Open Educational Resource (OER) Environmental Scan for Trades and Apprenticeship

SUMMARY REPORT

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Table of Contents

Introduction

About the Project

As part of eCampusOntario's 'Open at Scale' project, the *Green Hat Educational Services* team was contracted to conduct an environmental scan of Trades and Apprenticeship open educational resources (OERs).

Under this project, the eCampusOntario *Digital First: Trades and Apprenticeship* initiative targets the development of open educational resources in a specific discipline or area of study for a high-impact approach. The first stage of the project includes an environmental scan of existing OER repositories and programs to ensure that all existing open Trades and Apprenticeship learning resources are leveraged for reuse and adaptation where appropriate.

Scope

The scope of work for this project was originally defined based on the following parameters:

1. Apprenticeships to Consider
   - Plumber (Trade Code 306A)
   - Automotive Service Technician (Trade Code 310S)
   - Electrician – Construction and Maintenance (Trade Code 309A)
   - BC Common Core Competencies
     - Though not an apprenticeship program in itself, this body of content supports several trades and the research team was asked to consider content that would support this body of knowledge. We have therefore treated this body of knowledge as a program for the purpose of this research. See Appendix B for a description of the Common Core competencies.

2. This environmental scan focusses on educational resources that may align with the Skills listed in the **Ontario Training Standard** for the Plumber, Automotive Service Technician and Electrician-Construction and Maintenance trades. (See Appendix A for a list of these Skills). Our team has been asked to suggest possible alignment of the resources, which would be confirmed by a subject matter expert. (See the 'Next Steps' section of this report for details).

   In consultation with the Ontario Colleges' Heads of Apprenticeship Training (HAT), this approach was deemed to have the greatest positive impact for several reasons:

   a. The Training Standard identifies training that takes place at the apprentice's place of work (as opposed to "in school"). This training represents an overwhelmingly large percentage of the apprentice's journey to apprenticeship. Note that:
      - Plumber Apprenticeship is 9,000 hours in duration (approximately five years) consisting of 8,280 hours of on-the-job work experience and 720 hours of in-

school training.

- Automotive Service Technician Apprenticeship is 7,220 hours in duration (approximately four years) consisting of 6,500 hours of on-the-job work experience and 720 hours of in-school training.
- Electrician — Construction and Maintenance Apprenticeship is 9,000 hours in duration (approximately five years) consisting of 8,160 hours of on-the-job work experience and 840 hours of in-school training.

b. The Ontario Training Delivery Agents (those organizations approved to offer the in-school portion of the program) currently have a strong success rate with their portion of the training.

3. Repositories to consider as sources of OERs
   - Skills Commons (http://www.skillscommons.org/)
   - BCcampus Common Core Trades (https://open.bccampus.ca/)
   - Facilitating Access to Skilled Talent (FAST) (https://fastbc.org/)

Expanded Scope

Based on the limited amount of information discovered under the original scope, our research team discussed an expanded scope with eCampusOntario. This new scope included:

1. Examining additional repositories that are either known to the research team directly or have been recommended through the team's colleagues, and
2. Examining both Open Educational Resources identified under Creative Commons license as well as other educational resources that may be considered for use where the author has not explicitly identified these as open source. The combination of these "open source" and "not open source" materials will be referred to as "assets" in this Summary Report. The nature of "assets" will vary, and have been categorized as one of the following Educational Resource types:
   - Assignment, Project, Lab, Student Inquiry, Exercise
   - Course
   - Module or Lesson
   - Worksheet
   - Quiz/Test
   - Tutorial, Demonstration
   - Instructor Material
   - eTextbook

Timeline

This project commenced April 5, 2019 and was completed May 24, 2019.

Research Team

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Contact Information

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License of this document

Methodology

Before proceeding with the environmental scan, consultations were held with eCampusOntario, the Ontario College's Heads of Apprenticeship Training and the Ontario College of Trades. These consultations were held to confirm the scope and direction of the environmental scan.

Outreach

Our search for information included repositories and assets that were:

- Identified by eCampusOntario
- Known to the research team based on past experience
- Located through general web-based searches
- Identified by the research team's outreach to colleagues
- Identified through outreach to Heads of Apprenticeship Training members

Spreadsheet Creation

In order to collect information on the identified assets, a spreadsheet was created, using a series of identifiers or 'data fields' that would be collected against each asset. Our data fields can be sorted and combined in any order to create countless reports depending on the needs of eCampusOntario. We collected information on the following data fields:

1. Program
2. Training Standard(s)
3. Exam Priority
4. OER Title
5. OER Location (URL)
6. Description
7. Author
8. Content Owner/Affiliation
9. Publisher/Repository
10. Other Publisher/Repository
11. Year
12. Geographic Focus
13. OER Type
14. Format(s)
15. External Review
16. License/Stipulation
17. Notes

See Appendix C for an explanation of each field.

