

KEY WORDS

Assessment of Competencies, Graduating Attributes, Online Formative Assessment Portal, Online Analytical Processing (OLAP)

ABSTRACT

In 2011, The University of Alberta's Sub-Committee on Graduate Attributes (GAs) identified and developed indicators for the following seven competencies as graduating attributes of its undergraduate students: ethical responsibility, scholarship, critical thinking, communication, collaboration, creativity and confidence. The GAs constitutes a culmination of a unique profile for the undergraduate students. We have developed a theoretical assessment model for GAs focusing on two primary stakeholders: students' and instructors' interaction with course content. In this project, we aim to implement an online assessment portal/profile where the overarching goal is to actively assess these GAs among students and instructors. Both students and instructors will have a longitudinal access to the assessment model and they will be able to monitor self-assessment and feedback in the form of online analytical processing (OLAP) reports for the duration of the course for the former and the 4 years program for the latter.

PROJECT / RESEARCH DESCRIPTION

Innovation

A competency-based approach to learning and teaching is one that “structures learning around competencies defined as fundamental for successful performance” (Stoffle & Pryor 1980, 55). Through the years, several models for competencies (also known as graduate attributes; GAs) within universities have been elaborated. The Sub-Committee on Graduate Attributes at the University of Alberta (UoA) identified and developed indicators for the following seven competencies as graduating attributes for its students: ethical responsibility, scholarship, critical thinking, communication, collaboration, creativity and confidence. Closely related to the university mission and vision, these GAs constitute a culmination of a unique profile for students. However, the integration of these GAs has yet to gain traction campus-wide, as they remain abstract and difficult to assess. Building on the report of the Sub-committee on GAs, this project proposes to implement a GA assessment model at the UoA and determine its success. Prior literature and research at other institutions of higher education have provided evidence that GAs are notoriously difficult to implement and assess (Barrie, 2006; Drummond, Nixon & Wiltshire, 1998) typically because of the abstract and non-homogenous nature of GAs (Bennett, Dunne & Carre, 1999; Green, Hammer and Star, 2009; Taylor, Fallshaw, Hall, et al., 2012).

In our prior research, we devised a criteria-based model for assessing GAs (Ipperciel & ElAtia, 2014). This model is founded on the understanding of GAs as knowledge, skills and attitudes (KSA) which allows us to grasp GAs of a different nature. The model is also built around the notion that GAs need to be ‘interpreted’ as praxis-oriented, with ‘can-do’ statements. These two measures allow for a subsequent and crucial step prior to the operationalization of the GAs, (i.e., the development of assessment scales). The emphasis was placed on the theoretical basis that supports the development of assessment scales, which thus allows for a flexible framework for creating new iterations of scales for any additional GAs. Thus each KSA type that was elaborated rests on a particular theoretical frame (Bloom-cognitive, Dreyfus model, Bloom-affective) while displaying a common core (*ibid.*).

Following this theoretical study, we wish to develop a readily implementable and practical model of GA assessment. More specifically, we are requesting TLEF funding for: (1) implementation of the conceptualized model to establish an assessment procedure that accounts for the needs, interests and concerns of the main GA stakeholders (students, instructors and administrators) and (2) fulfills the pragmatic conditions for a successful application of the model. This next step will provide groundwork for subsequent empirical studies of GAs, their validity, reliability and feasibility. The figure 1 in appendix A illustrates the relationships in the proposed model of assessment and data collection.

Evaluation

Data Sources. This project is primarily student-centered and will in part be student-driven. We have been working with representatives from the Students Union, who will play a pivotal role in recruiting students, raising awareness about the project, and informing students of the model. With their assistance, we will recruit students and instructors who will pilot our GA assessment model. As a first step, we will contact the committee members of the 2011 final report of the subcommittee on GAs. They come from various disciplines and units within the university, and their prior experience and interest in this subject matter will be of value. We will hold information sharing meetings with associate deans academic in which they will be asked to disseminate the information to their respective faculties and to identify potential instructors who might be interested in partaking in the study. The research team will hold information session for

the participating students and instructors in order to ensure familiarity with the model and to explain any questions that might arise.

