teachingtools — Environments and tools for teaching materials *

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Released ?

1 Implementation

```
⟨*package⟩
⟨@@=teachingtools⟩
```

1.1 Preliminaries

The usual preliminaries apply.

```
\ProvidesExplPackage {teachingtools} {2017/11/25} {-1}
  {Environments and tools for teaching materials}
```

This package depends on recent versions of the l3kernel. Versions from TeXLive 2016 or newer should be fine.

```
\@ifpackagelater { expl3 } { 2015/11/15 }
  { }
  {
    \PackageError { teachingtools } { Support~package~expl3~too~old }
      {
        You~need~to~update~your~installation~of~the~bundles~'l3kernel'~and~
        'l3packages'.\MessageBreak
        Loading~teachingtools~will~abort!
      }
    \tex_endinput:D
  }
```

Now load the support packages. chngcntr is required to modify counters while they're in use, and enumitem provides convenience macros for modifing lists.

```
\RequirePackage{ l3keys2e , chngcntr , enumitem }
```

1.2 Messages and error handling

All of the error and warning messages are defined here in one place to simplify things.

```
\msg_new:nnnn { teachingtools } { unknown-option }
  { Unknown~option~'#1'. }
  {
    The~option~'#1'~is~not~known~by~teachingtools:~
```

*This file describes ?, last revised ?.

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```
    perhaps~it~is~spelled~incorrectly.
}
```

__teachingtools_error:nxx
__teachingtools_error:nx
__teachingtools_error:n
\l__teachingtools_error_bool

Some general-purpose functions for throwing errors are defined next.

```
\cs_new_protected:Npn \__teachingtools_error:nxx #1#2#3 {
  \bool_set_true:N \l__teachingtools_error_bool
  \msg_error:nnxx { teachingtools } {#1} {#2} {#3}
}
\cs_new_protected:Npn \__teachingtools_error:nx #1#2 {
  \__teachingtools_error:nxx {#1} {#2} { }
}
\cs_new_protected:Npn \__teachingtools_error:n #1 {
  \__teachingtools_error:nxx {#1} { } { }
}
\bool_new:N \l__teachingtools_error_bool
```

(*End definition for* `\__teachingtools_error:nxx` *and others.*)

\l__teachingtools_key_tl

Unknown options should raise an teachingtools-specific error message.

```
\tl_new:N  \l__teachingtools_key_tl
\keys_define:nn { teachingtools } {
  unknown .code:n = {
    \msg_error:nnx { teachingtools } { unknown-option }
    { \exp_not:V \l_keys_key_tl }
  }
}
\AtBeginDocument {
  \keys_define:nn { teachingtools } {
    unknown .code:n = {
      \msg_error:nnx { teachingtools } { unknown-option }
      { \exp_not:V \l_keys_key_tl }
    }
  }
}
```

(*End definition for* `\l__teachingtools_key_tl`.)

1.3 Printing routines

Some general-purpose printing routines are provided here to ensure that text can be printed with the necessary configuration.

__teachingtools_print_question:

This function prints the `question` environment numbering string.

```
\cs_new:Nn \__teachingtools_print_question: {
  \tl_clear:N \l_tmpa_tl
  \bool_if:NT \l__teachingtools_question_prefix_bool {
    \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_question_prefix_tl }
    \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_prefix_separator_str }
  }
  \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_question_label_tl }
  \tl_to_str:N \l_tmpa_tl
}
```

(*End definition for* `\__teachingtools_print_question:`.)

__teachingtools_print_example: This function prints the `example` environment numbering string.

```
\cs_new:Nn \__teachingtools_print_example: {
  \tl_clear:N \l_tmpa_tl
  \bool_if:NT \l__teachingtools_example_prefix_bool {
    \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_prefix_tl }
    \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_prefix_separator_str }
  }
  \tl_put_right:Nx \l_tmpa_tl { \l__teachingtools_example_label_tl }
  \tl_to_str:N \l_tmpa_tl
}
```

(*End definition for* `\__teachingtools_print_example:`.)

1.4 Resetting counters

\l__teachingtools_reset_question_tl The `reset-question` option provides a means for question numbering to be reset at different sectioning "levels". The default is for numbering to be reset at the "section" level.

