# Package 'rqti'

March 5, 2025

**Title** Create Tests According to QTI 2.1 Standard

**Version** 1.0.0

**Description** Create tests and tasks compliant with the Question & Test Interoperability (QTI) information model version 2.1. Input sources are Rmd/md description files or S4-class objects. Output formats include standalone zip or xml files. Supports the generation of basic task types (single and multiple choice, order, pair association, matching tables, filling gaps and essay) and provides a comprehensive set of attributes for customizing tests.

**License** GPL (>= 3)

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Imports** htmltools, xml2, yaml, rmarkdown, servr, rstudioapi, fs, stringr, methods, lubridate, magrittr, httr2, curl, digest, knitr, getPass, keyring, zip, kableExtra, textutils, lifecycle

**Suggests** covr, dplyr, testthat (>= 3.0.0), XML, readr, RCurl

**Config/testthat/edition** 3

**Config/testthat/parallel** false

**URL** https://github.com/shevandrin/rqti, https://shevandrin.github.io/rqti/

**BugReports** https://github.com/shevandrin/rqti/issues

**Collate** 'rqti.R' 'QtiMetadata.R' 'ModalFeedback.R' 'AssessmentItem.R' 'AssessmentSection.R' 'AssessmentTest.R' 'AssessmentTestOpal.R' 'Choice.R' 'CorrectFeedback.R' 'MatchTable.R' 'DirectedPair.R' 'Entry.R' 'Essay.R' 'Gap.R' 'InlineChoice.R' 'LMS.R' 'MultipleChoice.R' 'MultipleChoiceTable.R' 'NumericGap.R' 'OneInColTable.R' 'OneInRowTable.R' 'Opal.R' 'Ordering.R' 'SingleChoice.R' 'TextGap.R' 'TextGapOpal.R' 'WrongFeedback.R' 'character.R' 'extract_results.R' 'helpers.R' 'knit_functions.R' 'object_builder.R' 'qti_task.R' 'qti_test.R' 'response_processing.R' 'rqti_project.R' 'section_builder.R' 'utils-pipe.R' 'zzz.R'

**Depends** R (>= 2.10)

**NeedsCompilation** no

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**Date/Publication** 2025-03-05 12:40:02 UTC

# Contents

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AssessmentItem-class     *Class AssessmentItem*

---

### Description

Abstract class AssessmentItem is responsible for creating a root element 'assessmentItem' in XML task description according to QTI 2.1. This class is not meant to be instantiated directly; instead, it serves as a base for derived classes.

### Slots

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the [Entry](#) type, it is calculated as the sum of the gap points by default.
- For tasks of the [DirectedPair](#), the default is calculated as 0.5 points per pair.
- For tasks of the [MatchTable](#) type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the [MultipleChoice](#) type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either [ModalFeedback](#), [CorrectFeedback](#), or [WrongFeedback](#) class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class [QtiMetadata](#) that holds metadata information about the task.

---

assessmentSection *Create an object [AssessmentSection](#)*

---

## Description

Create an [AssessmentSection](#) rqti-object as part of a test content

## Usage

```
assessmentSection(
  assessment_item,
  identifier = generate_id(type = "section"),
  title = identifier,
  selection = NA_integer_,
  time_limit = NA_integer_,
  visible = TRUE,
  shuffle = FALSE,
  max_attempts = NA_integer_,
  allow_comment = TRUE
)
```

## Arguments

assessment_item

A list containing [AssessmentSection](#) and/or Assessment item objects, such as [SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneIn-ColTable](#), [MultipleChoiceTable](#), and [DirectedPair](#).

identifier        A character value indicating the identifier of the test file. By default, it is generated as 'id_section_dddd', where dddd represents random digits.

title             A character value, optional, representing the file title. By default, it takes the value of the `identifier`.

selection         An integer value, optional, defining how many children of the section are delivered in the test. Default is `NA_integer_`, meaning "no selection".

time_limit        An integer value, optional, controlling the amount of time in munutes a candidate is allowed for this part of the test.

visible           A boolean value, optional, indicating whether the title of this section is shown in the hierarchy of the test structure. Default is `TRUE`.

shuffle           A boolean value, optional, responsible for randomizing the order in which the assessment items and subsections are initially presented to the candidate. Default is `FALSE`.

max_attempts      An integer value, optional, enabling the maximum number of attempts allowed for a candidate to pass this section.

allow_comment     A boolean value, optional, enabling candidates to leave comments on each question of the section. Default is `TRUE`.

## Value

An object of class [AssessmentSection](#).

## See Also

[section()](#), [test()](#), [test4opal()](#)

## Examples

```
sc <- singleChoice(prompt = "Question", choices = c("A", "B", "C"))
es <- essay(prompt = "Question")
# Since ready-made S4 "AssessmentItem" objects are taken, in this example a
#permanent section consisting of two tasks is created.
s <- assessmentSection(list(sc, es), title = "Section with nonrandomized tasks")
```

---

AssessmentSection-class

*Class "AssessmentSection"*

---

## Description

Class AssessmentSection is responsible for forming a section in the test XML specification according to QTI 2.1.

## Slots

identifier A character representing the unique identifier of the assessment section. By default, it is generated as 'id_section_dddd', where dddd represents random digits.

title A character representing the title of the section in the test. By default, it takes the value of the identifier.

time_limit A numeric value, optional, controlling the amount of time *in munutes* a candidate is allowed for this part of the test.

visible A boolean value, optional. If TRUE, it shows this section in the hierarchy of the test structure. Default is TRUE.

assessment_item A list containing [AssessmentSection](#) and/or Assessment item objects, such as [SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), and [DirectedPair](#).

shuffle A boolean value, optional, responsible for randomizing the order in which the assessment items and subsections are initially presented to the candidate. Default is FALSE.

selection A numeric value, optional, defining how many children of the section are delivered in the test.

max_attempts A numeric value, optional, enabling the maximum number of attempts a candidate is allowed to pass in this section.

allow_comment A boolean value, optional, enabling to allow the candidate to leave comments in each question of the section. Defautl is TRUE.

## See Also

[section()](#), [test()](#), [test4opal()](#), [AssessmentTest](#), [AssessmentTestOpal](#).

## Examples

```
sc1 <- new("SingleChoice", prompt = "Example task 1", title = "SC1",
            identifier = "q1", choices = c("a", "b", "c"))
sc2 <- new("SingleChoice", prompt = "Example task 2", title = "SC2",
            identifier = "q2", choices = c("A", "B", "C"))
sc3 <- new("SingleChoice", prompt = "Example task 3", title = "SC3",
            identifier = "q3", choices = c("aa", "bb", "cc"))
exam_section <- new("AssessmentSection",
                    identifier = "sec_id",
```

```
                        title = "Section",
                        time_limit = 20,
                        visible = FALSE,
                        assessment_item = list(sc1, sc2, sc3),
                        shuffle = FALSE,
                        selection = 1,
                        max_attempts = 1,
                        allow_comment = FALSE)
```

---

assessmentTest                *Create an object [AssessmentTest](#)*

---

### Description

Create an AssessmentTest `rqti`-object.

### Usage

```
assessmentTest(
  section,
  identifier = generate_id(type = "test"),
  title = identifier,
  time_limit = 90L,
  max_attempts = 1L,
 academic_grading = c(`1.0` = 0.95, `1.3` = 0.9, `1.7` = 0.85, `2.0` = 0.8, `2.3` =
  0.75, `2.7` = 0.7, `3.0` = 0.65, `3.3` = 0.6, `3.7` = 0.55, `4.0` = 0.5, `5.0` = 0),
  grade_label = c(en = "Grade", de = "Note"),
  table_label = c(en = "Grade", de = "Note"),
  navigation_mode = "nonlinear",
  submission_mode = "individual",
  allow_comment = TRUE,
  rebuild_variables = TRUE,
  metadata = qtiMetadata(),
  points = NA_real_
)
```

### Arguments

| | |
|---|---|
| section | A list containing [AssessmentSection](#) objects. |
| identifier | A character value indicating the identifier of the test file. By default, it is generated as 'id_test_dddd', where dddd represents random digits. |
| title | A character value, optional, representing the file title. By default, it takes the value of the identifier. |
| time_limit | An integer value, optional, controlling the time given to a candidate for the test in minutes. Default is 90 minutes. |
| max_attempts | An integer value, optional, indicating the maximum number of attempts allowed for the candidate. Default is 1. |

academic_grading

> A named numeric vector that defines the grade table shown to the candidate as feedback at the end of the test. The default is the German grading system: gt <- c("1.0" = 0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" = 0.7, "3.0" = 0.65, "3.3" = 0.6, "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade corresponds to a minimum percentage score required to achieve it. To hide the grading table at the end of the test, set this parameter to NA_real_.

