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Igniting Self-Directed Learning and Higher Level Workforce Competencies in an Aviation Curriculum

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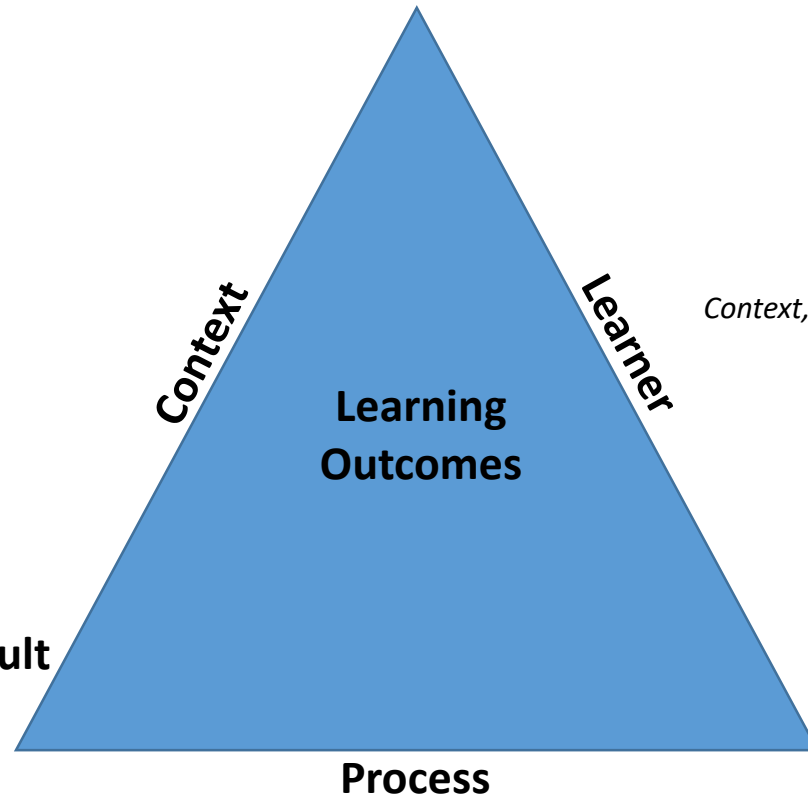
Igniting Self-Directed Learning and Higher Level Workforce Competencies In An Aviation Curriculum

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Key Learning Theories I resonate with

Teaching and Learning Triad

Internal-Personal nature in adult learning



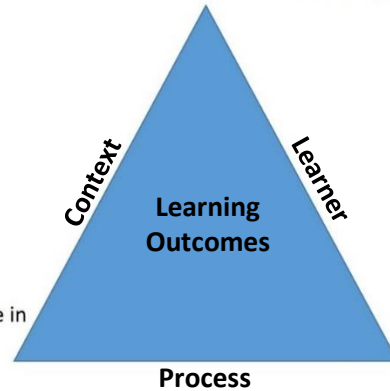
Context, Learner and Process noted by Merriam, et al., (2007).

Social and external process in adult learning

Relational/Facilitating role of the teacher in adult learning

Key Learning Theories

Internal-Personal nature in adult learning



Social and external process role in adult learning

Relational/Facilitating role of the teacher in adult learning

Process

Adult Learning Concepts

- Contemplative; relate to real life
- Experience colors reception & synthesis
- Teacher self-assess & improves
- Sometimes the Process imparts more value than the Learning Objective ... larger societal good and change
- My narrow vision, biases and blind spots
- Learning very personal (spiritual?)

John Dewey. Persistent reflection on a situation in the midst of an unknown or struggle...”undergoing”, critical thinking; memory of data alone is insufficient - learning to reflect society and the context

(Dewey, 1916; English 2008)

Malcolm Knowles. Most notable assumptions on adult learners:

- Tend to be self-directed
- Draw on accumulated experiences in life
- More ready to learn when new life changes or society changes occur, and
- Problem-centered, desire to apply new learning immediately, and are intrinsically motivated to learn

(Knowles, 1980, Pgs. 43-45)

Stephen Brookfield. Four reflective lenses, emphasis on the teacher transformation as much as the learner:

- Autobiographical (self-reflection)
- Students’ Eyes (student evaluation of the teacher)
- Peer Feedback experience
- Shared scholarship (SoTL)

Brookfield, (1995)

Inspirational and Foundational Concepts

Bloom (1956):

“... training will transfer to new areas most readily if the person is taught in such a way that he **learns good methods of attacking problems**, if he **learns concepts and generalizations** (rather than how to use certain facts in specific instances), if he learns **proper attitudes toward work**, and if he develops **proper attitudes of self-confidence and control**”

Dewey (1916) & English (2008):

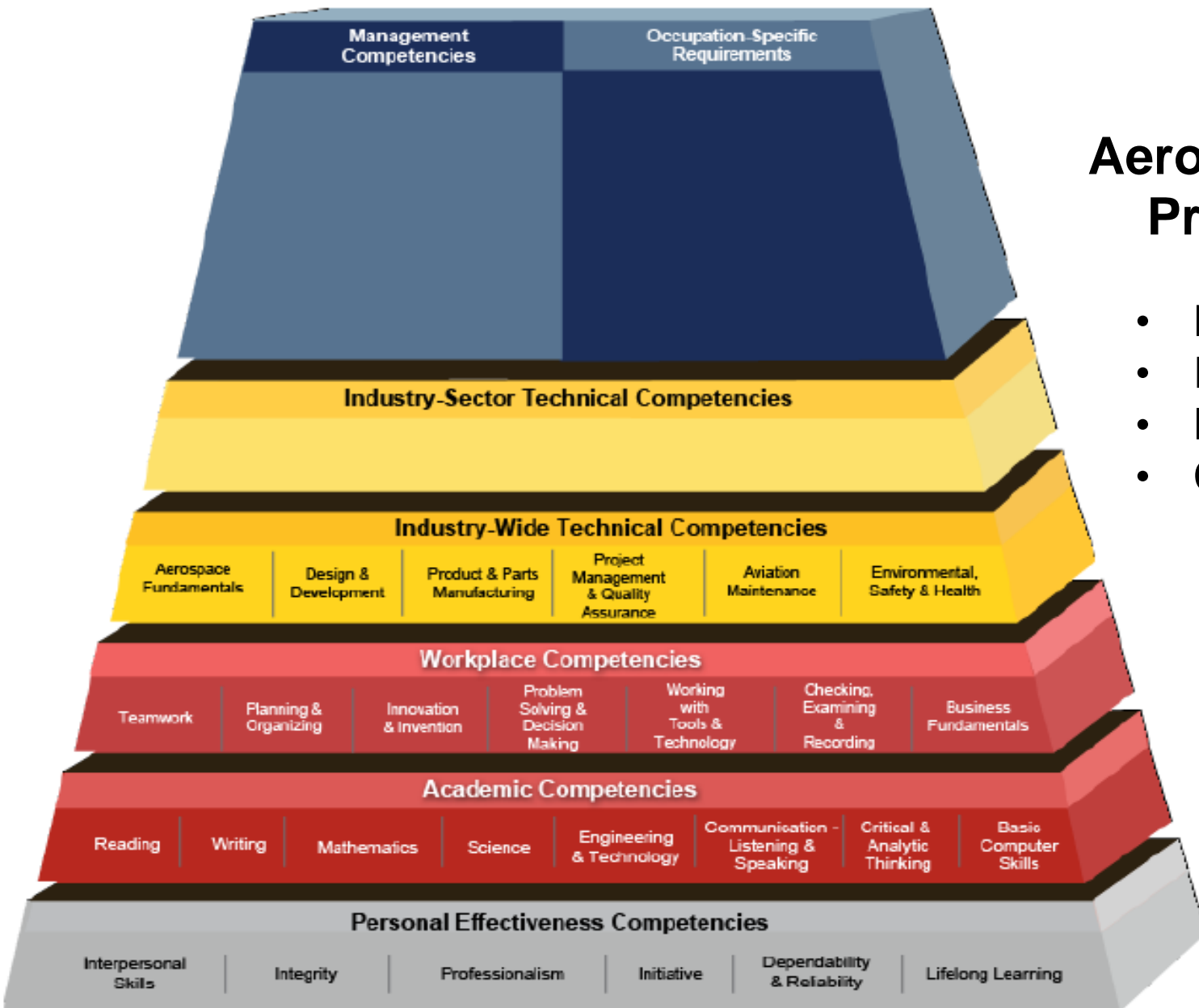
“...all **learning involves encounters with difference and otherness**, in which we experience moments of resistance that, in turn, open us up to **questioning our taken-for-granted ideas and habitual ways of being...** experience is both **active and passive: active**, in that it **involves an interaction between self and world** in which we ‘try’ something in the world, and **passive**, in that we ‘undergo’ something from the world in return.”

