

CBE Assessment in Aviation Training

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Proposal Summary

Requested Amount: \$12,335.80

Start Date: April 2020

End Date: November 2021

Timeline: 20 months

In recent years, aviation education institutions have started to implement a competency-based education (CBE) approach to prepare students for the work force. CBE is an approach to learning that focuses on the student and their ability to master certain competencies (Council of Independent colleges [CIC], 2015; Dodge, Bushway, & Long, 2018; Educause, 2014). Although this approach has the potential to ensure students meet the industry's needs and has gathered support from the International Civil Aviation Organization (ICAO) and other aviation regulating organizations (Kearns, Mavin, & Hodge, 2016), there are still many challenges associated with implementing a CBE approach, including a valid and reliable assessment strategy (Dodge et al., 2018; A. Voorhees, 2001). Based on the literature, this challenge is due to the many factors it encompasses and little research on the topic (Kearns et al., 2016; McClarty & Gaertner, 2015; Cunningham, Key, & Capron, 2016). Therefore, using a comparative multiple case study, this study will better understand the challenges faced during the implementation of a CBE assessment plan at an aviation training institution. The results from this study will provide recommendations for future implementation of CBE assessment in the aviation sectors.

Proposal Narrative

Background of the Study

The aviation industry is highly competitive and has a small tolerance for failure. For this reason, when organizations go through a hiring process, they work to match the applicants to the job competencies required (Watkins et al, 2016). It is up to educational organizations to ensure that applicants have mastered the competencies required by the industry to create effective work processes, increase safety, and reduce errors. In recent years, educational organizations, including the aviation industry, have started to implement a competency-based education approach to ensure students are prepared for the work force.

Competency-based education (CBE) is a term that has been used by various organizations to describe a method of design that focuses on the learner and incorporates a mastery of skills and/or abilities, otherwise known as competencies (Council of Independent colleges [CIC], 2015; Dodge et al., 2018; Educause, 2014). More specifically the Competency-Based Education Network in 2015 defined CBE as “...an intentional and transparent approach to curricular design.... [where] students acquire and demonstrate their knowledge and skills by engaging in learning exercises, activities and experiences.... [and] learners earn credentials by demonstrating mastery through multiple forms of assessment....” (Dodge et al., 2018, p. 2).

As this approach provides many benefits for student learning, gathers support from various international and domestic aviation regulatory organizations (Kearns, Mavin, & Hodge, 2016), there are still many challenges associated with implementing this approach.

Challenges may include creating competencies that might be too narrow for students to learn what they need to, individual interpretations of the competency texts, and the administrative burden created from the types of assessment methods and other documents in the CBE program (Kearns et al., 2016). A last challenge faced by CBE programs is the creation and implementation of assessment strategies (Dodge et al., 2018; A. Voorhees, 2001).

The creation of assessment strategies for a competency-based approach is a challenge because it is dependent on the competencies defined in the approach, the context and content where the approach is being implemented, the understanding of the individuals involved in the approach (i.e. professors, faculty, staff, etc.) (S. Caskurlu, personal communication, September 9, 2019), and the minimal research that has been done on this topic (Kearns et al., 2016; Cunningham et al., 2016). For these reasons, although organizations have attempted to provide guidelines for creating assessment strategies for CBE approaches, this concept is still new and unfamiliar to many individuals (Hager, Gonczi, & Athanasou, 2006).

Although research continues to grow in this area, Hodge (2014) suggest that even with the information, creating assessment instruments is a skill that takes time to develop. This skill can be hard to attain as designers, instructors, assessors, or whoever is in charge of creating the assessment has to be able to take into account various principles. These include sufficiency of evidence, authenticity, currency, validity, and reliability (Kearns et al., 2016). Of all these issues, McClarty and Gaertner (2015) suggest that the main issues that still need more research are those of validity and reliability, which Kearns et al. (2016) supports by proving that when it comes to assessing a person's competence it always brings issues of validity and reliability. For example, to help increase the validity and reliability of CBE assessments, institutions should start to use "outside" evidence for the competency performance level. This "outside" evidence could be future job performance or further mastery of a higher-level competency, which as McClarty and Gaertner (2015) further explain, could be used to determine if the assessment methods are linked to the competencies they are trying to measure.