grade_label    A character value, optional; a short message that shows with a grade in the final feedback; for multilingual use, it can be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default.

table_label    A character value, optional; a concise message to display as the column title of the grading table in the final feedback; for multilingual use, it can be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default.

navigation_mode

> A character value, optional, determining the general paths that the candidate may have during the exam. Two mode options are possible: - 'linear': Candidate is not allowed to return to previous questions. - 'nonlinear': Candidate is free to navigate; used by default.

submission_mode

> A character value, optional, determining when the candidate's responses are submitted for response processing. One of two mode options is possible: - 'individual': Submit candidates' responses on an item-by-item basis; used by default. - 'simultaneous': Candidates' responses are submitted all together by the end of the test.

allow_comment  A boolean, optional, enabling the candidate to leave comments in each question. Default is TRUE.

rebuild_variables

> A boolean, optional, enabling the recalculation of variables and reshuffling the order of choices for each item-attempt. Default is TRUE.

metadata       An object of class QtiMetadata that holds metadata information about the test. By default it creates QtiMetadata object. See qtiMetadata().

points         Do not use directly; the maximum number of points for the exam/test. It is calculated automatically as a sum of points of included tasks.

## Value

An AssessmentTest object.

## See Also

test(), test4opal(), section(), AssessmentTest, AssessmentSection

## Examples

```
sc <- sc <- singleChoice(prompt = "Question", choices = c("A", "B", "C"))
es <- new("Essay", prompt = "Question")
s <- section(c(sc, es), title = "Section with nonrandomized tasks")
t <- assessmentTest(list(s), title = "Example of the Exam")
```

AssessmentTest-class     *Class "AssessmentTest"*

## Description

Class `AssessmentTest` is responsible for creating XML exam files according to the QTI 2.1 standard.

## Details

Test consists of one or more sections. Each section can have one or more questions/tasks and/or one or more sub sections.

## Slots

**identifier** A character representing the unique identifier of the assessment test. By default, it is generated as 'id_test_dddd', where dddd represents random digits.

**title** A character representing the title of the test. By default, it takes the value of the identifier.

**points** Do not use directly; the maximum number of points for the exam/test. It is calculated automatically as a sum of points of included tasks.

**test_part_identifier** A character representing the identifier of the test part.

**navigation_mode** A character value, optional, determining the general paths that the candidate may have during the exam. Possible values:

- "linear" - candidate is not allowed to return to the previous questions.
- "nonlinear" - candidate is free to navigate. This is used by default.

**submission_mode** A character value, optional, determining when the candidate's responses are submitted for response processing. Possible values:

- "individual" - submit candidates' responses on an item-by-item basis. This is used by default.
- "simultaneous" - candidates' responses are submitted all together by the end of the test.

**section** A list containing one or more [AssessmentSection](#) objects.

**time_limit** A numeric value, optional, controlling the amount of time in minutes which a candidate is allowed for this part of the test.

**max_attempts** A numeric value, optional, enabling the maximum number of attempts that a candidate is allowed to pass.

**allow_comment** A boolean value, optional, enabling to allow candidates to leave comments in each question.

rebuild_variables A boolean value, optional, enabling to recalculate variables and reshuffle the
     order of choices for each item-attempt.

academic_grading A named numeric vector that defines the grade table shown to the candidate
     as feedback at the end of the test. The default is the German grading system: gt <- c("1.0" =
     0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" = 0.7, "3.0" = 0.65, "3.3" = 0.6,
     "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade corresponds to a minimum percentage score
     required to achieve it. To hide the grading table at the end of the test, set this parameter to
     NA_real_.

grade_label A character value, optional, representing a short message to display with a grade in
     the final feedback. For multilingual usage, it hat to be a named vector with two-letter ISO
     language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the
     value for the language of the operating system. Default is c(en="Grade", de="Note").

table_label A character value, optional, representing a concise message to display as the column
     title of the grading table in the final feedback. For multilingual usage, it hat to be a named vec-
     tor with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test
     creation, it takes the value for the language of the operating system. Default is c(en="Grade",
     de="Note").

metadata An object of class [QtiMetadata](#) that holds metadata information about the test.

## See Also

[AssessmentSection](#), [AssessmentTestOpal](#), [test()](#), [test4opal()](#), [section()](#).

## Examples

```
# This example creates test 'exam' with one section 'exam_section' which
# consists of two questions/tasks: essay and single choice types
task1 <- new("Essay", prompt = "Test task", title = "Essay",
             identifier = "q1")
task2 <- new("SingleChoice", prompt = "Test task", title = "SingleChoice",
             choices = c("A", "B", "C"), identifier = "q2")
exam_section <- new("AssessmentSection", identifier = "sec_id",
                    title = "section", assessment_item = list(task1, task2))
exam <- new("AssessmentTest",
            identifier = "id_test_1234",
            title = "Example of Exam",
            navigation_mode = "linear",
            submission_mode = "individual",
            section = list(exam_section),
            time_limit = 90,
            max_attempts = 1,
            grade_label = "Preliminary grade")
```

---

assessmentTestOpal          *Create an object [AssessmentTestOpal](#)*

---

**Description**

Create an AssessmentTestOpal `rqti`-object.

**Usage**

```
assessmentTestOpal(
  section,
  identifier = generate_id(type = "test"),
  title = identifier,
  time_limit = 90L,
  max_attempts = 1L,
 academic_grading = c(`1.0` = 0.95, `1.3` = 0.9, `1.7` = 0.85, `2.0` = 0.8, `2.3` =
  0.75, `2.7` = 0.7, `3.0` = 0.65, `3.3` = 0.6, `3.7` = 0.55, `4.0` = 0.5, `5.0` = 0),
  grade_label = c(en = "Grade", de = "Note"),
  table_label = c(en = "Grade", de = "Note"),
  navigation_mode = "nonlinear",
  submission_mode = "individual",
  allow_comment = TRUE,
  rebuild_variables = TRUE,
  show_test_time = TRUE,
  calculator = NA_character_,
  mark_items = TRUE,
  keep_responses = FALSE,
  metadata = qtiMetadata(),
  points = NA_real_
)
```

**Arguments**

| | |
|---|---|
| section | A list containing [AssessmentSection](#) objects. |
| identifier | A character value indicating the identifier of the test file. By default, it is generated as 'id_test_dddd', where dddd represents random digits. |
| title | A character value, optional, representing the file title. By default, it takes the value of the identifier. |
| time_limit | An integer value, optional, controlling the time given to a candidate for the test in minutes. Default is 90 minutes. |
| max_attempts | An integer value, optional, indicating the maximum number of attempts allowed for the candidate. Default is 1. |
| academic_grading | |
| | A named numeric vector that defines the grade table shown to the candidate as feedback at the end of the test. The default is the German grading system: gt <- c("1.0" = 0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" = 0.7, "3.0" = 0.65, "3.3" = 0.6, "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade corresponds to a minimum percentage score required to achieve it. To hide the grading table at the end of the test, set this parameter to NA_real_. |
| grade_label | A character value, optional; a short message that shows with a grade in the final feedback; for multilingual use, it can be a named vector with two-letter |

ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default.

table_label       A character value, optional; a concise message to display as the column title of the grading table in the final feedback; for multilingual use, it can be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default.

navigation_mode

A character value, optional, determining the general paths that the candidate may have during the exam. Two mode options are possible: - 'linear': Candidate is not allowed to return to previous questions. - 'nonlinear': Candidate is free to navigate; used by default.

submission_mode

A character value, optional, determining when the candidate's responses are submitted for response processing. One of two mode options is possible: - 'individual': Submit candidates' responses on an item-by-item basis; used by default. - 'simultaneous': Candidates' responses are submitted all together by the end of the test.

allow_comment     A boolean, optional, enabling the candidate to leave comments in each question. Default is TRUE.

rebuild_variables

A boolean, optional, enabling the recalculation of variables and reshuffling the order of choices for each item-attempt. Default is TRUE.

show_test_time    A boolean, optional, determining whether to show candidate elapsed processing time without a time limit. Default is TRUE.

calculator        A character value, optional, determining whether to show a calculator to the candidate. Possible values: - "simple" - "scientific".

mark_items        A boolean, optional, determining whether to allow candidate marking of questions. Default is TRUE.

keep_responses    A boolean, optional, determining whether to save the candidate's answers from the previous attempt. Default is FALSE.

metadata          An object of class [QtiMetadata](#) that holds metadata information about the test. By default it creates [QtiMetadata](#) object. See [qtiMetadata()](#).

points            Do not use directly; the maximum number of points for the exam/test. It is calculated automatically as a sum of points of included tasks.