**Toward Deeper learning, Competency Building
and Transfer
(Reviving Higher Level Competencies in a Capstone Course)**

AT40200 Aircraft Airworthiness Assurance

Reigniting Self-Directed Learning Competencies





Aerospace Industry Competencies/ Predominant traits demanded:

- Lifelong learner
- Participative Teams, Plan, Organize
- Innovation and Invention, Problem Solving
- Critical Examination and Decision Making

U.S. Dept. of Labor Aviation and Aerospace Competency Model. Source: U.S. Dept. of Labor, Employment and Training Administration (2018). Aerospace industry competency model. Tier 3 Workplace competencies.

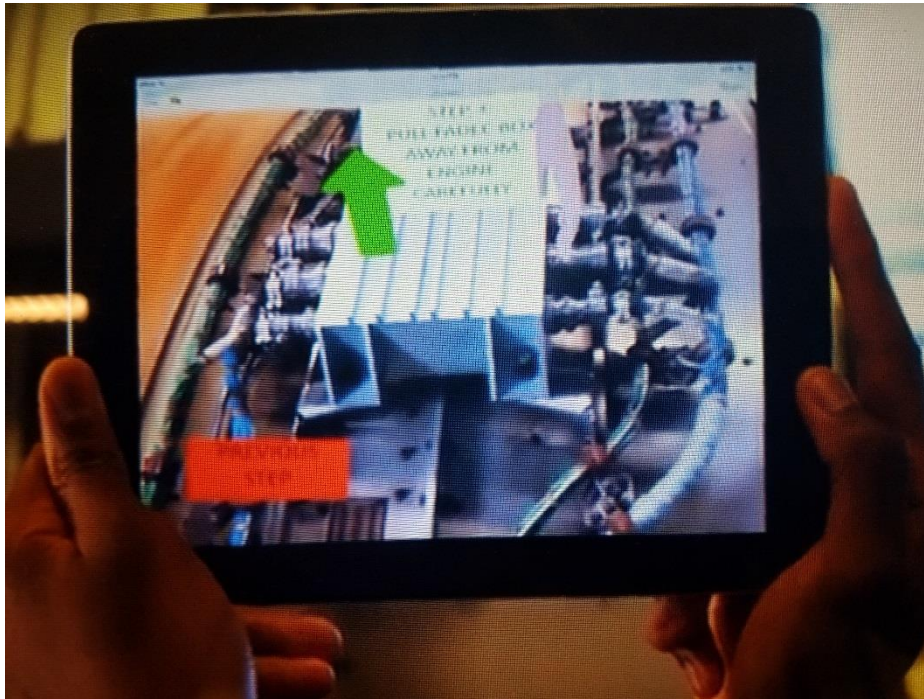
AT40200 Capstone: Create and deploy simulated Maintenance, Repair and Overhaul (MRO) & Line Svc. Ops.

- Young adults early to mid-20's but trending older (Coasties; a few 2nd career)
- Problem-Based Learning projects (Aircraft e-Visualization & Tech. Data System, SMS, Leadership Performance)
- 10 Technical Dev. Projects: paper based → applied, FAA Part 147 practical skills (Air vehicle systems Inspection & maintenance procedures, Gen-Fam, Haz-Ops)



Learners also create and deploy advanced technologies related to air vehicle advanced manufacturing and new generation maintenance on “Smart” airplanes working through my *Hangar of the Future* Research Lab

