

Portfolio Project

EDUC 765: Trends and Issues in Instructional Design

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Project Proposal

The Jenkins Journey: Troubleshooting Common Failure Modes in JourneyQube
Continuous Integration

SPONSORING ORGANIZATION

ABC Company

ABC Company is a Fortune 500 technology solutions provider offering a wide variety of products and services. One of the products, a software package called JourneyQube, is built using a Continuous Integration and Continuous Delivery (CI/CD) pipeline built around the open source Jenkins tool. JourneyQube's development team consists of approximately 50 software engineers on three continents.

PROJECT DESCRIPTION

The JourneyQube development team suffers from a high rate of turnover, as it is considered a "legacy" product. JourneyQube is scheduled to be replaced with TripOrb in Q3 2023. Because of this, the CI/CD automation, which comprises approximately 300,000 lines of custom code developed in 2009-2011, fails frequently due to an inability to handle unexpected inputs from new developers who are not fully up to speed on the caveats with certain parts of their code. It is estimated that it would take a team of five engineers approximately one calendar year to fully refactor/rewrite the CI/CD pipeline. Since development efforts are focused on TripOrb, this is not viable. Instead, the request is to ensure minimal disruptions to service availability on the support side.

AIM

The aim of this training is to identify common failure modes in the JourneyQube CI/CD pipeline and prepare documentation for new help desk employees so they can efficiently address the problem.

TARGET AUDIENCE

One or more Site Reliability Engineers in ABC Company's DevOps team.

DELIVERY OPTIONS

This training will be conducted completely online with an optional in-person review.

Front-End Analysis: Instructional Need

INSTRUCTIONAL NEED

Between 2009 and 2011, the CICD framework for JourneyQube was developed. The training is needed currently because:

1. In 2018-2019, the majority of the JourneyQube senior developers were moved to the TripOrb project. This loss of “tribal knowledge” has increased the incidence of errors.
2. It has been determined that the five most frequent CICD errors are preventable, and account for 75% of total errors and 60% of total developer downtime. The average pay per hour of the impacted developers is \$39.72 per hour.
3. JourneyQube is going to be replaced in Q3 of 2023. As a result, it is not cost effective to rework all of the CICD framework for JourneyQube. Management has decided to minimize the impact of JourneyQube’s CICD framework errors by providing training to DevOps support staff on how to rapidly diagnose and resolve these common errors without developer involvement.

Front-End Analysis: Learner Characteristics

LEARNER ANALYSIS

Primary Audience

- JourneyQube's DevOps team
- JourneyQube DevOps Manager

Secondary Audience

- JourneyQube Developers

General Learner Characteristics

- Population of learners is 5 people – 4 men, and 1 woman ranging in age from 24 to 62
- Three people have four-year degrees and two have two year degrees
- Work experience ranges from 3 months to 40 years, in and out of the IT field
- 60% of people identify as white, 20% Asian, and 20% Hispanic/Latin American
- All learners are fluent in English

Entry Characteristics

- All learners have a high level of general technology knowledge
- If another team member is added to the project, there will be separate training for the new team member so that the new hire/transfer employee will have at least a developing understanding of the CICD framework and will be able to fully participate in this training.
- All learners will have a familiarity with company standards and practices
- All learners are open to the training, knowing that it will make them more efficient

CONTEXTUAL ANALYSIS

Orienting Context

- Learners want to identify, understand, and quickly resolve the five most common JourneyQube CICD framework failures
- Learners will be at least moderately motivated to participate in the training in order to be more efficient in their work
- Management has set the expectation that all identified employees participate in the learning. Management is highly respected and has not had an incident of noncompliance with training in over five years
- Some learners think that the CICD framework should be rewritten; they would rather address the fundamental problem as opposed to “patching” it

Instructional Context

- Training will be rolled out to learners the week of September 7th with expected completion by September 17th. Learners will then have a one hour in person meeting on September 18th at 9:00 AM to review what they learned and answer any questions.
- Office fluorescent lighting
- Background noise is minimal
- 69 degrees Fahrenheit (climate is controlled)
- For initial training, learners will be at their desks. For the one hour in person meeting, everyone will meet in Conference Room B, which has seating for 37 people.
- Coffee and bagels will be provided at the in person training
- Learners need individual laptops, and headset. Conference room will be equipped with a projector to facilitate review.
- Learners are responsible for getting themselves to work

Technology Inventory

- Learners have Internet access, which is what they will need to complete this training

Transfer Context

- Realistically, there is not much transferability in this learning because it is specifically designed for JourneyQube. Broadly, it is hoped that this training will encourage good trouble shooting habits.
- Learned information will be put to use right away in solving the CICD framework failures
- Management will survey learners for support questions

Instructional Impact Based Upon Learner Characteristics

APPLICATION OF LEARNING THEORIES

1. Training will have clearly defined objectives and outcomes, and be able to be completed in an hour.
2. Required training will be online, and learners will have two weeks to complete it.
3. The in-person review will add a social component to the training. Coffee and bagels will be available to all.
4. Training will tap into learners' previous experience and make new connections to the learning in this training.