## Value

An [AssessmentTestOpal](#) object.

## See Also

[test()](#), [test4opal()](#), [section()](#), [assessmentTest()](#), [AssessmentTest](#), [AssessmentSection](#)

## Examples

```
sc <- sc <- singleChoice(prompt = "Question", choices = c("A", "B", "C"))
es <- new("Essay", prompt = "Question")
s <- section(c(sc, es), title = "Section with nonrandomized tasks")
t <- assessmentTest(list(s), title = "Example of the Exam")
```

---

AssessmentTestOpal-class

*Class "AssessmentTestOpal"*

---

## Description

Class `AssessmentTestOpal` is responsible for creating XML exam files according to the QTI 2.1 standard for LMS Opal.

## Details

Test consists of one or more sections. Each section can have one or more questions/tasks and/or one or more sub sections.

## Slots

identifier A character representing the unique identifier of the assessment test. By default, it is generated as 'id_test_dddd', where dddd represents random digits.

title A character representing the title of the test. By default, it takes the value of the identifier.

points Do not use directly; the maximum number of points for the exam/test. It is calculated automatically as a sum of points of included tasks.

test_part_identifier A character representing the identifier of the test part.

navigation_mode A character value, optional, determining the general paths that the candidate may have during the exam. Possible values:

- "linear" - candidate is not allowed to return to the previous questions.
- "nonlinear" - candidate is free to navigate. This is used by default.

submission_mode A character value, optional, determining when the candidate's responses are submitted for response processing. Possible values:

- "individual" - submit candidates' responses on an item-by-item basis. This is used by default.
- "simultaneous" - candidates' responses are submitted all together by the end of the test.

section A list containing one or more [AssessmentSection](#) objects.

time_limit A numeric value, optional, controlling the amount of time in minutes which a candidate is allowed for this part of the test.

max_attempts A numeric value, optional, enabling the maximum number of attempts that a candidate is allowed to pass.

allow_comment  A boolean value, optional, enabling to allow candidates to leave comments in each question.

rebuild_variables  A boolean value, optional, enabling to recalculate variables and reshuffle the order of choices for each item-attempt.

academic_grading  A named numeric vector that defines the grade table shown to the candidate as feedback at the end of the test. The default is the German grading system: gt <- c("1.0" = 0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" = 0.7, "3.0" = 0.65, "3.3" = 0.6, "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade corresponds to a minimum percentage score required to achieve it. To hide the grading table at the end of the test, set this parameter to NA_real_.

grade_label  A character value, optional, representing a short message to display with a grade in the final feedback. For multilingual usage, it hat to be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system. Default is c(en="Grade", de="Note").

table_label  A character value, optional, representing a concise message to display as the column title of the grading table in the final feedback. For multilingual usage, it hat to be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system. Default is c(en="Grade", de="Note").

metadata  An object of class [QtiMetadata](#) that holds metadata information about the test.

show_test_time  A boolean value, optional, determining whether to show the candidate elapsed processing time without time limit. Default is `FALSE`.

calculator  A character value, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific".

mark_items  A boolean value, optional, determining whether to allow candidate marking of questions. Default is `TRUE`.

keep_responses  A boolean value, optional, determining whether to save candidate's answers from the previous attempt. Default is `FALSE`.

files  A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

## See Also

[AssessmentSection](#), [AssessmentTest](#), [test()](#), [test4opal()](#), [section()](#).

## Examples

```
# This example creates test 'exam' with one section 'exam_section' which
# consists of two questions/tasks: essay and single choice types
task1 <- new("Essay", prompt = "Test task", title = "Essay",
             identifier = "q1")
task2 <- new("SingleChoice", prompt = "Test task", title = "SingleChoice",
             choices = c("A", "B", "C"), identifier = "q2")
exam_section <- new("AssessmentSection", identifier = "sec_id",
```

```
                          title = "section", assessment_item = list(task1, task2))
exam <- new("AssessmentTestOpal",
            identifier = "id_test_1234",
            title = "Example of Exam",
            navigation_mode = "linear",
            submission_mode = "individual",
            section = list(exam_section),
            time_limit = 90,
            max_attempts = 1,
            grade_label = "Preliminary grade",
            show_test_time = TRUE,
            calculator = "scientific-calculator",
            mark_items = TRUE,
            files = "text_book.pdf")
```

---

authLMS                         *Authenticate with LMS*

---

### Description

A generic function to handle authentication with a Learning Management System (LMS).

The method to handle authentication with LMS.

### Usage

```
authLMS(object, ...)

## S4 method for signature 'LMS'
authLMS(object, ...)
```

### Arguments

| | |
|---|---|
| object | an instance of the S4 object Opal, LMS |
| ... | Additional arguments to be passed to the method, if applicable. |

---

buildAssessmentSection
                        *Build tags for AssessmentSection in assessmentTest*

---

### Description

Generic function for tags that contains assessementSection in assessnetTest

## Usage

```
buildAssessmentSection(object, folder = NULL, verify = FALSE)

## S4 method for signature 'AssessmentItem'
buildAssessmentSection(object, folder)

## S4 method for signature 'AssessmentSection'
buildAssessmentSection(object, folder = NULL, verify = FALSE)

## S4 method for signature 'character'
buildAssessmentSection(object, folder = NULL, verify = FALSE)
```

## Arguments

| | |
|---|---|
| `object` | an instance of the S4 object (AssessmentSection and all types of AssessmentItem) |
| `folder` | string; a folder to store xml file |
| `verify` | boolean, optional; check validity of xml file, default FALSE |

---

Choice-class                    *Class "Choice"*

---

## Description

Abstract class `Choice` is not meant to be instantiated directly; instead, it serves as a base for derived classes SingleChoice and MultipleChoice.

## Slots

choices A character vector defining a set of answer options in the question.

choice_identifiers A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list.

shuffle A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

orientation A character, determining whether to place answers in vertical or horizontal mode. Possible values:

- "vertical" - Default.
- "horizontal"

---

correctFeedback                    *Create object [CorrectFeedback](#)*

---

### Description

Create object [CorrectFeedback](#)

### Usage

```
correctFeedback(content = list(), title = character(0), show = TRUE)
```

### Arguments

content      A character string or a list of character strings to form the text of the question,
             which may include HTML tags.

title        A character value, optional, representing the title of the feedback window.

show         A boolean value, optional, determining whether to show (TRUE) or hide (FALSE)
             the feedback. Default is TRUE.

### Value

An object of class [CorrectFeedback](#)

### Examples

```
cfb <- correctFeedback(content = "Some comments", title = "Feedback")
```

---

CorrectFeedback-class  *Class "CorrectFeedback"*

---

### Description

Class CorrectFeedback is responsible for delivering feedback messages to the candidate in case
of a correct answer on the entire exercise.