```
\newcounter{question}
\keys_define:nn { teachingtools } {
  reset-question .default:n = section,
  reset-question .choices:nn = {
    part, chapter, section, subsection, subsubsection, paragraph, subparagraph
  }
  {
    \counterwithin*{question}{ \tl_to_str:N \l_keys_choice_tl }
  },
  reset-question / none .code:n = {
    \counterwithout*{question}{section}
  },
}
```

(*End definition for* `\l__teachingtools_reset_question_tl`.)

\l__teachingtools_reset_example_tl The `reset-example` option provides a means for example numbering to be reset at different sectioning "levels". The default is for numbering to be not reset.

```
\newcounter{example}
\keys_define:nn { teachingtools } {
  reset-example .default:n = none,
  reset-example .choices:nn = {
    part, chapter, section, subsection, subsubsection, paragraph, subparagraph
  }
  {
    \counterwithin*{example}{ \tl_to_str:N \l_keys_choice_tl }
  },
  reset-example / none .code:n = {
    \counterwithout*{example}{section}
  },
}
```

(*End definition for* `\l__teachingtools_reset_example_tl`.)

\l__teachingtools_reset_all_tl The `reset-all` option provides a means for environment numbering to be reset at different sectioning "levels". The default is for numbering to be set individually for each environment.

```
\keys_define:nn { teachingtools } {
  reset-all .choice:,
  reset-all / part .meta:n = {
    reset-question = part,
    reset-example = part
  },
  reset-all / chapter .meta:n = {
    reset-question = chapter,
    reset-example = chapter
  },
  reset-all / section .meta:n = {
    reset-question = section,
    reset-example = section
  },
  reset-all / subsection .meta:n = {
    reset-question = subsection,
    reset-example = subsection
  },
  reset-all / subsubsection .meta:n = {
    reset-question = subsubsection,
    reset-example = subsubsection
  },
  reset-all / paragraph .meta:n = {
    reset-question = paragraph,
    reset-example = paragraph
  },
  reset-all / subparagraph .meta:n = {
    reset-question = subparagraph,
    reset-example = subparagraph
  },
  reset-all / none .meta:n = {
    reset-question = none,
    reset-example = none
  },
  reset-all / false .meta:n = {
    reset-question,
    reset-example
  },
  reset-all .default:n = false,
  reset-all .initial:n = false,
}
```

(*End definition for* `\l__teachingtools_reset_all_tl`.)

1.5 Formatting counters and labels

The label style of both environments can be set to any of the predefined counter styles: arabic, alphabetic, uppercase alphabetic, Roman numerals, uppercase Roman numerals, and footnote symbols. The latter style is provided but not recommended for use.

The following features are planned but not yet implemented:

- `suffix`: The character to append after the counter
- formatting of environment? No idea how to do that

Each environment can have an optional prefix to precede the number with that of the specified sectioning level. Note that this implies resetting of the environment counter at the specified level, unless overridden by the `reset-question`, `reset-example`, or `reset-all` options. The default is none.

\l__teachingtools_prefix_separator_tl

The `prefix-separator` is a character used to separate the environment numbering prefix from its number, if the prefix exists.

```
\str_new:N \l__teachingtools_prefix_separator_str
\keys_define:nn { teachingtools } {
  prefix-separator .choice:,
  prefix-separator / dash .code:n = {
    \str_set:Nn \l__teachingtools_prefix_separator_str { - }
  },
  prefix-separator / dot .code:n = {
    \str_set:Nn \l__teachingtools_prefix_separator_str { . }
  },
  prefix-separator / colon .code:n = {
    \str_set:Nn \l__teachingtools_prefix_separator_str { : }
  },
  prefix-separator / none .code:n = {
    \str_gclear:N \l__teachingtools_prefix_separator_str
  },
  prefix-separator .default:n = none,
  prefix-separator .initial:n = none,
}
```

(*End definition for* `\l__teachingtools_prefix_separator_tl`.)

\l__teachingtools_question_prefix_tl
\l__teachingtools_question_prefix_bool

The `question-prefix` sets the prefix for the `question` environment.