With these issues in mind, the aviation industry has implemented a few competency-based models in various contexts. For example, the ICAO has created a multicrew pilot license

(MPL) that uses a competency approach to train pilots in crew environments, airlines in the United States have implemented an advance qualification program (AQP) to train pilots at initial and recurrent training that uses some aspects of CBE, and the NOTECHS training in Europe for non-technical skills that also uses CBE principles (Kearns et al., 2016). Although these are good starts, one main point to notice about all these programs is that the assessment is based on observable behavior of the pilots or crew. Given that assessment of competencies require should include more than one method of assessment. For example, aside from these direct observations of behavior, assessors could include case studies, oral questioning, or other assessment documents (Kearns et al., 2016). It is for this reason that more research into aviation assessments of CBE approaches needs to be conducted to determine best practices for this context.

Methods

Purpose and Research Method

The purpose of this study is to better understand the challenges faced by various stakeholders involved in the implementation of a CBE assessment plan at an institution of higher education that provides a major in Professional Flight. Through this exploratory study, recommendations for future implementation of CBE assessment in the aviation sectors can be provided. The research questions for this study include:

1. What are challenges professors/instructors face when implementing the assessment plan in their CBE course?
2. What are the challenges students face when complying with the various assessment methods in the CBE course?
3. What suggestions do professors/instructors and/or students have to overcome the challenges faced?

In order to meet the purpose of this study, a comparative multiple case study as defined by Merriam and Tisdell (2016) will be conducted. This study will have two cases, being (1) the professors implementing the CBE assessment strategy and (2) the students who are acting on the assessment strategy. This approach was selected in order to get in-depth information about the challenges of CBE assessment implementation between different stakeholder groups. This method will also provide more insight into how the implementation of the CBE assessment is viewed by the two groups as well as to see if there are any similar challenges faced by all.

In order to aid in the analysis of the data collected in this study, the researcher will use the ICAO (2015) competencies of assessment. In this study the professors will also be the assessors, in order to maintain the reliability of the assessment strategy, comparing results from the study to these competencies will shed some light on the challenges faced during implementation. Furthermore, comparison to the ICAO competencies could uncover other challenges that are faced during the implementation process.

Participants

Participants for this study will include the professors and students who are part of the Professional Flight program. Since it is one of the undergraduate aviation programs that is implementing a CBE approach and the most rapidly growing program at the institution, it was selected for this study. It is important that this study have at least two professors in the study to explore differing views on the CBE assessment methods and implementation. Student participants will be selected through purposeful sampling to ensure that diversity of achievement is attained for the study. The students will receive an email with an invitation to participate in the study. With the help from the professors participating in study, students will be selected from their courses as they meet the criteria below. In order to attain valid results, the researcher will

aim to include ten students to interview as a means to include differing viewpoints and experiences.

1. Low achievers (average grades C or less)
2. Average achievers (grades are B)
3. High achievers (grades are A)

Procedures

The study will be conducted after the assessment strategy has been implemented into the educational context for one academic semester. Professors and students will be contacted towards the end of the semester via email or in person about participating in the study. After the selection of professors and students, semi-structured interviews will be conducted. These interviews will consist of questions that are based in the literature, as well as open-ended questions to bring about conversation with the participants. A sample question for the interviews with the professors include:

1. Are the challenges you faced associated with
 - a. The amount of evidence required to assess the competency?
 - b. The validity or reliability of assessment?
 - c. Your understanding of the competency? [interpretation of the text]

Student questions for the interviews will be in similar fashion, with some structured questions to gather responses in various areas from the literature, as well as more open-ended questions. A sample open-ended question for the student interviews include “As a student, did you understand why you were doing the various assessment methods in your course? Why or why not?”

Through this method, participants will be able to share their experiences freely and with as much detail as possible. As the study will be conducted after the semester is over, interviews will be conducted in person or via skype or FaceTime. The interviews will be recorded, transcribed, and transcription provided to participants for accuracy.