### Slots

outcome_identifier A character representing the unique identifier of the outcome declaration
    variable that relates to feedback. Default is "FEEDBACKMODAL".

show A boolean value, optional, determining whether to show (TRUE) or hide (FALSE) the modal
    feedback. Default is TRUE.

title A character value, optional, representing the title of the modal feedback window.

content A list of character content to form the text of the modal feedback, which can include
    HTML tags.

identifier A character value representing the identifier of the modal feedback item. Default
    is "correct". cfb <- new("CorrectFeedback", title = "Right answer", content = list("Some
    demonstration"))

---

createAssessmentTest        *Create an element assessmentTest of a qti-xml document for test*

---

### Description

Generic function for creating assessmentTest element for XML document of specification the test following the QTI schema v2.1

### Usage

```
createAssessmentTest(object, folder, verify = FALSE)

## S4 method for signature 'AssessmentTest'
createAssessmentTest(object, folder, verify = FALSE)

## S4 method for signature 'AssessmentTestOpal'
createAssessmentTest(object, folder, verify = FALSE)
```

### Arguments

| | |
|---|---|
| object | an instance of the S4 object AssessmentTest or AssessmentTestOpal |
| folder | string, optional; a folder to store xml file; working directory by default |
| verify | boolean, optional; to check validity of xml file, default FALSE |

---

createItemBody        *Create an element itemBody of a qti-xml document*

---

### Description

Generic function for creating itemBody element for XML document of specification the question following the QTI schema v2.1

### Usage

```
createItemBody(object)

## S4 method for signature 'DirectedPair'
createItemBody(object)

## S4 method for signature 'Entry'
createItemBody(object)

## S4 method for signature 'Essay'
createItemBody(object)
```

```
## S4 method for signature 'MultipleChoice'
createItemBody(object)

## S4 method for signature 'MultipleChoiceTable'
createItemBody(object)

## S4 method for signature 'OneInColTable'
createItemBody(object)

## S4 method for signature 'OneInRowTable'
createItemBody(object)

## S4 method for signature 'Ordering'
createItemBody(object)

## S4 method for signature 'SingleChoice'
createItemBody(object)
```

## Arguments

object          an instance of the S4 object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Or-](#)
                [dering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#))

---

createMetadata          *Create an element of metadata*

---

## Description

Create an element of metadata

## Usage

```
createMetadata(object)

## S4 method for signature 'QtiContributor'
createMetadata(object)

## S4 method for signature 'AssessmentItem'
createMetadata(object)

## S4 method for signature 'AssessmentTest'
createMetadata(object)
```

## Arguments

object              an instance of the S4 object ([QtiContributor](#), [QtiMetadata](#)

---

createOutcomeDeclaration

*Create an element outcomeDeclaration of a qti-xml document*

---

## Description

Generic function for creating outcomeDeclaration element for XML document of specification the question following the QTI schema v2.1

## Usage

```
createOutcomeDeclaration(object)

## S4 method for signature 'AssessmentItem'
createOutcomeDeclaration(object)

## S4 method for signature 'AssessmentTest'
createOutcomeDeclaration(object)

## S4 method for signature 'Entry'
createOutcomeDeclaration(object)

## S4 method for signature 'Gap'
createOutcomeDeclaration(object)
```

## Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap, NumericGap, InlineChoice)

---

createQtiTask-methods   *Create XML or zip file for question specification*

---

## Description

Create XML or zip file for question specification

## Usage

```
createQtiTask(object, dir = ".", verification = FALSE, zip = FALSE)

## S4 method for signature 'AssessmentItem'
createQtiTask(object, dir = ".", verification = FALSE, zip = FALSE)

## S4 method for signature 'character'
createQtiTask(object, dir = getwd())
```

## Arguments

| | |
|---|---|
| object | An instance of the S4 object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#)). |
| dir | A character value, optional; a folder to store xml file; working directory is used by default. |
| verification | A boolean value, optional; to check validity of xml file. Default is FALSE. |
| zip | A boolean value, optional; the TRUE value allows to create a zip archive with the manifest and task files inside. Default is FALSE. |

## Value

A path to xml or zip file.

## Examples

```
essay <- new("Essay", prompt = "Test task", title = "Essay")
## Not run:
# creates folder with XML (side effect)
createQtiTask(essay, "result")
# creates folder with zip (side effect)
createQtiTask(essay, "result", zip = TRUE)

## End(Not run)
```

---

createQtiTest-methods    *Create zip-archive of the qti test specification*

---

## Description

Create zip-archive of the qti test specification

## Usage

```
createQtiTest(object, dir = NULL, verification = FALSE, zip_only =
  FALSE)

## S4 method for signature 'AssessmentItem'
createQtiTest(object, dir = ".", verification = FALSE, zip_only = FALSE)

## S4 method for signature 'AssessmentTest'
createQtiTest(object, dir = getwd(), verification = FALSE, zip_only = FALSE)

## S4 method for signature 'character'
createQtiTest(object, dir = getwd())
```

## Arguments

| | |
|---|---|
| object | An instance of the [AssessmentTest](#), [AssessmentTestOpal](#) or [AssessmentItem](#) S4 object. |
| dir | A character value, optional; a folder to store xml file; working directory is used by default. |
| verification | A boolean value, optional; to check validity of xml files. Default is FALSE. |
| zip_only | A boolean value, optional; returns only zip file in case of TRUE or zip, xml and downloads files in case of FALSE value. Default is FALSE. |

## Value

A path to zip and xml files.

## Examples

```
essay <- new("Essay", prompt = "Test task", title = "Essay",
             identifier = "q1")
sc <- new("SingleChoice", prompt = "Test task", title = "SingleChoice",
          choices = c("A", "B", "C"), identifier = "q2")
exam_section <- new("AssessmentSection", identifier = "sec_id",
                    title = "section", assessment_item = list(essay, sc))
exam <- new("AssessmentTestOpal", identifier = "id_test",
            title = "some title", section = list(exam_section))
## Not run:
# creates folder with zip (side effect)
createQtiTest(exam, "exam_folder", "TRUE")

## End(Not run)
```

---

createResponseDeclaration

*Create an element responseDeclaration of a qti-xml document*

---

## Description

Generic function for creating responseDeclaration element for XML document of specification the question following the QTI schema v2.1

## Usage

```
createResponseDeclaration(object)

## S4 method for signature 'AssessmentItem'
createResponseDeclaration(object)

## S4 method for signature 'MatchTable'
createResponseDeclaration(object)
```

```
## S4 method for signature 'Entry'
createResponseDeclaration(object)

## S4 method for signature 'Essay'
createResponseDeclaration(object)

## S4 method for signature 'InlineChoice'
createResponseDeclaration(object)

## S4 method for signature 'MultipleChoice'
createResponseDeclaration(object)

## S4 method for signature 'MultipleChoiceTable'
createResponseDeclaration(object)

## S4 method for signature 'NumericGap'
createResponseDeclaration(object)

## S4 method for signature 'Ordering'
createResponseDeclaration(object)

## S4 method for signature 'SingleChoice'
createResponseDeclaration(object)

## S4 method for signature 'TextGap'
createResponseDeclaration(object)
```

## Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Entry, Ordering,
                OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap,
                NumericGap, InlineChoice)

---

createResponseProcessing

*Create an element responseProcessing of a qti-xml document*

---

## Description

Generic function for creating responseProcessing element for XML document of specification the
question following the QTI schema v2.1

## Usage

```
createResponseProcessing(object)
```

```
## S4 method for signature 'AssessmentItem'
createResponseProcessing(object)

## S4 method for signature 'Entry'
createResponseProcessing(object)

## S4 method for signature 'Essay'
createResponseProcessing(object)

## S4 method for signature 'Gap'
createResponseProcessing(object)

## S4 method for signature 'NumericGap'
createResponseProcessing(object)

## S4 method for signature 'Ordering'
createResponseProcessing(object)

## S4 method for signature 'SingleChoice'
createResponseProcessing(object)

## S4 method for signature 'TextGapOpal'
createResponseProcessing(object)
```

## Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap, NumericGap, InlineChoice)

---

| createText | *Compose a set of html elements to display question in qti-xml document* |
|---|---|

---

## Description

Generic function for creating a set of html elements to display question for XML document of specification the question following the QTI schema v2.1

## Usage

```
createText(object)

## S4 method for signature 'Gap'
createText(object)

## S4 method for signature 'InlineChoice'
```

```
createText(object)

## S4 method for signature 'character'
createText(object)
```

## Arguments

object          an instance of the S4 object (Gap, InlineChoice, character)

---

createZip                    *Create an Zip archive of QTI test*

---

## Description

Generic function for creating zip archive with set of XML documents of specification the test following the QTI schema v2.1

## Usage

```
createZip(object, input, output, file_name, zip_only)

## S4 method for signature 'AssessmentTest'
createZip(object, input, output, file_name, zip_only)

## S4 method for signature 'AssessmentTestOpal'
createZip(object, input, output, file_name, zip_only)
```

## Arguments

object          an instance of the S4 object AssessmentTest or AssessmentTestOpal

input           string, optional; a source folder with xml files

output          string, optional; a folder to store zip and xml files; working directory by default

file_name       string, optional; file name of zip archive

zip_only        boolean, optional; returns only zip file in case of TRUE or zip, xml and downloads files in case of FALSE value

---

create_assessment_item

*Compose a root element AssessmentItem of xml task*

---

### Description

create_assessment_item() creates html structure with AssessmentItem root element (shiny.tag) for xml qti task description according QTI 2.1

### Usage

```
create_assessment_item(object)
```

### Arguments

object          an instance of the S4 object

### Value

A list() with a shiny.tag class

---

create_qti_task          *Create XML file for question specification*

---

### Description

Create XML file for question specification

### Usage

```
create_qti_task(object, dir = NULL, verification = FALSE)
```

### Arguments

| | |
|---|---|
| object | an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair). |
| dir | string, optional; a folder to store xml file; working directory by default |
| verification | boolean, optional; to check validity of xml file, default FALSE |

### Value

xml document.