Data collection will begin with an online survey. Survey validity will be conducted through pilot testing and an extensive analysis of the literature. Survey reliability will be conducted on the Likert-type rating scale responses, with adequate Cronbach alpha (above 0.7). Survey data will be analyzed (descriptive statistics/ANOVA, cross tabs) in the aggregate using SPSS. Participating students and instructors will sign on to the online platform, each having their own interface with specific prompts. They will supply basic background information that will assist in codifying the data. At the beginning and end of each course, participating students will be asked to perform self-evaluations by filling out the Student GA Scale (SGS) on the e-platform. Instructors will be asked to fill out the Instructor GA Scale (IGS) and include the resulting GA profile (in the form of a radar graph with descriptive elements) in their syllabus, alongside the course description and objectives and learning outcomes. Note that the SGS and IGS are detailed rubric-based five-point Likert scales ranging from 1. emergent, 2. basic, 3. adequate to 4. superior, and 5. exceptional. Appendix C contains the rubrics that have been developed. Student responses from the first and the last evaluations will be compared to one another and to the instructor's course profile. Specific Online Analytical Processing (OLAP) reports will be generated and displayed to both groups in the platform. Participating students will track the progression of their GA acquisition during the course of their studies spanning several years. As such, they will acquire a holistic view of their progress and competency level. They will also have an opportunity to provide feedback and reflect on their learning at each stage.

Participating administrators (e.g., department chair or dean) will be provided with aggregates of student self-evaluations compiled from SGSs and aggregates of course profiles compiled from IGS. This information will be crucial for determining the extent to which programs are targeting specific GAs and the compatibility of instructors' with students' perceptions of GA support, thus allowing for curriculum-wide adjustments.

To accomplish this, we will implement a dynamic Learning Analytics (LA) approach in the platform. LA is the "use of data, statistical analysis, and explanatory and predictive models to gain insights and act on complex issues [...] about the learners (Diaz & Brown 2012, 3)." Two types of data can be used for implementing LA. First, data generated by the learners themselves, and often referred to as digital footprints. This type of data would enable us to implement techniques to carry out data mining analyses leading to a holistic understanding of student behavior. Second, data supplied by learners in the form of surveys and other demographic and background information. These data provide a foundation for building an information system about students. Both types of data are necessary to assess learners' reactions, behaviour, interaction and use of a specific e-learning environment. It also provides (1) insights on how effective such environments are and (2) feedback for both future improvement and potential wider use. In this project, we will use LA to provide empirical OLAP reports to participants and university academic stakeholder from the data collected. These reports will show the interactive assessment framework that targets GAs and the competence acquired from the course. Appendix B shows a sample of an LA report for the on-line evaluations.

Preparatory Phase: from April to August 2015. Drs. ElAtia and Ipperciel will supply the necessary information and content for the on-line platform. They have already elaborated the assessment model and its scales (Appendix C). Dr. Zaiane, along with a graduate research assistant, will work on developing the online model with the underlying computing LA, with feedback from Drs. ElAtia and Kanuka on the design and ease of accessibility to users. Dr.

Kanuka work with the SU to recruit student participants. Dr. ElAtia will prepare the information packages, consent forms and workshop materials for students and instructors. She will also communicate with the Provost Office, CTL and associate deans to seek their feedback and potential participation and contribution in the project.

Implementation Phase: From September 2015- December 2016. Dr. ElAtia and Dr. Kanuka will oversee the first evaluations made by participants. When necessary, they will provide answers to participants regarding the platform and its use. Dr. Zaiane will oversee the underlying LA model and ensure that participants receive appropriate OLAP reports. Participants partake in the second round of self-assessment starting in January 2016. As more information becomes available, the research team will work collaboratively on coding the data and conducting various statistical analyses. During this phase, both Dr. Kanuka and Dr. ElAtia will conduct follow up semi-structured interviews with participating instructors and students in order to collect their feedback on the model. The data collected will help (1) to make any necessary adjustments to the model (2) to collect introspective comments from students and instructors on the GAs assessment model and interaction with online platform. The interviews may be recorded upon students' consent and are guided by prepared questions developed by the research team. The semi-structured interviews will be analyzed using constant comparison techniques, searching for themes and topics. Each participant will have the opportunity to review and edit the record of his/her interview before the record is analyzed, and again after analysis; trustworthiness for the interviews will be conducted through peer debriefing, member checks and an audit trail. The qualitative data will be important in the validation process of the proposed model in addition to the quantitative one. A third round of self-assessment will also be scheduled. This is important in order to have a longitudinal dimension to the data collected.