Ongoing Consultations

Throughout our work, ongoing consultations were held with eCampusOntario, the Heads of Apprenticeship Training and the Ontario College of Trades to re-confirm the scope and methodology.

Presentation of Draft Findings

Prior to the writing of this report, draft findings were presented to the Heads of Apprenticeship Training and eCampusOntario.

Irrelevant Data

Assets that were discovered but deemed irrelevant were not included in the findings.

Environmental Scan Data - Repositories

Repositories – Initial Scope

Initially three repositories were selected for our research; SkillsCommons.org, BCcampus Common Core Trades and fastbc.org.

Both SkillsCommons.org and BCcampus Common Core Trades proved to be quite useful, yielding 34 and 47 relevant assets respectively.

Unfortunately, our exploration into fastbc.org proved to be more challenging. Our investigation discovered that fastbc.org was a repository of content uniquely designed to serve the needs of new Canadians. Access to the site was granted only to registered immigrants. Through further discussions with fastbc.org, we were able to determine that they utilize licensed ebook content from Nelson, Pan Global and, Pearson publishers. With this, we elected to pursue other avenues for relevant OERs (see the expanded scope below).

Repositories – Expanded Scope

The research team proposed to eCampusOntario that we expand the scope based on personal experiences and to also reach out to colleagues who might be in a position to refer us to additional sources. eCampusOntario concurred, and this proved to be successful, as we were able to locate additional assets in the following repositories:

- All About Circuits
- ATE Central
- Camosun Innovates
- Class Central
- Merlot
- OER Commons
- eCampusOntario
- EdX
- iFixit
- COL - Open Polytechnic of New Zealand
- Multi-State Advanced Manufacturing Consortium (M-SAMC)
- Durham College Showcase
- Open Course Library
- Open Oregon Pressbook
- Open Oregon
- Open Textbook Library
- Openpress.usask.ca
- Sparkfun Tutorials
- WorkSafe BC
- PHET Interactive Simulations
- Vimeo
- Wikiversity
- WISC online
- YouTube

In addition to the expanded scope in repositories, we also undertook to scan for content which may not be classified as “Open” under Creative Commons, yet could possibly be made available through the *Open at Scale* project. 139 assets meeting this criterion were located and have been flagged as “Not Open Source” on our spreadsheet.

With this new focus to broader considerations, we will use the term ‘assets’ throughout this report to identify the combination of both “open source” and “not open source” content that we have sourced.

Environmental Scan Data - Findings

In this section of the report we present our data which has been combined and summarized to provide insightful information.

Assets Located

The table below identifies the total number of different assets that were catalogued in the spreadsheet, broken down by Program. Recall that for the purpose of this environmental scan, that Common Core was deemed to be a program.

Total Count of Assets by Program	Count
Automotive Service Technician	78
Electrical	99
Plumbing	71
Common Core	99
	347

Training Standards Addressed

The table below identifies the total number Training Standard Skills that are addressed through the catalogued assets. Note that this number is higher than the number of assets located (above), as some assets addressed more than one Training Standard Skill.

Total Count of Training Standard Skills by Program	Count
Automotive Service Technician	166
Electrical	106
Plumbing	126
Common Core	107
	505

Assets Related to Automotive Service Technician

The table below identifies the number of assets that were located for each Training Standard Skill from the Automotive Service Technician Training Standard. In cases where the alignment of an asset with a specific Skill from a Training Standard could not be suggested, we noted that we were “unsure” of the alignment.

Automotive Service Technician Skills	**Count**
Occupational Health and Safety Procedures	8
Engine Systems	13
Electrical Systems - Starting and Charging	21
Engine Management Systems	7
Electrical Systems – Body	18
Fuel Delivery Systems	4
Transmission Systems	9
Drive Shafts, Differentials, and Drive Axle Assemblies	5
Suspension Systems and Frames	14
Steering Systems	5
Braking Systems	4
Tires, Wheels, Rims, and Hubs	11
Heating, Ventilation, and Air-Conditioning Systems	5
Body and Trim	3
Exhaust, Intake, and Emission Control Systems	13
Hybrid Vehicle Systems	13
Unsure	13
	166

Assets Related to Electrician - Construction and Maintenance

The table below identifies the number of assets that were located for each Training Standard Skill from the Electrician – Construction and Maintenance Training Standard. In cases where the alignment of an asset with a specific Skill from a Training Standard could not be suggested, we noted that we were "unsure" of the alignment.