---

create_qti_test          *Create XML file for exam test specification*

---

### Description

Create XML file for exam test specification

### Usage

```
create_qti_test(object, path = ".", verification = FALSE, zip_only
  = FALSE)
```

### Arguments

| | |
|---|---|
| object | an instance of the [AssessmentTest](#) S4 object |
| path | string, optional; a path to folder to store zip file with possible file name; working directory by default |
| verification | boolean, optional; to check validity of xml file, default FALSE |
| zip_only | boolean, optional; returns only zip file in case of TRUE or zip, xml and downloads files in case of FALSE value |

### Value

xml document.

---

create_question_object
<div align="center">

*Create rqti S4 [AssessmentItem](#) Object from Rmd*
</div>

---

### Description

Generates an rqti S4 AssessmentItem object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#)) from an Rmd file.

### Usage

```
create_question_object(file)
```

### Arguments

| | |
|---|---|
| file | A string representing the path to an Rmd file. |

### Value

One of the rqti S4 AssessmentItem objects: [SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), or [DirectedPair](#).

## Examples

```
create_question_object("file.Rmd")
```

---

directedPair                    *Create object [DirectedPair](#)*

---

## Description

Create object [DirectedPair](#)

## Usage

```
directedPair(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
  points = 1,
  rows,
  rows_identifiers,
  cols,
  cols_identifiers,
  answers_identifiers,
  answers_scores = NA_real_,
  shuffle = TRUE,
  shuffle_rows = TRUE,
  shuffle_cols = TRUE,
  feedback = list(),
  orientation = "vertical",
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

| | |
|---|---|
| identifier | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| title | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| content | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| prompt | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| points | A numeric value, optional, representing the number of points for the entire task. If not provided, the default is calculated as 0.5 points per pair. |

| | |
|---|---|
| rows | A character vector specifying answer options as the first elements in couples. |
| rows_identifiers | A character vector, optional, specifies identifiers of the first elements in couples. |
| cols | A character vector specifying answer options as the second elements in couples. |
| cols_identifiers | A character vector, optional, specifies identifiers of the second elements in couples. |
| answers_identifiers | A character vector specifying couples of identifiers that combine the correct answers. |
| answers_scores | A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options. |
| shuffle | A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE. |
| shuffle_rows | A boolean value, optional, determining whether to randomize the order of the choices only for the first elements of the answer tuples. Default is TRUE. |
| shuffle_cols | A boolean value, optional, determining whether to randomize the order of the choices only for the second elements of the answer tuples. Default is TRUE. |
| feedback | A list containing feedback message-object ModalFeedback for candidates. |
| orientation | A character, optional, determining whether to place answers in vertical or horizontal mode. Possible values: |

- "vertical" - Default.
- "horizontal".

| | |
|---|---|
| calculator | A character, optional, determining whether to show a calculator to the candidate. Possible values: |

- "simple"
- "scientific".

| | |
|---|---|
| files | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

## Value

An object of class DirectedPair

## Examples

```
dp_min <- directedPair(content = "<p>\"Directed pairs\" task</p>",
                       rows = c("alfa", "beta", "gamma"),
                       rows_identifiers = c("a", "b", "g"),
                       cols = c("A", "B", "G;"),
                       cols_identifiers = c("as", "bs", "gs"),
                       answers_identifiers = c("a as", "b bs", 'g gs'))
```

```
dp <- directedPair(identifier = "id_task_1234",
                   title = "Directed Pair Task",
                   content = "<p>\"Directed pairs\" task</p>",
                   prompt = "Plain text, can be used instead of the content",
                   rows = c("alfa", "beta", "gamma"),
                   rows_identifiers = c("a", "b", "g"),
                   cols = c("A", "B", "G"),
                   cols_identifiers = c("as", "bs", "gs"),
                   answers_identifiers = c("a as", "b bs", "g gs"),
                   answers_scores = c(1, 0.5, 0.1),
                   shuffle_rows = FALSE,
                   shuffle_cols = TRUE,
                   orientation = "horizontal")
```

---

DirectedPair-class          *Class "DirectedPair"*

---

### Description

Class DirectedPair is responsible for creating assessment tasks according to the QTI 2.1 standard,
where a candidate has to make binary associations between answer options.

### Slots

identifier A character representing the unique identifier of the assessment task. By default, it is
   generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it
   takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags.
   For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as
   [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

prompt An optional character representing a simple question text, consisting of one paragraph.
   This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is
   1, but pay attention:

   - For tasks of the [Entry](#) type, it is calculated as the sum of the gap points by default.
   - For tasks of the [DirectedPair](#), the default is calculated as 0.5 points per pair.
   - For tasks of the [MatchTable](#) type, it can also be calculated as the sum of points for indi-
     vidual answers, when provided.
   - For tasks of the [MultipleChoice](#) type, points is numeric vector and required. Each number
     in this vector determines the number of points that will be awarded to a candidate if they
     select the corresponding answer. The order of the scores must match the order of the
     choices. It is possible to assign negative values to incorrect answers. All answers with a
     positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be
   an instance of either [ModalFeedback](#), [CorrectFeedback](#), or [WrongFeedback](#) class.

calculator  A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files  A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata  An object of class QtiMetadata that holds metadata information about the task.

rows  A character vector specifying answer options as row names in the table or the first elements in couples in DirectedPair.

rows_identifiers  A character vector, optional, specifying identifiers for answer options defined in rows of the table or identifiers of the first elements in couples in DirectedPair.

cols  A character vector specifying answer options as column headers in the table or the second elements in couples in DirectedPair.

cols_identifiers  A character vector, optional, specifying identifiers for answer options defined in columns of the table or identifiers of the second elements in couples in DirectedPair.

answers_identifiers  A character vector specifying couples of identifiers that combine the correct answers.

answers_scores  A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options.

shuffle  A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

shuffle_rows  A boolean value, optional, determining whether to randomize the order of the choices only in rows. Default is TRUE.

shuffle_cols  A boolean value, optional, determining whether to randomize the order of the choices only in columns. Default is TRUE.

orientation  A character, optional, determining whether to place answers in vertical or horizontal mode. Possible values:

- "vertical" - Default.
- "horizontal"

**Examples**

```
dp <- new("DirectedPair",
          identifier = "id_task_1234",
          title = "Directed pair",
          content = list("<p>\"Directed pairs\" task</p>"),
          points = 5,
          rows = c("row1", "row2", "row3"),
          rows_identifiers = c("a", "b", "c"),
          cols = c("alfa", "beta", "gamma"),
          cols_identifiers = c("k", "l", "m"),
          answers_identifiers = c("a k", "b l", 'c m'),
          shuffle = TRUE,
          orientation = "vertical")
```

| dropdown | *Create YAML string for InlineChoice object (dropdown list)* |
|---|---|

## Description

Create YAML string for InlineChoice object (dropdown list)

## Usage

```
dropdown(
  choices,
  solution_index = 1,
  points = 1,
  shuffle = TRUE,
  response_identifier = NULL
)
```

## Arguments

| | |
|---|---|
| choices | A numeric or character vector; contains values of possible answers. If you use a named vector, the names will be used as identifiers. |
| solution_index | An integer value, optional; the number of right answer in the `choices` vector. Default is 1. |
| points | A numeric value, optional; the number of points for this gap. Default is 1. |
| shuffle | A boolean, optional; is responsible to randomize the order in which the choices are initially presented to the candidate. Default is `TRUE`. |
| response_identifier | |
| | A character string, optional; an identifier for the answer. |

## Value

A character string mapped as yaml.

## See Also

[gap_text()](), [gap_numeric()](), [mdlist()]()

## Examples

```
dropdown(c("Option A", "Option B"), response_identifier = "task_dd_list")
```

---

entry                          *Create object [Entry](#)*

---

### Description

Create object [Entry](#)

### Usage