Data Analysis

For this study, the interviews, transcription, and analysis will be done concurrently. The analysis of the interview transcripts will start with an initial coding. The labeling of these codes will be based from the literature review (the challenges of implementing the assessment strategy). After the initial coding, the codes and themes will be grouped together into larger categories, in other words, axial coding will be used. Since this study is a multiple case study, with-in case analysis will be done. Once the case analysis is complete, a cross-case analysis will be conducted to compare the categories from each case.

Principal Investigator

This study will include the principal investigator and researcher. The principal investigator will be Dr. Sunnie Watson. Her role in this study is to oversee the progress of they study and provide feedback on any part of the project. The researcher will be a graduate student who will conduct all duties in this study. The duties include communicating and staying up to date with the Professional Flight program's implementation process of the CBE assessment strategy, contacting participants, conducting interviews, coordinate the transcription service, analyze the transcripts, write the report, and submit and present study at a conference.

Scientific or Scholarly Significance

As competency-based education becomes more popular throughout higher education and various industries, it is imperative that more research is conducted on this approach. Outcomes of

such research can be guidelines, “rules of thumb,” recommendations, or procedures for the various aspects of a CBE approach to ensure its successful implementation. This study is a step into providing recommendations of the aspect of CBE assessment to aid institutions or organizations in implementing a CBE approach, specifically their assessment strategy. Although this study is focused on the context of aviation training, it can be used by other researchers as a guide to study this same concept in other contexts or as a guide to aid in implementation of a CBE assessment strategy in their context.

(Word Count: 1799)

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Time Frame and Budget

This study is expected to last 20 months, starting in April 2020 and finishing with dissemination of the study on November 2021. A Gantt chart for the study is provided in Figure 1.

The Gantt chart shows that the main work for this study will be from April 2020 to February 2021. In this time frame the researcher will conduct the study, collect and analyze data, and write a paper for submission to the AECT conference. Once accepted, the researcher will travel to the conference in November 2021 to present the results and steps for further research.

The budget expected for this project is shown in Table 1 below.

Table 1. Study Budget

Item	Description	Cost	Qty	Amount	Notes
Personnel					
	Researcher Salary	\$781.75	10	\$7,817.50	For the 10 month period
	Fringe Benefits	\$166.43	10	\$1,664.30	For the 10 month period
Study Requirements					
	Voice Recorder	\$40.00	1	\$40.00	
	Giftcards	\$15.00	10	\$150.00	Incentives for participation in study
	Transcription Services	\$60.00	12	\$720.00	
	Supplies	\$100.00	1	\$100.00	Paper, stikcy notes, etc.
Conference					
	Registration	\$323.00	1	\$323.00	
	Hotel	\$1,021.00	1	\$1,021.00	Stay for the 5 days of conference
	Travel	\$500.00	1	\$500.00	Includes plane ticket and car rental
Total				\$12,335.80	

As can be seen from Figure 2, the expected budget for this study includes cost for personnel, study requirements, and conference costs. In personnel costs, the researcher's salary and fringe benefits are included. The principal investigator in this study will not be paid as her duties include only oversight of the project and provide feedback as needed. The salary and fringe benefits were calculated based on the university requirements.

The study requirements section includes cost for a voice recorder. In order to have clear audio recordings the purchase of a voice recorder is necessary. Further, in order to keep the data secured a voice recorder will be kept in a locked office, whereas if a phone was used, it would not be secured as it would be carried around by the researcher. Gift cards is another expense in this section as they will act as incentives for students to participate in the study. The study accounts for ten \$15-dollar gift cards for the study. Due to the time frame of this study,

transcription services will be required. Based on the service provider, the price for transcription services is \$1 per minute. This study will conduct twelve interviews for one hour each, which brings the total to \$720. Lastly, \$100 dollars are required for any other supplies that the study may require. For example, paper and printing costs.

The last section included in this budget is conference costs. This section includes the registration costs for the conference, hotel costs, and travel costs. The hotel costs are based on the researcher staying at hotel where conference is held as well as the cost for staying for the whole duration of the conference. The travel costs include the two-way plane tickets as well as costs for a car rental, in order to have mobility during the conference to attend networking events or other conference events outside the hotel.