Electrician – Construction and Maintenance Skills	**Count**
Protect Self and Others	0
Read, Interpret and Revise Schematic Drawings and Documentation	8
Select, Maintain and Use Tools and Equipment	6
Install, Maintain and Repair Wiring Systems	29
Select, Install, Maintain and Troubleshoot Power Distribution Equipment Systems	23
Select, Install, Maintain and Troubleshoot Lighting Systems	4
Install, Maintain and Troubleshoot Rotating Equipment and Associated Control Systems	10
Install, Maintain and Troubleshoot Motor Drives and Associated Control Systems	1
Install, Maintain and Troubleshoot Stand-by Power Systems and Associated Equipment	0
Install, Maintain and Troubleshoot Communications Systems	2
Select, Maintain and Operate Test and Measuring Equipment	5
Install, Maintain and Troubleshoot Instrumentation Devices and Systems	2
Communicate in the Workplace	2
Unsure	14
	106

Assets Related to Plumber

The table below identifies the number of assets that were located for each Training Standard Skill from the Plumber Training Standard. In cases where the alignment of an asset with a specific Skill from a Training Standard could not be suggested, we noted that we were “unsure” of the alignment.

Plumber Skills	**Count**
Protect Self and Others	7
Communicate	2
Read, Interpret, Create and Maintain Drawings and Specifications	7
Design Systems	38
Plan and Prepare for the Project	6
Install Pipe, Fittings, Valves and Supports	9
Install Piping Systems	20
Install Fixtures	7
Install Equipment	13
Install Devices	12
Test Systems	1
Commission/Activate Systems	2
Perform Rigging and Hoisting	0
Service and Maintain Mechanical Systems	0
Unsure	2
	126

Assets Related to Common Core

The table below identifies the number of assets that were located for each Skill from the Common Core (see Appendix B for details on the specifics of each of these Common Core competencies).

Common Core	Count
Safe Work Practices	11
Employability Skills	10
Tools and Equipment	20
Organizational Skills	38
Electrical Fundamentals	28
	107

Observations and Analysis

Observations

OER Proliferation

There are impressive OER resources scattered throughout the web for topics such as management studies, health, and science, arts. (e.g., https://openoregon.org/). We often found a promising new repository with hundreds of objects only to discover that very few of these resources related to the Trades.

CC Markers

We found several individuals producing a prolific amount of trades-related content either as web content or YouTube videos.

It is rare that this content is identified as CC; however in the description of the work, producers usually share that they want to provide the information free of charge.

Examples include:

- https://www.youtube.com/channel/UC9ZmmnmSWeeg58lZ0ilDrOA/videos
- https://www.youtube.com/user/LearnEngineeringTeam/videos
- https://www.youtube.com/channel/UCJkHaJP25N2xZA1VpN1JGvA/videos
- https://www.youtube.com/channel/UC4G0by2AWtWgKkWIekLVQ3Q/videos
- https://www.youtube.com/user/TheAutoPartsShop/videos

Patreon Platform

Some individuals and companies have started to provide Creative Commons content while at the same time linking to a patreon page where people can financially support and/or recognize the producer for their efforts. (https://www.patreon.com/)

Some of the people we catalogued such as Chad Flinn (Electrical), James Pytel (Electrical) and Eugene Khutoryansky (Common Core), have Patreon accounts.

This could provide the basis for an interesting eCampusOntario option.

Granularity

The granularity of catalogued assets varies significantly by repository, and even within a single repository.

For example, from Skills Commons alone, 19 examples were cited that consisted of single worksheets while other resources consisted of entire courses or even programs that are zipped or provided as back up cartridges from Learning Management Systems.

OER Metafinders

An OER Metafinder is a form of search engine that searches several repositories for information. Mason OER Metafinder is one example.

We found this meta-search engine helpful and although it has many OER repositories in its database, the only Canadian source was BC Campus.

eCampusOntario may wish to have their OER repository added to OER Metafinders.

International Resources

There are a number of YouTube channels from other countries (e.g., India) that use animation and professional-looking images. A few of these sites are CC licensed however many are not.

Some of these foreign YouTube channels are produced by individuals who seem to have the same drive as our Western colleagues.

Perhaps the Indian producers are not aware of CC licensing? Perhaps they may be interested in their videos being translated or re-used with English sub-titles?

Institutional Producers

A number of Colleges produce video content for their trades courses outside of repositories. This is different from individual instructors producing content as the colleges provide their videos on their college channels or sites. Again, most of the content is non-CC licensed, which may be a result of the date the content was uploaded (pre-OER age) or simply matter of not knowing the content can be licensed CC.

As examples, consider New York University (142 videos https://itp.nyu.edu/), Dunwoody College (77 videos in their Technical Video Library https://www.youtube.com/playlist?list=PL275D63C4D35436DD), the Red River College Tutoring site which has been posting videos since 2010 with over 300 on their YouTube channel (https://www.rrc.ca/tutoring/), and Gillette College Electrical which has produced a number of electrical videos (https://www.youtube.com/channel/UCzsc11PtM41ygkDm97D17wQ with approximately 59 videos).