```
entry(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
  points = 1,
  feedback = list(),
  calculator = NA_character_,
  files = NA_character_
)
```

### Arguments

| | |
|---|---|
| identifier | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| title | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| content | A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as `TextGap`, `TextGapOpal`, `NumericGap`, or `InlineChoice`. |
| prompt | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| points | A numeric value, it is calculated as the sum of the gap points by default. |
| feedback | A list containing feedback message-object [ModalFeedback](#) for candidates. |
| calculator | A character, optional, determining whether to show a calculator to the candidate. Possible values:<br>• "simple"<br>• "scientific". |
| files | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

### Value

An object of class [Entry](#)

#### See Also

[textGap()][numericGap()][textGapOpal()]

#### Examples

```
gap_min <- entry(content = list("Question and Test Interoperability",
                                textGap("QTI")))

gap <- entry(identifier = "id_task_1234",
          title = "Essay Task",
                  content = list("Question and Test Interoperability:",
                                textGap("QTI")),
                  prompt = "Plain text, can be used instead of content",
                  points = 2,
                  feedback = list(new("ModalFeedback",
                                      content = list("Model answer"))),
                  calculator = "scientific-calculator",
                  files = "text_book.pdf")
```

---

Entry-class                    *Class "Entry"*

---

#### Description

Class Entry is responsible for creating assessment tasks according to the QTI 2.1 standard. These tasks include one or more instances of text input fields (with numeric or text answers) or dropdown lists.

#### Slots

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the [Entry](#) type, it is calculated as the sum of the gap points by default.
- For tasks of the [DirectedPair](#), the default is calculated as 0.5 points per pair.
- For tasks of the [MatchTable](#) type, it can also be calculated as the sum of points for individual answers, when provided.

- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

## See Also

NumericGap, TextGap, TextGapOpal, InlineChoice

## Examples

```
entry_gaps <- new("Entry", content = list("<p>In mathematics, the common
logarithm is the logarithm with base", new("NumericGap",
                                            response_identifier = "numeric_1",
                                            solution = 10,
                                            placeholder = "it is a number"),
". It is also known as the decimal", new("TextGap",
                                            response_identifier = "text_1",
                                            solution = "logarithm",
                                            placeholder = "it is a text"),
 ".</p>"),
                    title = "entry with number and text in answers",
                    identifier = "entry_example")
entry_dropdown <- new("Entry", content = list("<p>In mathematics, the common
logarithm is the logarithm with base", new("InlineChoice",
                                            response_identifier = "numeric_1",
                                            choices = c("10", "7", "11")),
". It is also known as the decimal", new("InlineChoice",
                                            response_identifier = "text_1",
                                            choices = c("logarithm", "limit")),
 ".</p>"),
                    title = "entry with dropdown lists for answers",
                    identifier = "entry_example")
```

---

essay *Create object [Essay](Essay)*

---

### Description

Create object [Essay](Essay)

### Usage

```
essay(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
  points = 1,
  feedback = list(),
  expected_length = length_expected(feedback),
  expected_lines = lines_expected(feedback),
  words_max = max_words(feedback),
  words_min = NA_integer_,
  data_allow_paste = FALSE,
  calculator = NA_character_,
  files = NA_character_
)
```

### Arguments

| | |
|---|---|
| identifier | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| title | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| content | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| prompt | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| points | A numeric value, optional, representing the number of points for the entire task. Default is 1. |
| feedback | A list containing feedback message-object [ModalFeedback](ModalFeedback) for candidates. |
| expected_length | |
| | A numeric, optional. Responsible for setting the size of the text input field in the content delivery engine. By default it will be calculated according to model answer in the slot content of ModalFeedback. |
| expected_lines | A numeric, optional. Responsible for setting the number of rows of the text input field in the content delivery engine. By default it will be calculated according to model answer in the slot content of ModalFeedback. |

| words_max | A numeric, optional. Responsible for setting the maximum number of words that a candidate can write in the text input field. By default it will be calculated according to model answer in the slot `content` of `ModalFeedback`. |
| words_min | A numeric, optional. Responsible for setting the minimum number of words that a candidate should write in the text input field. |
| data_allow_paste | |
| | A boolean, optional. Determines whether it is possible for a candidate to copy text into the text input field. Default is FALSE. |
| calculator | A character, optional, determining whether to show a calculator to the candidate. Possible values: |

- "simple"
- "scientific".

| files | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

## Value

An object of class Essay

## Examples

```
es_min <- essay(content = list("<h2>Open question</h2>", "Write your answer here"))

es <- essay(identifier = "id_task_1234",
           title = "Essay Task",
           content = "<h2>Open question</h2> Write your answer here",
           prompt = "Plain text, can be used instead of content",
           points = 2,
           expected_length = 100,
           expected_lines = 5,
           words_max = 100,
           words_min = 1,
           data_allow_paste = TRUE,
           feedback = list(new("ModalFeedback",
                              content = list("Model answer"))),
           calculator = "scientific-calculator",
           files = "text_book.pdf")
```

---

Essay-class                    *Class "Essay"*

---

## Description

Class Essay is responsible for creating essay type of assessment task according to QTI 2.1.

**Slots**

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as TextGap, TextGapOpal, NumericGap, or InlineChoice.

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

expected_length A numeric, optional. Responsible for setting the size of the text input field in the content delivery engine.

expected_lines A numeric, optional. Responsible for setting the number of rows of the text input field in the content delivery engine.

words_max A numeric, optional. Responsible for setting the maximum number of words that a candidate can write in the text input field.

words_min A numeric, optional. Responsible for setting the minimum number of words that a candidate should write in the text input field.

data_allow_paste A logical, optional. Determines whether it is possible for a candidate to copy text into the text input field. Default is FALSE.

**Note**

If 'ModalFeedback' is given, default values for slots related to the text input field are calculated automatically.

## Examples

```
es <- new("Essay",
          identifier = "id_task_1234",
          title = "Essay Task",
          content = list("<p>Develop some idea and write it down in
                                  the text field</p>"),
          prompt = "Write your answer in text field",
          points = 1,
          feedback = list(),
          calculator = "scientific-calculator",
          files = "text_book.pdf",
          expected_length = 100,
          expected_lines = 5,
          words_max = 200,
          words_min = 10,
          data_allow_paste = FALSE)
```

---

extract_results            *Create data frame with test results*

---

## Description

The function `extract_results()` takes Opal zip archive "Export results" or xml file and creates
two kinds of data frames (according to parameter 'level'), see the 'Details' section.

## Usage

```
extract_results(file, level = "task", hide_filename = TRUE)
```

## Arguments

| | |
|---|---|
| `file` | A string with a path of the xml test result file. |
| `level` | A string with two possible values: task and item. |
| `hide_filename` | A boolean value, TRUE to hide original file names by default. |

## Value

A dataframe with attribues of the candidates outcomes and result variables.

## Note

1.With option level = "task" data frame consists of columns:

- 'file' - name of the xml file with test results (to identify candidate)
- 'date' - date and time of test
- 'id_question' - question item identifier
- 'duration' - time in sec. what candidate spent on this item

- 'score_candidate' - points that were given to candidate after evaluation
- 'score_max' - max possible score for this question
- 'is_answer_given' - TRUE if candidate gave the answer on question, otherwise FALSE
- 'title' - the values of attribute 'title' of assessment items

2.With option level = "item" data frame consists of columns:

- 'file' - name of the xml file with test results (to identify candidate)
- 'date' - date and time of test
- 'id_question' - question item identifier
- 'base_type' - type of answer (identifier, string or float)
- 'cardinalities' - defines whether this question is single, multiple or ordered -value
- 'qti_type' - specifies the type of the task
- 'id_answer' - identifier of each response variable
- 'expected_response' - values that considered as right responses for question
- 'candidate_response' - values that were given by candidate
- 'score_candidate' - - points that were given to candidate after evaluation
- 'score_max' - max possible score for this question item
- 'is_response_correct' - TRUE if candidate gave the right response, otherwise FALSE
- 'title' - the values of attribute 'title' of assessment items

## Examples

