (Zeldin & Pajares, 2000), and how these responses can be incorporated into the design of interventions which will lead to equitable outcomes.

In regard to category (b), in reinforcement of voices in the literature (Thurston & Potvin, 2003), this study demonstrated why evaluations must be planned from the earliest possible point in the development and deployment of an intervention, and the premeditation of the planning may be at least as if not more important than the evaluation method and underpinning theoretical propositions upon which planned evaluations will be based. No matter what point the evaluation strategy is conceived in relation to the deployment of the intervention, it would seem desirable to use a strategy that is effective and efficient, and takes account of both aggregate rational agendas as well as critical propositions for individuals and social groups. Recommendations for future study in this category are: (a) in terms of administration, the strategy of deploying self-efficacy scales shows merit and should be further applied in other situations and in future evaluations of the same program, (b) meta-reviews of evaluation to examine the relationship of indices or categories of statistical strength against a measure of premeditation/planning, and (c) development of corresponding indices or categorizations for effectiveness and efficiency of evaluation deployment in terms of costs and the invasiveness on the individuals receiving the intervention.

Lastly, there are several recommendations which emanate from this study relating specifically to the operation and refinement of the CIC at NU (category (c)): (a) continued research into the relationship of gender and the impact of sources of self-efficacy, (b) continued research into the relationship of age and the impact of sources of self-efficacy, and (c) continued monitoring of the exemptions policy. With regard to the relationship of gender and the impact of the sources of self-efficacy, it was found that female students were approximately twice more likely to participate in the online survey than males, a rate higher than the approximately 60% to 40% gender makeup of the class (based on a rough gender analysis of first names). Females did show a higher mean OLSE than males. In the ANCOVA analysis, it was found that gender explained approximately 15% of the variation in OLSE scores. Therefore, an ongoing and planned evaluation program should track gender more precisely and analyze if there are indeed significant differences between males and females at NU, particularly looking at whether the findings of Zeldin and Pajares (2000) that females respond to a greater degree of verbal persuasion and affective somatic state than do males are consistently contradicted by the undergraduate population of NU.

In terms of instructional design and continuous improvement, the current course outline document for the AL course prescribes the learning outcome relevant to the CIC should be expanded to reflect the broader technological literacies required in the emerging networked world. The literacy base needed for online learning in higher education is increasingly relevant to lifelong learning in the workplace, as well as to finding a place in the present future workforce reflecting increased teleworking from home and other situations which require functioning with the aid of technology to achieve tasks large and small working collaboratively with others at distance. An expanded outcome statement could actually reflect all three factors identified by Randall (2001) during the development of the TOIS items. Currently, NU is demonstrating awareness only of the computing skills requirements of operating desktop and Internet software programs; it also needs to take into account the other personal and collaborative skill factors.

With regard to the distribution of ages of students and the exemption policy, there are two separate but related questions to consider in more detail. The first is the distribution of ages amongst the NU student population. Although there was diversity across all age categories, the study documented skewness toward the two younger categories (mode was “20 or under,” median was “20–25”) which are representative of the “traditional” undergraduate. However, the study did not find a significant relationship between age and online learning self-efficacy. A recommendation is to examine the relationship between age and students’ choices to seek an exemption from the curricular requirement of the CIC, to find if age and accompanying experience in the environments of institutions like the workplace and universities shows a relationship in exploring options available to satisfy program requisites.

Although computing skills are important, the study found that in terms of Randall’s (2001) scale, the students who had been exempted showed a significantly lower level of OLSE. As discussed earlier, that scale measures not only computing and Internet skills, but also collaborative and self-directed learning efficacy factors. Recommendations here are (a) develop further differentiation in the content of the CIC in terms of the OLSE factor categories, and (b) extend the exemption policy to include not only content which ensures computing and Internet operator skills, but also the self-direction and collaboration capabilities that are important to online learning success.
With regard to of the undergraduate student population demographic variable, a recent report from the Australian Bureau of Statistics (2004) has indicated a dramatic increase in Internet connectivity by households with an ATSI background. A recommendation is to build into the ongoing evaluation of the CIC a watching brief with regard to whether trends in technology literacy and online learning self-efficacy are supported by this connectivity, in order to ensure that ATSI students at NU do not continue to be disadvantaged by the “social digital divide” as reported by Harper (2003). NU’s high percentage of ATSI students positions it well to determine if recent rises in trends of technology access by individuals with ATSI backgrounds are reflected in online learning self-efficacy. This information would be important to communities in education and other social programs across Australia.

6. Conclusion

Higher education is a significant social institution, which should leverage technology to promote equity of opportunity at personal and global levels. This study has examined how the construct of self-efficacy can be used to support and ensure such progress. Self-efficacy, as defined in social cognitive theory, allows for understanding at both individual and aggregate human levels.

The application of the CIC could also be informed by this elaboration of collective efficacy. Current policy at NU was missing the opportunity for efficacious learning community formation by not ensuring students take the AL course immediately and participate, not only in the computing and technical aspects of learning to learn online (which may be appropriately exempted for some), but also in the collective and collaborative aspects of this new emergent modality of higher education.

Shared values of equity must be realized through an efficacious outlook across our global community of learning and higher education. To extend a program goal into becoming a “believed” reality requires evidence which can be obtained and shared with stakeholders. This evidence should derive from evaluations based on well-supported constructs, and the process of evaluation should integrate easily with the intervention. This study has documented the potential for using social cognitive constructs of efficacy to provide such evaluations.

References