- Augmented/Mixed Reality, 3D Printing, AutoID: Deploy into environment



AT40200 Aircraft Airworthiness Assurance

Reigniting Self-Directed Learning Competencies

Problem: Losing the ‘cool’ factor

Around 2015, noted current course had become top heavy with well intended add-on project tasks. *“the road to hell is paved with good intentions...”*

Course was “overweight”:

- Six comprehensive, multi paragraph, fuzzy Learning Objectives
- Too much of a good thing. “Nice to know vs. need to know”

Trying to save the whales

Reflective Observation:

Instructor's intended Self-Directed learning structure was interpreted by learners as *busy work, redundant and lacking structure*

Evidence: 'Student's eyes' - Brookfield's lenses, (1995).

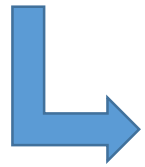
*“There **needs to be more organization** as to what is required for personal and group goals. A lot of the work was subjected to only a few groups and the work other **groups had seemed stagnate early on**. It was sometimes hard to know what grade you were receiving or how to show the work you have been doing. Often times **feeling like there was busy work to kill time..**” - Fall 2015*

*“I didn't like that **we did a lot of the same things every week** in lab. There **isn't as much variety** as I would have liked there to be in lab. Lecture was fine” - Spring 2016*

*“Other than keeping busy, I didn't get much out of the <work instruction development project>. A lot of **repeat writing and process mapping work I could have got done in a few weeks** instead of most of the semester.” - Fall 2016*

Causes and Results:

A redundant, shallow feel in the learning context due to time constraints from too many project tasks



Drove instructor to revert back to **lecture style** to expedite instead of PBL and ‘undergoing’ or *learning in process* (Dewey, 1916/English, 2016).



Drove **lack of student persistence** in problem solving, self-directed initiative and innovation; increase in passive learning behavior

“Just the minimums”

Corrective And Preventive Action – Spring 2017

Spring 2017 Semester – IMPACT Training:

- **Revised and streamlined Learning Objectives (from six to four)**
- **Re-mapped and reduced tasks on some projects (favored depth over breadth)**
 - **but still continued PBL, exploration on topic and “come up with new ideas”**
- **Created student-directed interactive course syllabus**
 - Visually diagrammed. Students help determine the learning path.

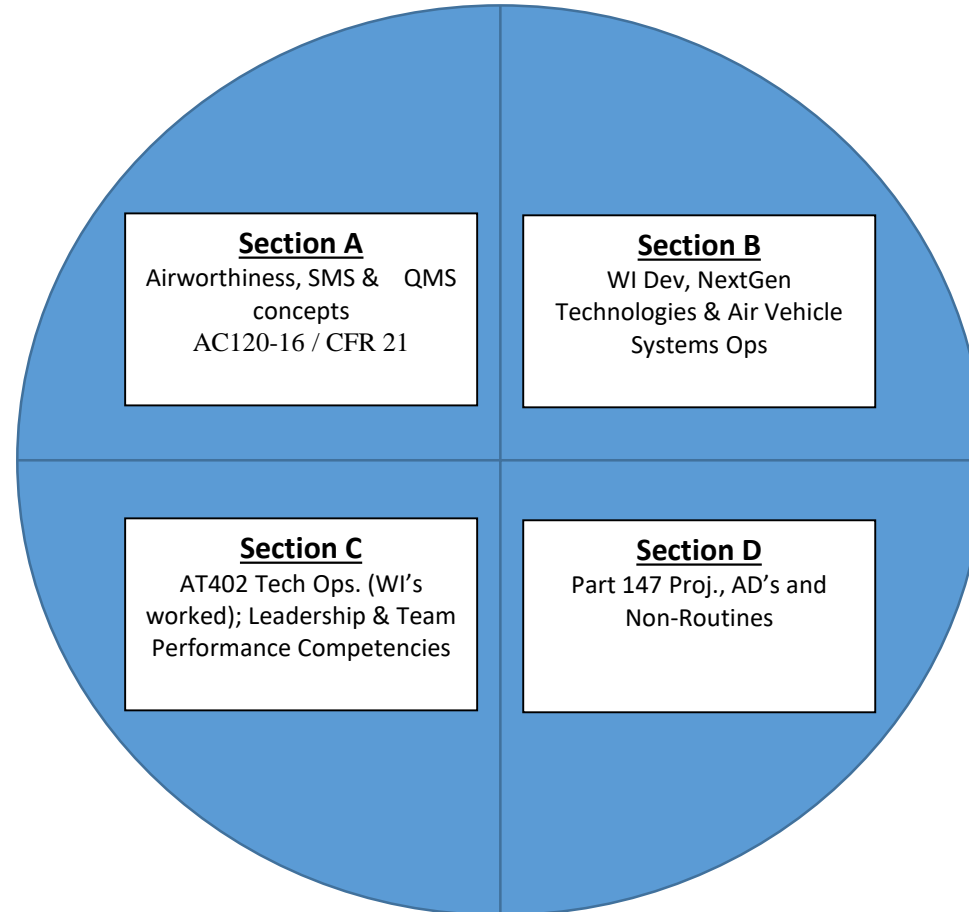
Corrective And Preventive Action – Fall 2017