```
file <- system.file("test_results.zip", package='rqti')
df <- extract_results(file, level = "item")
```

Gap-class                    *Class "Gap"*

## Description

Abstract class Gap is not meant to be instantiated directly; instead, it serves as a base for derived classes such as NumericGap, TextGap, TextGapOpal and InlineChoice.

## Slots

response_identifier A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points A numeric value, optional, representing the number of points for this gap. Default is 1.

placeholder A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine.

expected_length A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine.

**See Also**

NumericGap, TextGap, TextGapOpal and InlineChoice.

---

gap_numeric                 *Create YAML string for NumericGap object*

---

**Description**

Create YAML string for NumericGap object

**Usage**

```
gap_numeric(
  solution,
  tolerance = 0,
  tolerance_type = "absolute",
  points = 1,
  response_identifier = NULL,
  include_lower_bound = TRUE,
  include_upper_bound = TRUE,
  expected_length = size_gap(solution),
  placeholder = NULL
)
```

**Arguments**

| | |
|---|---|
| solution | A numeric value; contains right answer for this numeric entry. |
| tolerance | A numeric value, optional; specifies the value for up and low boundaries of tolerance rate for candidate answer. Default is 0. |
| tolerance_type | A character string, optional; specifies tolerance mode; possible values:"exact", "absolute" (by default), "relative". |
| points | A numeric value, optional; the number of points for this gap. Default is 1. |
| response_identifier | |
| | A character string, optional; an identifier for the answer. |
| include_lower_bound | |
| | A boolean, optional; specifies whether or not the lower bound is included in tolerance rate. |
| include_upper_bound | |
| | A boolean, optional; specifies whether or not the upper bound is included in tolerance rate. |
| expected_length | |
| | An integer value, optional; is responsible to set a size of text input field in content delivery engine. |
| placeholder | A character string, optional; is responsible to place some helpful text in text input field in content delivery engine. |

## Value

A character string mapped as yaml.

## See Also

[gap_text()](), [dropdown()](), [mdlist()]()

## Examples

```
gap_numeric(5.0, tolerance = 10, tolerance_type = "relative")
```

---

gap_text                    *Create YAML string for TextGap object*

---

## Description

Create YAML string for TextGap object

## Usage

```
gap_text(
  solution,
  tolerance = NULL,
  case_sensitive = FALSE,
  points = 1,
  response_identifier = NULL,
  expected_length = size_gap(solution),
  placeholder = NULL
)
```

## Arguments

| | |
|---|---|
| solution | A character vector containing values considered as correct answers. |
| tolerance | An integer value, optional; defines the number of characters to tolerate spelling mistakes in evaluating candidate answers. |
| case_sensitive | A boolean, optional; determines whether the evaluation of the correct answer is case sensitive. Default is `FALSE`. |
| points | A numeric value, optional; the number of points for this gap. Default is 1. |
| response_identifier | |
| | A character string (optional) representing an identifier for the answer. |
| expected_length | |
| | An integer value, optional; sets the size of the text input field in the content delivery engine. |
| placeholder | A character string, optional; places helpful text in the text input field in the content delivery engine. |

## Value

A character string mapped as yaml.

## See Also

[gap_numeric()](), [dropdown()](), [mdlist()]()

## Examples

```
gap_text(c("Solution", "Solutions"), tolerance = 2)
```

---

getAssessmentItems     *Get list of AssessmentItems for AssessmentSection*

---

## Description

Generic function for

## Usage

```
getAssessmentItems(object)

## S4 method for signature 'AssessmentItem'
getAssessmentItems(object)

## S4 method for signature 'AssessmentSection'
getAssessmentItems(object)

## S4 method for signature 'character'
getAssessmentItems(object)
```

## Arguments

object          an instance of the S4 object ([AssessmentSection](), [AssessmentItem]())

---

getCalculator-methods    *Get value of the slot 'calculator'*

---

### Description

Get value of the slot 'calculator'

### Usage

```
getCalculator(object)

## S4 method for signature 'AssessmentItem'
getCalculator(object)

## S4 method for signature 'AssessmentSection'
getCalculator(object)

## S4 method for signature 'character'
getCalculator(object)
```

### Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap, NumericGap, InlineChoice)

---

getContributors-methods
                    *Get list of contributors values*

---

### Description

Get list of contributors values

### Usage

```
getContributors(object)

## S4 method for signature 'AssessmentItem'
getContributors(object)

## S4 method for signature 'AssessmentSection'
getContributors(object)

## S4 method for signature 'character'
getContributors(object)
```

**Arguments**

object            an instance of the S4 object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Or-](#)
                  [dering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#),
                  [TextGap](#), [NumericGap](#), [InlineChoice](#))

---

getCourseElements            *Get elements of the course by courseId from LMS*

---

**Description**

This method gets elements of the user's course by its courseId on Learning Management System
(LMS). If no LMS connection object is provided, it attempts to guess the connection using default
settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

**Usage**

```
getCourseElements(object, course_id)

## S4 method for signature 'missing'
getCourseElements(object, course_id)

## S4 method for signature 'Opal'
getCourseElements(object, course_id)
```

**Arguments**

object            An S4 object of class [Opal](#) that represents a connection to the LMS.

course_id         A length one character vector with course id.

**Value**

A dataframe with the elements of the course.

A dataframe with the data of the elements of the course (fields: nodeId, shortTitle, shortName,
longTitle) on LMS Opal.

---

getCourseResult          *Get zip with course results by resource id and node id*

---

### Description

This method retrieves zip with course results by its resource id and node id on Learning Management System (LMS). If no LMS connection object is provided, it attempts to guess the connection using default settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

### Usage

```
getCourseResult(object, resource_id, node_id, path_outcome = ".", ...)

## S4 method for signature 'missing'
getCourseResult(object, resource_id, node_id, path_outcome = ".", ...)

## S4 method for signature 'Opal'
getCourseResult(
  object,
  resource_id,
  node_id,
  path_outcome = ".",
  rename = TRUE
)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class [Opal](#) that represents a connection to the LMS. |
| resource_id | A length one character vector with resource id. |
| node_id | A length one character vector with node id (test). |
| path_outcome | A length one character vector with path, where the zip should be stored. Default is working directory. |
| ... | Additional arguments to be passed to the method, if applicable. |
| rename | A boolean value; optional; Set TRUE value to take the short name of the course element for naming zip (results_shortName.zip). FALSE combines in zip name course id and node id. Default is TRUE. |

### Value

It downloads a zip and return a character string with path.

### Examples

```
zip_file <- getCourseResult("89068111333293", "1617337826161777006")
```

---

getFiles-methods          *Get file paths for attachment of test*

---

## Description

Get file paths for attachment of test

## Usage

```
getFiles(object)

## S4 method for signature 'AssessmentItem'
getFiles(object)

## S4 method for signature 'AssessmentSection'
getFiles(object)

## S4 method for signature 'character'
getFiles(object)
```

## Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap, NumericGap, InlineChoice)

---

getIdentifier-methods  *Get identifier*

---

## Description

Get identifier

## Usage

```
getIdentifier(object)

## S4 method for signature 'AssessmentItem'
getIdentifier(object)

## S4 method for signature 'AssessmentSection'
getIdentifier(object)

## S4 method for signature 'Gap'
getIdentifier(object)
```

```
## S4 method for signature 'character'
getIdentifier(object)
```

## Arguments

object        an instance of the S4 object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Or-](#)
              [dering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#),
              [TextGap](#), [NumericGap](#), [InlineChoice](#))

---

getLMSResources              *Get records of all current user's resources on LMS*

---

## Description

This method retrieves data about all resources associated with the current user on the Learning
Management System (LMS). If no LMS connection object is provided, it attempts to guess the con-
nection using default settings (e.g., environment variables). If the connection cannot be established,
an error is thrown.

## Usage

```
getLMSResources(object, ...)

## S4 method for signature 'missing'
getLMSResources(object)

## S4 method for signature 'Opal'
getLMSResources(object)
```

## Arguments

object        An S4 object of class [Opal](#) that represents a connection to the LMS.

...           Additional arguments to be passed to the method, if applicable.

## Value

A dataframe with attributes of user's resources.