Private Producers

Some private individuals have rich content collections that may be considered [e.g., Chad Flinn (Electrical), Jim Pytel (Electrical), Marc L'Ecuyer (AST/Electrical), Fred Bretzke (Plumbing), and Justin Miller (Automotive)]. Please refer to the spreadsheet for additional information.

Search Capabilities and Analytics

This project provided insight into the searching and analytics capabilities of a number of OER repositories.

Both Skills Commons and WISC Online (https://www.wisc-online.com/) stand out from the rest for having user-friendly, robust search engines as well as useful analytics such as usage and rating tallies.

Specific to this study, the advanced search in Skills Common permitted the selection of a particular occupation which allowed us to properly differentiate content (e.g., “Automotive Service Technician” from “Bus Truck Mechanics”).

Simplicity

One other repository to mention is the open course library, Air Washington (http://opencourselibrary.org/air-washington/), not so much for its searching capabilities but for its low-tech solution to housing OERs. The interesting point about the Open Course Library is that they used Google Docs to house all their course content.

In another example, Multi-State Advanced Manufacturing Consortium (M-SAMC) (http://www.msamc.org/) makes use of simple direct links to download educational resources, and even provides a "download all" option.

Funded and Non-Funded Development

There is a broad distinction between OERs originally commissioned and paid for "as OER" and those items made by an individual and then released "for free". (e.g., BCcampus Common Core versus the plumbing instructor at Southern Alberta Institute of Technology)

The former (funded OER) benefits from proper review but may suffer from its generality. These OERs may be designed to fit many applications.

The latter (shared teaching aids) sometimes suffers from quirkiness and may be too specific and focused on a single class's interest. (e.g., reference to yesterday's handout or a 1 hour video of a specific lecture)

Other Provincial Initiatives

Other jurisdictions have initiated e-apprentice initiatives and these initiatives could be a source of content. For example, in Manitoba, Red River College has undertaken the E-Apprenticeship Design and Development Initiative (EADDI) initiative aimed at developing the following online programs from from 2010 to 2014:

Electrician Level 1, Level 2, Level 3 and Level 4

- Plumber Level 1, Level 2, Level 3 and Level 4
- Water and waste-water technician Level 1 and 2
- Heavy-duty equipment technician/transport truck technician and agriculture equipment technician – common core
- Carpenter Level 1, Level 2, Level 3 and Level 4
- Common core math/science and communications
- Refrigeration and air-conditioning mechanic (residential and commercial) Level 1
- Automotive service technician Level 1 and 4
- Industrial mechanic/millwright Level 1 and 4
- Pork production technician

These initiatives could present an opportunity for eCampusOntario to secure content.

Dated Materials

Some materials that have been discovered, though excellent in their instructional design, proved to be technologically dated. In many cases they relied on technologies that are no longer current (such as the use of Flash in the design of interactive content).

For instance, Wisc-Online (https://www.wisc-online.com/) is a creation of Wisconsin's Technical Colleges and maintained by Fox Valley Technical College. This repository has been operating since 1999 and has quite a sophisticated searching, rating and tracking system. The Wisc-Online section entitled "Manufacturing and Engineering" is of interest, with the subject areas including electronics (492 items), industrial automation (265 items), machine tool (227 items), and welding (37 items). In addition, Gamma+ apps are found in the Wisc-Online repository and are mobile learning apps and flashcards for key advanced manufacturing programs. There are over 450 apps aligning with a variety of trades however most were produced over 4 years old in Flash and therefore need to be updated to be easily reused.

Another such repository is PhET interactive simulations. PhET products (https://phet.colorado.edu/) originally used Java as the main engine but now, many of the simulators are being updated to HTML5.

Some of the PhET and Gamma+ OERs were added to our spreadsheet however cataloguing the entire collections was felt to be beyond the scope of this study.

Analysis

In this section, you will noticed that the data has been analyzed to highlight important characteristics, such as the type of license, the type of asset, the currency of the asset, the geographic focus of the asset, and the alignment of the assets to the Training Standards.

This is but a sample of the possible reporting and analysis that can be accomplished with this data. Because the spreadsheet is formatted in a database format, and data validation has been used to ensure consistency of input, any number of reports can be drawn from this data for further analysis.

Our analysis does not include an assessment of 'quality', as quality can be determined by any number of indicators such as number of downloads, number of views, client ratings, the age of the asset, the interactive nature of the asset and alignment of the asset with the desired purpose. Given the inconsistent and subjective nature of assessing quality, an educational resource may be rated as 'high quality' in one application and flagged as 'poor quality' for a different application.

For this reason, we felt it prudent to present all of the necessary data to evaluate the quality of the asset, but not to provide our subjective rating.