Dissemination Phase: From September 2016 to April 2017. The research team will write preliminary reports and prepare presentations, workshops and meetings for all stakeholders (through CTL, Teaching Festival, etc.). The research team will also share the findings with the Provost Office, with specific recommendations of the feasibility of a university-wide system for implementing GAs.

Collaboration

As PI, Dr. ElAtia will lead this project; co-researchers will include Drs. Kanuka, Zaiane and Ipperciel. Additionally, this project will involve various university units in the process. Dr. Zaiane will primarily work on technical development of the on-line platform for the assessment model that will be piloted amongst participating students and instructors. Dr. Ipperciel and Dr. ElAtia will supply the assessment model that they have been working on since 2013. Dr. Ipperciel, who has recently moved to York University, has agreed to continue to be a research team member on this project, working primarily on implementation of the GA model and providing feedback and assistance to the team. Dr. Kanuka, who has conducted several studies on GAs and is very familiar with the literature and research in this area will contribute to the research design, data collection and analysis, and theoretical framework.

The research team members will work with Kathryn Orydzuk (Students Union, VPA) who has agreed to be involved in this project. The PI will also inform students (purposely selected campus-wide) of this project, emphasizing its importance to ensure we attain our sample size. The team will also seek collaboration from the members of the subcommittee in 2011. They are best placed to provide feedback and assist researchers on this project.

Sustainability / Impact on Students

The implementation model that we are proposing will provide a strong platform for formative and diagnostic assessment of the GAs. Students will be actively engaged in the process, thus ensuring that they are attentive to the acquisition their GAs. We anticipate that their perception of their academic experience will be deeply and positively impacted by reflecting on their achievement of GAs through the courses they are taking.

We anticipate that participating instructors will also benefit from this project. By monitoring and receiving reports on how their course's learning outcomes relate (or not) to the GAs, instructional staff will be able to retrospectively address the content of their courses and adapt their instructional methods accordingly. The end of term OLAP reports will provide solid empirical evidence about students and instructors perceptions and reactions to course content and objectives as they relate to the University's identified GAs.

Once the GA e-portfolio and related reports are up and running, minimal support will be required from existing resources (e.g. server maintenance). With the final reports and modifications to the model, we plan to sign off to the central academic administration of the university, namely the PO office for the implementation of the model institution-wide. It will thus provide the University with the tools and tangible results to implement the GA model.

Dissemination

We are proposing internal and external types of dissemination activities. The GA e-portfolio will serve as an online assessment systems providing: (1) participating students with information on their self-evaluation for the duration of their program; (2) participating instructors with information supplied by students about the types of GAs integrated in the course, as well as on their own evaluation of the course; and (3) administrators with aggregate information compiled from (1) and (2) that will be used for program evaluation. Results of this project will also be shared with campus-wide committees and subcommittees that have been active in initiating GAs (e.g. Committee of the Learning Environment).

Additionally, we will set regular meetings with the Students' Union to keep them apprised of the GAs and the implementation of the assessment model and seek ongoing input. We will also meet with the PO and CTL to inform them of the results of the study as we received them and brief them of the progress of the assessment model that would help both units. Finally, within internal dissemination activities, we hope to be able to meet with various associate deans to inform them of the results. They are stakeholders in this project and by doing so, they will be able to inform their faculties of the progress of the project. It is anticipated that the model will be adopted as standard procedure throughout the university once the trial period is successfully completed.

Externally, the results of the data analysis describe in above will be presented in conferences, including Canadian scholarly gatherings of teaching in higher education (e.g., Society of Teaching and Learning in Higher Education-STLHE) where we will inform our colleagues nation-wide about implementing an assessment model for competencies. We will disseminate our results internationally through another symposium to be organized during the 2017gathering of the World Educational Research Association (WERA). In addition to the two articles already published on our prior work on GAs, we will send manuscripts to various journals where we target the technical aspect of this project such as Computers and Education, Journal of Research on Computing and Education, Journal of Interactive Learning Research, Educational Technology, and in journals targeting higher education such as the Canadian Journal of Higher Education, International Journal of Higher Education.

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