APPLICATION OF MOTIVATIONAL THEORIES

1. The subject matter is very relevant to the learners; it literally affects their everyday work interactions.
2. Learners will have many opportunities to be successful and prove their learning.
3. This training will help employees be more productive.

IMPACT OF A DIVERSE AUDIENCE ON INSTRUCTION

Given the subject material and the educational attainment of the learners, it is not believed that any special accommodations need to be built into the instructional module. The office building itself is already ADA compliant. All of the learners access data on a computer as part of their daily tasks. Best practice will be used throughout the training.

Goal and Task Analysis

GOAL ANALYSIS

1. The help desk employee needs to be able to confirm that a failure has occurred and determine if it is one of the top five most commonly identified failure types.
2. Help desk employee needs to be able to execute the identified solution for a failure that is one of the five most common error cases.
3. When the failure is not one of the top five most common failure modes, the helpdesk employee needs to know the proper escalation process.
4. Help desk employee needs to be able to correctly identify the solution for the failure.
5. The help desk employee needs to be able to confirm whether the solution to the failure was a success.

INSTRUCTIONAL GOAL

The aim of this training is to identify common failure modes in the JourneyQube CICD pipeline and prepare documentation for new help desk employees so they can efficiently address the problem.

TASK ANALYSIS METHOD

I have chosen to do a Procedural Analysis for this project. The main reasons I chose this type of analysis are:

1. There is a step by step logical way to proceed through the presented problem.
2. I am able to state a lot of “if/then” statements. For example “If the employee gets a red notification on their screen, then a failure has occurred”.
3. The definition from the textbook for a procedural analysis – “applied to a task to identify steps, cues and sequence for performing steps” (p. 95), seems to be the best fit of the three options. This training is definitely not involving a critical incident, and while aspects of the task analysis could apply in this situation, I feel that the most accurate description of the needed training is a procedure.

TASK ANALYSIS

1. The help desk employee receives a digital request for assistance from a developer regarding a failure. (Visual cue: Email or Slack message)

2. The help desk employee logs into the build log and looks for any indication of why the build failed.
 - a. Employee starts from the end of the build log and works backwards.
Employee is looking for error messages or output that matches known top five failure modes.
3. If help desk employee does not find a match in the build log that would indicate the failure was due to the top five common failure modes, the issue needs to be escalated.
 - a. If this is the case, the help desk employee is finished with this request for assistance; it is no longer their area of responsibility.
4. If the help desk employee does find a match, they need to follow the troubleshooting procedure identified for that failure mode.
 - a. The procedure identified above must be executed.
5. The help desk employee needs to verify that the failure was resolved
 - a. This is completed by rerunning the build to see if the same or a different failure occurs.
 - b. If the same failure results after rerunning the build, the failure should be escalated.
 - c. If a different failure occurs, the help desk employee proceeds to step 2 and continues until there is a resolution of the failure or escalation.

Instructional Objectives

TERMINAL OBJECTIVES AND ENABLING OBJECTIVES

Domain: Cognitive

Terminal Objective: With the aid of supplied documentation, helpdesk employee can verbally summarize the conditions that are most likely to cause each of the top five failure modes in the JourneyQube CICD pipeline

- Verbally summarize the most likely set of conditions that cause failure mode one
- Verbally summarize the most likely set of conditions that cause failure mode two
- Verbally summarize the most likely set of conditions that cause failure mode three
- Verbally summarize the most likely set of conditions that cause failure mode four
- Verbally summarize the most likely set of conditions that cause failure mode five

Domain: Cognitive

Terminal Objective: Using the build log, helpdesk employee needs to be able to determine if a given failure matches one of the top five failure modes in the JourneyQube CICD pipeline

- Demonstrate how to access the build log
- Using the build log, be able to identify the error that caused a build to fail
- Using build log and supplied documentation, determine if the error that caused the failure is one of the top five failure modes in the JourneyQube CICD pipeline

Domain: Cognitive

Terminal Objective: Helpdesk employee needs to identify and execute next steps based on the identified failure

- Demonstrate how to escalate the failure if it does not match any of the top five failure modes
- If the failure is one of the top five failure modes, using supplied documentation, execute the resolution procedure

Domain: Cognitive

Terminal Objective: Help desk employee needs verify whether the executed solution was successful

- Demonstrate how to rerun the pipeline

- If failure is resolved, communicate with developer who initially raised the issue and record work completed if a ticket was generated
- If failure is not resolved after following provided documentation, escalate failure to the engineering team

Enabling Objectives Matrix & Supporting Content

Enabling Objective	Level on Bloom's Taxonomy	Learner Activity (What would learners do to master this objective?)	Delivery Method (Group presentation/lecture, self-paced, or small group)
Demonstrate how to access the build log	Applying	Watch a screencast on how to log into the build log.	Self-Paced
Using the build log, be able to identify the error that caused a build to fail	Remembering	Using a screenshot, drag and arrow to the line of code that caused the build to fail.	Self-Paced
Using build log and supplied documentation, determine if the error that caused the failure is one of the top five failure modes in the JourneyQube CICD pipeline	Applying	Using a screenshot and a multiple choice question, provide learner with sample failure and have learner select correct response as to whether the failure was due to one of the top five most common failure modes or if it was due to a different failure mode.	Self-Paced