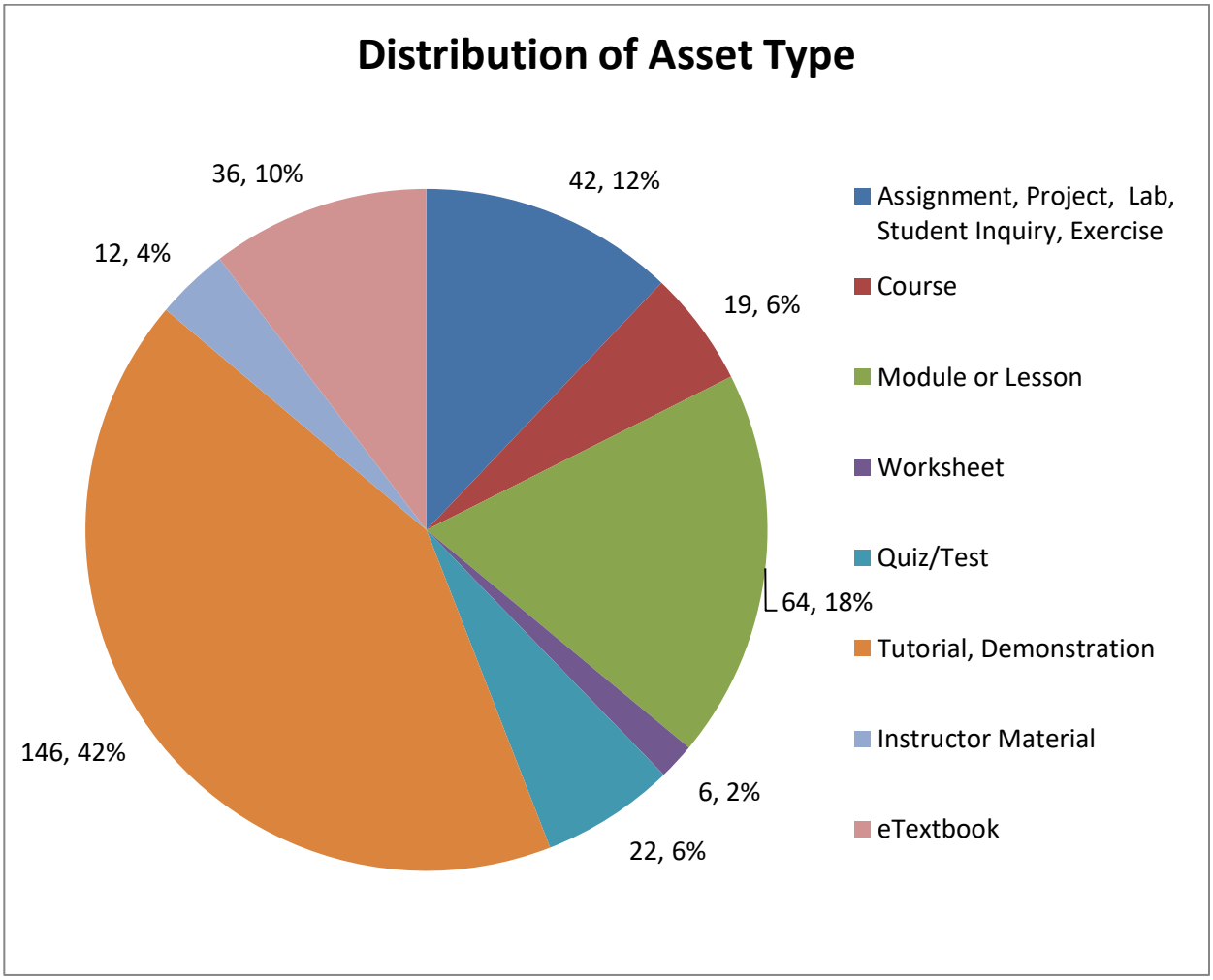
Licensing

The table below shows the breakdown of all assets categorized by the type of license. Note that with the expanded scope of the research, 139 of these assets are not open source, yet could provide a source of content should the author/owner be willing to discuss this option. Also note that many of the 139 assets in this category consist of videos where the author has indicated that they are free to use, however has not provided an associated Creative Commons license.

License Types	Count
CC BY (Attribution)	183
Not Open Source	139
CC BY-SA (Attribution-Share-Alike)	13
CC BY-NC (Attribution-Non-Commercial)	5
CC BY-NC-ND (Attribution-NonCommercial-NoDerivatives)	4
CC BY-NC-SA (Attribution-NonCommercial-ShareAlike)	3
CC BY-ND (Attribution-No-Derivatives)	0
	347