```
\tl_new:N \l__teachingtools_question_prefix_tl
\bool_new:N \l__teachingtools_question_prefix_bool
\keys_define:nn { teachingtools } {
  question-prefix .choice:,
  question-prefix / part .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{part} }
    \keys_set:nn { teachingtools } {
      reset-question = part,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / chapter .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{chapter} }
    \keys_set:nn { teachingtools } {
      reset-question = chapter,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / section .code:n = {
```

```
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{section} }
    \keys_set:nn { teachingtools } {
      reset-question = section,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / subsection .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subsection} }
    \keys_set:nn { teachingtools } {
      reset-question = subsection,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / subsubsection .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subsubsection} }
    \keys_set:nn { teachingtools } {
      reset-question = subsubsection,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / paragraph .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{paragraph} }
    \keys_set:nn { teachingtools } {
      reset-question = paragraph,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / subparagraph .code:n = {
    \tl_set:Nn \l__teachingtools_question_prefix_tl { \arabic{subparagraph} }
    \keys_set:nn { teachingtools } {
      reset-question = subparagraph,
      prefix-separator = dash,
    }
    \bool_set_true:N \l__teachingtools_question_prefix_bool
  },
  question-prefix / none .code:n = {
    \tl_gclear:N \l__teachingtools_question_prefix_tl
  },
  question-prefix .default:n = none,
  question-prefix .initial:n = none,
}
```

(*End definition for* `\l__teachingtools_question_prefix_tl` *and* `\l__teachingtools_question_prefix_bool`.)

`\l__teachingtools_example_prefix_tl`
`\l__teachingtools_example_prefix_bool`

The `example-prefix` sets the prefix for the `example` environment.

```
\tl_new:N \l__teachingtools_example_prefix_tl
\bool_new:N \l__teachingtools_example_prefix_bool
\keys_define:nn { teachingtools } {
  example-prefix .choice:,
```

```
  example-prefix / part .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{part} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = part,
      prefix-separator = dash,
    }
  },
  example-prefix / chapter .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{chapter} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = chapter,
      prefix-separator = dash,
    }
  },
  example-prefix / section .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{section} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = section,
      prefix-separator = dash,
    }
  },
  example-prefix / subsection .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subsection} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = subsection,
      prefix-separator = dash,
    }
  },
  example-prefix / subsubsection .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subsubsection} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = subsubsection,
      prefix-separator = dash,
    }
  },
  example-prefix / paragraph .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{paragraph} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = paragraph,
      prefix-separator = dash,
    }
  },
  example-prefix / subparagraph .code:n = {
    \tl_set:Nn \l__teachingtools_example_prefix_tl { \arabic{subparagraph} }
    \bool_set_true:N \l__teachingtools_example_prefix_bool
    \keys_set:nn { teachingtools } {
      reset-example = subparagraph,
      prefix-separator = dash,
```

```
    }
  },
  example-prefix / none .code:n = {
    \tl_gclear:N \l__teachingtools_example_prefix_tl
    \bool_set_false:N \l__teachingtools_example_prefix_bool
  },
  example-prefix .default:n = none,
  example-prefix .initial:n = none,
}
```

(*End definition for* `\l__teachingtools_example_prefix_tl` *and* `\l__teachingtools_example_prefix_bool`.)

`\l__teachingtools_question_label_tl` The label on the question environment can be set using this key. The default is Arabic numerals, and the options `alph` and `roman` are aliases for `lower-alph` and `lower-roman`.

```
\tl_new:N \l__teachingtools_question_label_tl
\keys_define:nn { teachingtools } {
  question-label .choice:,
  question-label / arabic .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \arabic{question} }
  },
  question-label / alph .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \alph{question} }
  },
  question-label / lower-alph .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \alph{question} }
  },
  question-label / upper-alph .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \Alph{question} }
  },
  question-label / roman .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \roman{question} }
  },
  question-label / lower-roman .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \roman{question} }
  },
  question-label / upper-roman .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \Roman{question} }
  },
  question-label / footnote-symbol .code:n = {
    \tl_set:Nn \l__teachingtools_question_label_tl { \fnsymbol{question} }
  },
  question-label .default:n = arabic,
  question-label .initial:n = arabic,
}
```

(*End definition for* `\l__teachingtools_question_label_tl`.)

`\l__teachingtools_example_label_tl` The label on the example environment can be set using this key. The default is also Arabic numerals.