Interactive Syllabus Introduced Fall 2017 but still some gaps – WIP.

Spring 2018 worked better (I was better explaining)

Same content. Clustered into topical areas, allowing students to choose which section to head into, based on research questions.

Fall 2018 will introduce a Concept Mapping exercise as an additional tool to drive further exploration and self-direction (explained slide 19)



Corrective And Preventive Action – Current State

- Revised and streamlined Learning Objectives (from six to four)
- Re-mapped and reduced tasks on some projects (favored depth over breadth)

.... but still continued PBL, exploration on topic and “come up with new ideas”

- Created Interactive Syllabus
 - Visually diagrammed. Students help determine the learning path

Learner Self-Reflection Papers and Semester Portfolio (Implemented Fall 2017 and Spring 2018)

- Had the greatest impact re-engaging students in behaviors suggesting self-directed learning

Corrective And Preventive Action – Current State

More on Learner Self-Reflection and Semester Portfolio

- Required for all 10 core development projects throughout the semester. Final reflection and work sample portfolio required.
- Template: Five topic format for project learning self-assessment:
 1. Purpose statement
 2. Skills used (including basic keyboarding and web searches)
 3. Challenges or roadblocks encountered
 4. What they did to work through or innovate around the barrier, and
 5. Final deliverable assessment of Quality and **Technology Readiness Level**



Corrective And Preventive Action – Current State:

More on Learner Self-Reflection and Semester Portfolio

They hated these at first, which gave me great pleasure...

Immediately Generated:

- Q&A on projects
- Challenges to status quo
- Expressed opinion
- In-process feedback instead of end of semester



Translated to higher SDL practices!

- Application
- Analysis
- Evaluation

(Johnson, 2017; Knowles, 1975; Bloom, 1956)

Corrective And Preventive Action – Current State:

As of May 9, 2018 de-identified qualitative student exit comments appear to show a positive shift in learner attitude and contextual awareness:

*“The lab is really **practical and hands on**”*

*“I feel as though I always learn practical lessons from his courses. The **work can be tedious at times, but these are important skills for all of us to learn for use in any role in industry.**”*

*“We **learned a lot of stuff** from his class in a very relaxed, professional atmosphere.”*

*“I would suggest focusing on only 1 or 2 job cards for the entire semester. This will allow us to put our efforts towards less work, **producing a better product.** Doing 3 <Technical Work Instructions> seemed a little unnecessary to me.”*

*“It will be great if we can have a thread that includes all the deliverables and hw for the semester in the beginning. Although <he> was very patient to explain to us those deliverables, a **checklist may save him some time.**”*

*Participative feedback;
constructive criticism!*

Corrective And Preventive Action – Future State

Fall 2018:

- Pilot a more rigorous project Self-Reflection Paper format adapted from Williams (2017) (Combining Knowles and Bloom)

Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation

- Self Directed Learning Readiness Assessment (Guglielmino, 2008; 1977)

Likert Scale Assessment:

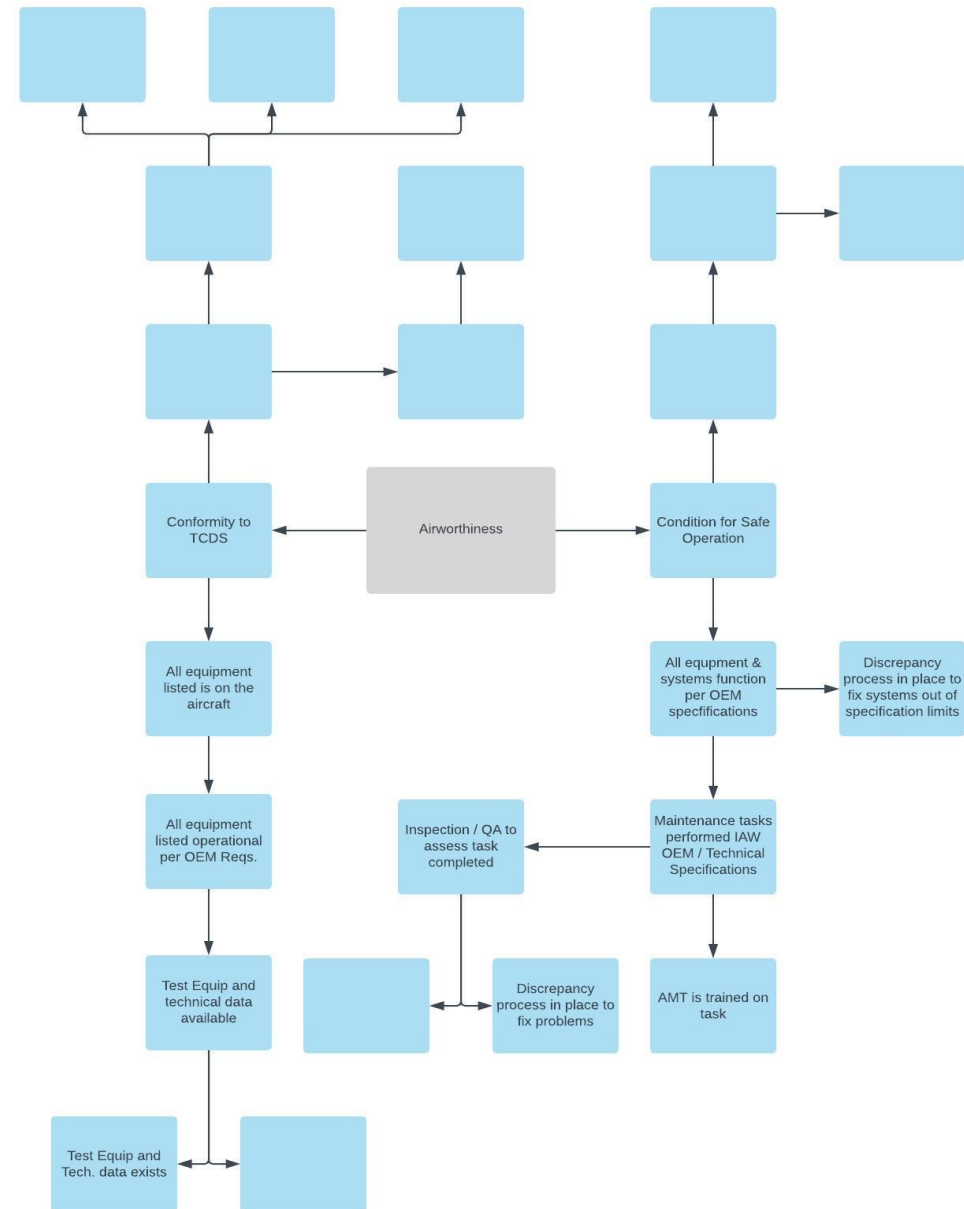
- Initiative, independence, and persistence in learning
- Acceptance of responsibility for one's own learning
- View of problems as challenges to be overcome
- Self-discipline
- High degree of curiosity

Corrective And Preventive Action – Future State

Fall 2018:

Concept Mapping Exercise on Airworthiness

- Explain and demo a few steps
- Student completes and uses throughout the semester as an inquiry/exploratory research and discussion roadmap
- Help set Interactive Syllabus topic directions



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