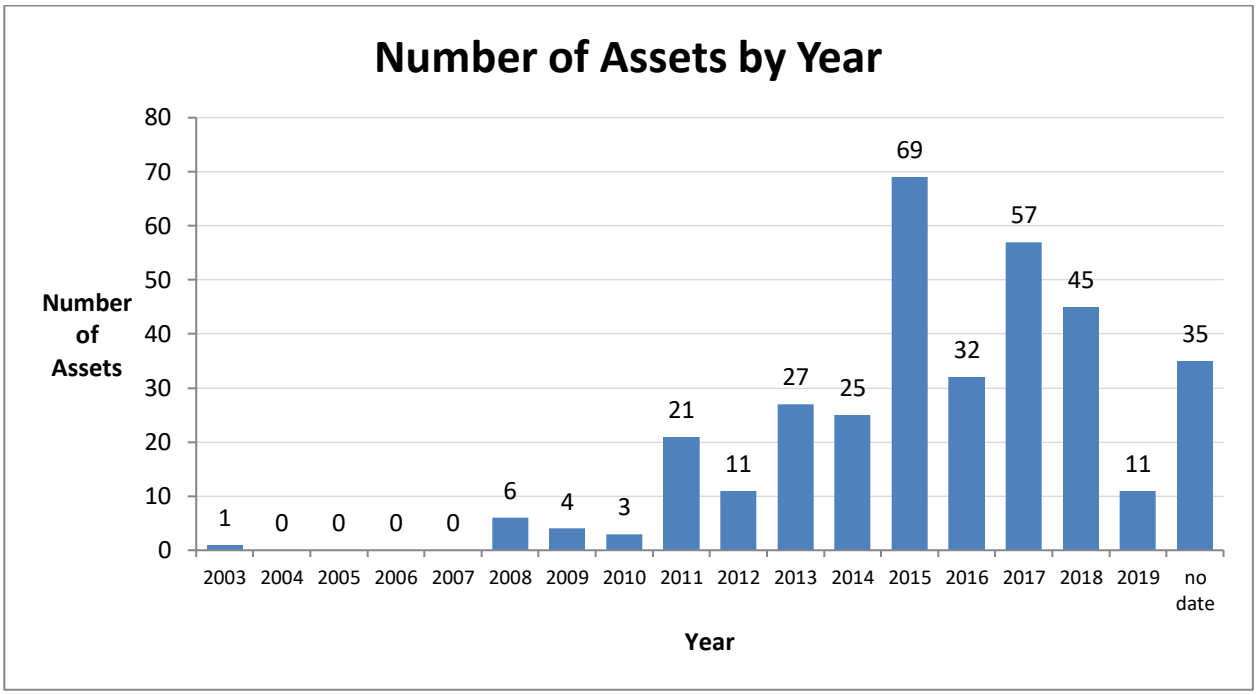
Asset Type

The following is a breakdown on the 'type' of assets that were identified through our research.