```
\tl_new:N \l__teachingtools_example_label_tl
\keys_define:nn { teachingtools } {
  example-label .choice:,
  example-label / arabic .code:n = {
```

```
    \tl_set:Nn \l__teachingtools_example_label_tl { \arabic{example} }
  },
  example-label / alph .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \alph{example} }
  },
  example-label / lower-alph .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \alph{example} }
  },
  example-label / upper-alph .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \Alph{example} }
  },
  example-label / roman .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \roman{example} }
  },
  example-label / lower-roman .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \roman{example} }
  },
  example-label / upper-roman .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \Roman{example} }
  },
  example-label / footnote-symbol .code:n = {
    \tl_set:Nn \l__teachingtools_example_label_tl { \fnsymbol{example} }
  },
  example-label .default:n = arabic,
  example-label .initial:n = arabic,
}
```

(*End definition for* `\l__teachingtools_example_label_tl`.)

1.6 Dimensions and lengths

A number of dimensions and lengths are used internally to define spacing around each environment. Each environment has its own skip length, initially set to the value of that for the `question` environment.

```
\skip_new:N \questionbefore
\skip_new:N \questionafter
\skip_new:N \answerbefore
\skip_new:N \answerafter
\skip_new:N \examplebefore
\skip_new:N \exampleafter
\skip_new:N \noticebefore
\skip_new:N \noticeafter

\skip_set:Nn \questionbefore { 1.0ex plus -1ex minus -0.25ex }
\skip_set:Nn \questionafter { 1ex plus 0.25ex }

\skip_set_eq:NN \answerbefore \questionbefore
\skip_set_eq:NN \examplebefore \questionbefore
\skip_set_eq:NN \noticebefore \questionbefore

\skip_set_eq:NN \answerafter \questionafter
\skip_set_eq:NN \exampleafter \questionafter
\skip_set_eq:NN \noticeafter \questionafter
```

1.7 Environments

This package defines a number of environments for teaching materials.

`question` The `\question` environment is used to create a list of questions. The starred version is unnumbered and does not increment the question counter.

```
\NewDocumentEnvironment { question } { s } {
  \par \skip_vertical:N \questionbefore
  \IfBooleanTF #1
    { { \bfseries Question.\par } }
    {
      \refstepcounter{question}
      {\bfseries Question~\__teachingtools_print_question: .\par}
    }
  \begin{itshape}
}
{\end{itshape}\par \skip_vertical:N \questionafter}
\cs_new:cpn {question*} {\question*}
\cs_new_eq:cN {endquestion*} \endquestion
```

`answer` The `\answer` environment is used to format the answer.

```
\NewDocumentEnvironment { answer } { s } {
  \par\vspace\answerbefore
  \setcounter{equation}{0}
    { \bfseries Solution:\par }
}
{\par\vspace\answerafter}
\cs_new:cpn {answer*} {\example*}
\cs_new_eq:cN {endanswer*} \endexample
```

`example` The `\example` environment is used to create a list of examples. The starred version is unnumbered and does not increment the example counter.

```
\NewDocumentEnvironment { example } { s } {
  \par\vspace\examplebefore
  \IfBooleanTF #1
    { { \bfseries Example.\par } }
    {
      \refstepcounter{example}
      {\bfseries Example~\__teachingtools_print_example: .\par}
    }
}
{\par\vspace\exampleafter}
\cs_new:cpn {example*} {\example*}
\cs_new_eq:cN {endexample*} \endexample
```

1.8 Document macros

The user document macros are all collected together here for ease.

`\ttsetup` The set-up macro simply moves to the correct path and executes whatever has been passed.

```
\NewDocumentCommand \ttsetup { m } {
  \keys_set:nn { teachingtools } {#1}
}
```

(*End definition for* `\ttsetup`. *This function is documented on page* **??**.)

1.9 Loading configuration

Apply the settings given at load time.

```
\ProcessKeysOptions { teachingtools }
```

⟨/package⟩

Change History

v0.1

General: First public testing release . . 1

v0.2

General: Added support for environment numbering prefixes . . 1

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