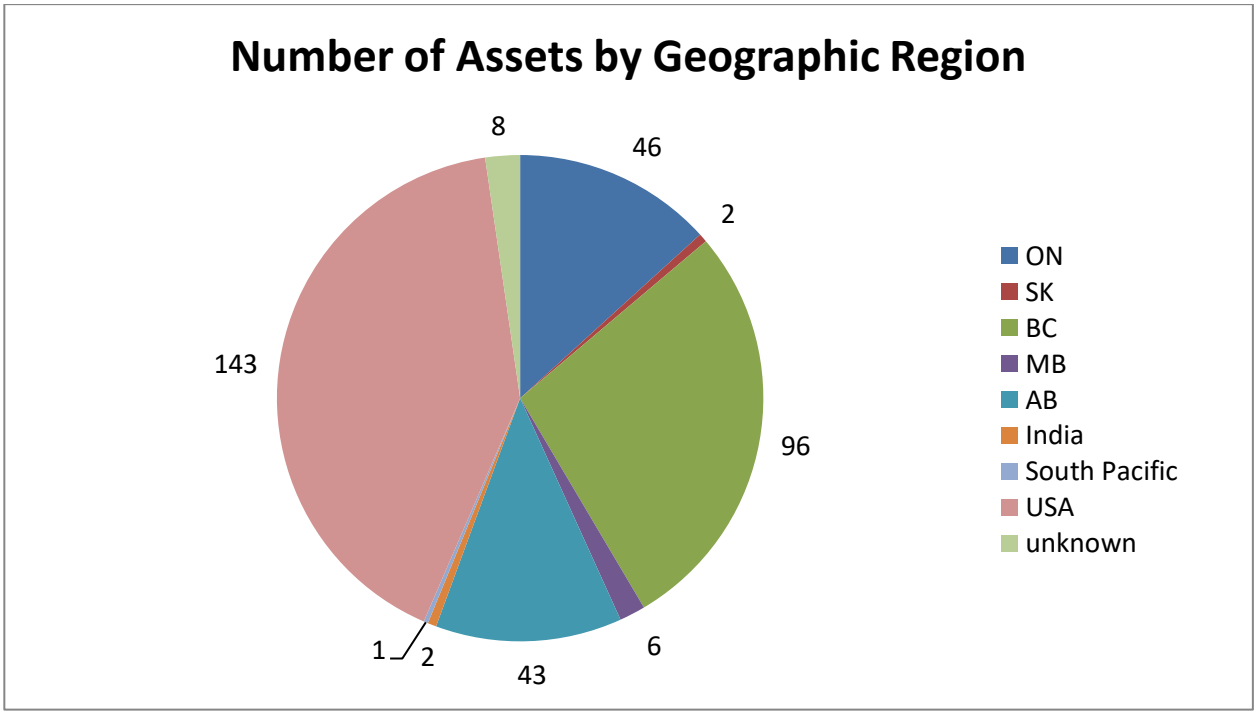
Asset Currency

In reviewing each asset, we have recorded the date that the asset was created. This will provide useful information, particularly when compared against the revision date for Apprenticeship Training Standard. It will assist in determining which assets may require revision prior to adoption.



Jurisdiction

Because apprenticeship Training Standards vary by jurisdiction, the research team recorded the geographic focus of each asset. This will provide valuable information in confirming the asset alignment to the Ontario Training Standards as suggested in the 'Next Steps' section of this document. Below is the breakdown of the assets by geographic region.



Future Work / Next Steps

1. Determine the Structure of the Ideal Open Educational Resource

   Determine the Standard for an open educational resource that could be used to support apprentices and employers during the workplace learning component of the apprentice's education. For example, this could include the combination of 1) a written introduction, 2) reading(s), 2) a video demonstration, 3) a simulation to allow apprentices to practice the skill, and 4) an assessment based on the information. These assets could also be combined into an integrated study guide.

2. Acquire Information on Certificate of Qualification (C of Q) Results

   The C of Q is the exam that apprentices write in order to achieve their terminal apprenticeship qualification of Journeyperson.

   Therefore, we should seek to obtain data from the Ministry of Training, Colleges and Universities (MTCU) and the Ontario College of Trades (OCOT) on the C of Q completion against the National Training Standards. It should be noted that the National Standards (based on which the C of Q exam is predicated) differ somewhat from the Provincial Standards in Ontario. OCOT has been very helpful in identifying the type of data that could potentially be made available. This data can be used help focus resources on those Training Standards that present significant challenges to apprentices on the C of Q exam.

3. Align Provincial and National Training Standards

   Map the National Standards to the Provincial Training Standards to facilitate alignment with the identified assets in this document. This will also guide the development of future materials designed to assist apprentices on the C of Q exam.

4. Establish Development Priorities

   Set priorities for acquisition/development/redevelopment based on MTCU/OCOT data, thereby ensuring the largest impact on the success of the apprentices, and the most efficient use of development resources.

5. Confirm Technical Alignment of OER Content

   Engage subject matter experts to review the Environmental Scan database to determine if the 'proposed' alignment to Training Standard Skills accurately reflects what is done in the field.

Appendix A: Skills Identified in Ontario Apprenticeship Training Standards

Skills Identified in the Automotive Service Technician Apprenticeship Training Standard

1. Occupational Health and Safety Procedures
2. Engine Systems
3. Electrical Systems - Starting and Charging
4. Engine Management Systems
5. Electrical Systems – Body
6. Fuel Delivery Systems
7. Transmission Systems
8. Drive Shafts, Differentials, and Drive Axle Assemblies
9. Suspension Systems and Frames
10. Steering Systems
11. Braking Systems
12. Tires, Wheels, Rims, and Hubs
13. Heating, Ventilation, and Air-Conditioning Systems
14. Body and Trim
15. Exhaust, Intake, and Emission Control Systems
16. Hybrid Vehicle Systems

Skills Identified in the Electrician - Construction and Maintenance Training Standard

1. Protect Self and Others
2. Read, Interpret and Revise Schematic Drawings and Documentation
3. Select, Maintain and Use Tools and Equipment
4. Install, Maintain and Repair Wiring Systems
5. Select, Install, Maintain and Troubleshoot Power Distribution Equipment Systems
6. Select, Install, Maintain and Troubleshoot Lighting Systems
7. Install, Maintain and Troubleshoot Rotating Equipment and Associated Control Systems
8. Install, Maintain and Troubleshoot Motor Drives and Associated Control Systems
9. Install, Maintain and Troubleshoot Stand-by Power Systems and Associated Equipment
10. Install, Maintain and Troubleshoot Communications Systems
11. Select, Maintain and Operate Test and Measuring Equipment
12. Install, Maintain and Troubleshoot Instrumentation Devices and Systems
13. Communicate in the Workplace

Skills Identified in the Plumber Apprenticeship Training Standard

1. Protect Self and Others
2. Communicate
3. Read, Interpret, Create and Maintain Drawings and Specifications
4. Design Systems
5. Plan and Prepare for the Project
6. Install Pipe, Fittings, Valves and Supports
7. Install Piping Systems
8. Install Fixtures
9. Install Equipment
10. Install Devices
11. Test Systems
12. Commission/Activate Systems
13. Perform Rigging and Hoisting
14. Service and Maintain Mechanical Systems

Appendix B: BC Common Core Competencies

Line A – Safe Work Practices

A-1: Control Workplace Hazards
A-2: Describe WorkSafeBC Regulations
A-3: Hazardous Materials Safely
A-4: Describe Personal Safety Practices
A-5: Describe Fire Safety

Line B - Employability Skills

B-1: Apply Study and Learning Skills
B-2: Describe Expectations and Responsibilities of Employers and Employees
B-3: Use Interpersonal Communication Skills
B-4: Describe the Apprenticeship System

Line C - Tools and Equipment

C-1: Describe Common Hand Tools and Their Uses
C-2: Describe Common Power Tools and Their Uses
C-3: Describe Rigging and Hoisting Equipment
C-4: Describe Ladders and Work Platforms

Line D - Organizational Skills Competency

D-1: Solve Trades Mathematical Problems
D-2: Apply Science Concepts to Trades Applications
D-3: Read Drawings and Specifications
D-4: Use Codes, Regulations and Standards
D-5: Use Manufacturer and Supplier Documentation
D-6: Plan Projects

Line E - Electrical Fundamentals

E-1: Describe the Basic Principles of Electricity
E-2: Identify Common Circuit Components and Their Symbols
E-3: Explain Wiring Connections
E-4: Use Multimeters

Appendix C: Spreadsheet Fields

1. **Program**

   This field contains one of the following 4 entries:

   - AST (Automotive Service Technician Apprenticeship)
   - Electrical (Electrician - Construction and Maintenance Apprenticeship)
   - Plumbing (Plumber Apprenticeship)
   - Common Core (related to BC Common Core competencies)

2. **Training Standard(s)**

   Depending on the "Program" selection in the previous field, a list of associated training standards skills is automatically presented for selection. Multiple selections are allowed in this field, as a single asset may address more than one training standard.

3. **Exam Priority**

   This field is currently blank, pending information from MTCU and OCOT on those training standards that present the greatest challenges for apprentices when writing the Certificate of Qualification exam.

4. **OER Title**

   Title as it appears on the publisher's website.

5. **OER Location (URL)**

   This field generally contains a link to the asset.

6. **Description**

   Where available, a description of the asset is provided in this field. The information is generally drawn from the asset itself.

7. **Author**

   Where known, the name of the author appears in this field.

8. **Content Owner/Affiliation**

   This field contains information on the organization that owns the content.

9. Publisher/Repository

The following entries are allowed in this field.

SkillsCommons.org
BCcampus Common Core Trades
fastBC.org
Other
Not found in Repository

10. Other Publisher/Repository

When "Other" is selected in the Publisher/Repository field, the 'Other Publisher/Repository' field contains an explanation as warranted.

11. Year

Where known, the year the asset was created is contained in this field.

12. Geographic Focus

Where known, the geographic focus of the asset is identified in this field. This allows for differentiation of content that was produced for Ontario, other Canadian provinces, for the United States or for other countries. Because training standards vary by jurisdiction, this indicator was determined to be important.

13. OER Type

The following entries are allowed in this field.

Assignment, Project, Lab, Student Inquiry, Exercise
Course
Module or Lesson
Worksheet
Quiz/Test
Tutorial, Demonstration
Instructor Material
eTextbook

14. Format(s)

A list of format columns is provided and each column will either be blank or contain "X". Separate columns were used rather than a drop-down list to allow the data to be filtered by multiple format types.

Here is a list of available formats:

· Packaged - Self Paced	Typically created using Articulate, Flash or Captivate, and cannot be easily unpacked
· Packaged - Zip or LMS	Package of related zipped files or back up of a lesson, module or a course from an LMS
· PDF	Adobe PDF document
· Simulation	Interactive content
· Video	Most often from YouTube or Vimeo
· Word	Microsoft Word document
· PPT	Microsoft PowerPoint document
· Web Site	A website containing the content, a splash page to the content or a website containing several related files
· Other	If not one of the above, then this field is identified
· Other Explained	In all cases, this was found to be a collection of files that make up a module, lesson or exercise

15. External Review

Either contains "Y" or "N" depending on whether the asset has been independently reviewed.

16. License/Stipulation

The following entries are allowed in this field.

CC BY (Attribution)
CC BY-SA (Attribution-Share-Alike)
CC BY-ND (Attribution-No-Derivatives)
CC BY-NC (Attribution-Non-Commercial)
CC BY-NC-SA (Attribution-NonCommercial-ShareAlike)
CC BY-NC-ND (Attribution-NonCommercial-NoDerivatives)
Not Open Source

If "Not Open Source" is selected, an explanation (if required) appears in the 'Notes" field.

17. Notes

This field contains any additional notes that the researchers believed to be relevant.