---

getLMSResourcesByName    *Get select records about user resources by name.*

---

### Description

This method retrieves data about a user's resource by its name on Learning Management System
(LMS). If no LMS connection object is provided, it attempts to guess the connection using default
settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

### Usage

```
getLMSResourcesByName(object, ...)

## S4 method for signature 'missing'
getLMSResourcesByName(object, display_name, rtype = NULL)

## S4 method for signature 'Opal'
getLMSResourcesByName(object, display_name, rtype = NULL)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class Opal that represents a connection to the LMS. |
| ... | Additional arguments to be passed to the method, if applicable. |
| display_name | A string value withe the name of resource. |
| rtype | A string value with the type of resource. Possible values: "FileResource.TEST", "FileResource.QUESTION", or "FileResource.SURVEY". |

### Value

A dataframe with attributes of user's resources.

### Examples

```
df <- getLMSResourcesByName("task_name")
```

---

getLMSResourceURL    *Create an URL using the resource's display name on LMS*

---

### Description

This method creates an URL for user's resource by its name on Learning Management System
(LMS). If no LMS connection object is provided, it attempts to guess the connection using default
settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

## Usage

```
getLMSResourceURL(object, display_name)

## S4 method for signature 'missing'
getLMSResourceURL(object, display_name)

## S4 method for signature 'Opal'
getLMSResourceURL(object, display_name)
```

## Arguments

| | |
|---|---|
| object | An S4 object of class [Opal](#) that represents a connection to the LMS. |
| display_name | A length one character vector to entitle file in OPAL; it takes file name without extension by default; optional. |

## Value

A string value of URL.

---

getObject-methods *Get object*

---

## Description

Get object

## Usage

```
getObject(object)

## S4 method for signature 'AssessmentItem'
getObject(object)

## S4 method for signature 'AssessmentSection'
getObject(object)

## S4 method for signature 'character'
getObject(object)
```

## Arguments

| | |
|---|---|
| object | an instance of the S4 object ([SingleChoice](#), [MultipleChoice](#), [Essay](#), [Entry](#), [Ordering](#), [OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#), [TextGap](#), [NumericGap](#), [InlineChoice](#)) |

---

getPoints-methods    *Get points from AssessmentItem object*

---

### Description

Get points from AssessmentItem object

### Usage

```
getPoints(object)

## S4 method for signature 'AssessmentItem'
getPoints(object)

## S4 method for signature 'AssessmentSection'
getPoints(object)

## S4 method for signature 'MultipleChoice'
getPoints(object)

## S4 method for signature 'character'
getPoints(object)
```

### Arguments

object          an instance of the S4 object (SingleChoice, MultipleChoice, Essay, Entry, Ordering, OneInRowTable, OneInColTable, MultipleChoiceTable, DirectedPair, TextGap, NumericGap, InlineChoice)

---

getResponse    *Get and process a piece of question content*

---

### Description

Generic function to get and process a different types of question content (text with instances of gaps or dropdown lists) for XML document of specification the question following the QTI schema v2.1

### Usage

```
getResponse(object)

## S4 method for signature 'InlineChoice'
getResponse(object)

## S4 method for signature 'NumericGap'
```

```
getResponse(object)

## S4 method for signature 'TextGap'
getResponse(object)

## S4 method for signature 'character'
getResponse(object)
```

## Arguments

object          an instance of the S4 object (NumericGap, TextGap, InlineChoice, character)

---

inlineChoice          *Create object [InlineChoice](#)*

---

## Description

Create object [InlineChoice](#)

## Usage

```
inlineChoice(
  choices,
  solution_index = 1,
  response_identifier = generate_id(type = "gap"),
  choices_identifiers = paste0("Choice", LETTERS[seq(choices)]),
  points = 1,
  shuffle = TRUE,
  placeholder = "",
  expected_length = size_gap(choices)
)
```

## Arguments

choices          A character vector containing the answers shown in the dropdown list.

solution_index   A numeric value, optional, representing the index of the correct answer in the options vector. Default is 1.

response_identifier

A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

choices_identifiers

A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "OptionD", where D is a letter representing the alphabetical order of the answer in the list.

points          A numeric value, optional, representing the number of points for this gap. Default is 1

shuffle          A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

placeholder      A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine. Default is "".

expected_length
                 A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine. Default value is adjusted by the first choice size.

## Value

An object of class [InlineChoice](#)

## See Also

[entry()][numericGap()][textGap()][textGapOpal()]

## Examples

```
dd_min <- inlineChoice(c("answer1", "answer2", "answer3"))

dd <- inlineChoice(choices = c("answer1", "answer2", "answer3"),
                   solution_index = 2,
                   response_identifier  = "id_gap_1234",
                   choices_identifiers = c("a", "b", "c"),
                   points = 2,
                   shuffle = FALSE,
                   placeholder = "answers",
                   expected_length = 10)
```

---

InlineChoice-class          *Class "InlineChoice"*

---

## Description

Class InlineChoice is responsible for creating instances of dropdown lists as answer options in [Entry](#) type assessment tasks according to the QTI 2.1 standard.

## Slots

response_identifier A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points A numeric value, optional, representing the number of points for this gap. Default is 1.

placeholder A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine.

expected_length A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine.

choices A character vector containing the answers shown in the dropdown list.

solution_index A numeric value, optional, representing the index of the correct answer in the options vector. Default is 1.

choices_identifiers A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "OptionD", where D is a letter representing the alphabetical order of the answer in the list.

shuffle A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

## See Also

[Entry,](#) [NumericGap,](#) [TextGap,](#) [TextGapOpal](#)

## Examples

```
dd <- new("InlineChoice",
         response_identifier = "id_gap_1234",
         points = 1,
         choices = c("answer1", "answer2", "answer3"),
         solution_index = 1,
         choices_identifiers = c("OptionA", "OptionB", "OptionC"),
         shuffle = TRUE)
```

---

isUserLoggedIn            *Check if User is Logged in LMS*

---

## Description

This method checks whether a user is logged into an LMS (Learning Management System) by sending a request to the LMS server and evaluating the response.

This method checks whether a user is logged into an LMS Opal by sending a request to the LMS server and evaluating the response.

## Usage

```
isUserLoggedIn(object)

## S4 method for signature 'Opal'
isUserLoggedIn(object)
```

## Arguments

object            An S4 object of class [Opal](#) that represents a connection to the LMS.

## Value

A logical value (TRUE if the user is logged in, FALSE otherwise).

A logical value (TRUE if the user is logged in, FALSE otherwise).

---

LMS-class                 *LMS Class*

---

#### Description

The `LMS` class is an abstract representation of a Learning Management System (LMS). It provides a foundation for defining LMS-specific implementations.

#### Slots

name  A character string representing the name or identifier of the LMS.

api_user  A character string containing the username for authentication.

endpoint  A character string specifying the LMS API endpoint. By default, this value is retrieved from the environment variable RQTI_API_ENDPOINT. To set this variable globally, use: `Sys.setenv(RQTI_API_ENDPOINT = 'your_endpoint')`, or add it to your `.Renviron` file for persistence across sessions.

---

MatchTaable-classs        *Class "MatchTable"*

---

#### Description

Abstract class `MatchTable` is not meant to be instantiated directly; instead, it serves as a base for derived classes such as OneInRowTable, OneInColTable, MultipleChoiceTable, and DirectedPair.

#### Slots

identifier  A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title  A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content  A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as TextGap, TextGapOpal, NumericGap, or InlineChoice.

prompt  An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points  A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.

- For tasks of the [MultipleChoice](#) type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback  A list containing feedback messages for candidates. Each element of the list should be an instance of either [ModalFeedback](#), [CorrectFeedback](#), or [WrongFeedback](#) class.

calculator  A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files  A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata  An object of class [QtiMetadata](#) that holds metadata information about the task.

rows  A character vector specifying answer options as row names in the table or the first elements in couples in [DirectedPair](#).

rows_identifiers  A character vector, optional, specifying identifiers for answer options defined in rows of the table or identifiers of the first elements in couples in [DirectedPair](#).

cols  A character vector specifying answer options as column headers in the table or the second elements in couples in [DirectedPair](#).

cols_identifiers  A character vector, optional, specifying identifiers for answer options defined in columns of the table or identifiers of the second elements in couples in [DirectedPair](#).

answers_identifiers  A character vector specifying couples of identifiers that combine the correct answers.

answers_scores  A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options.

shuffle  A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is `TRUE`.

shuffle_rows  A boolean value, optional, determining whether to randomize the order of the choices only in rows. Default is `TRUE`.

shuffle_cols  A boolean value, optional, determining whether to randomize the order of the choices only in columns. Default is `TRUE`.

### See Also

[OneInRowTable](#), [OneInColTable](#), [MultipleChoiceTable](#), [DirectedPair](#)

---

## mdlist                            *Create a markdown list for answer options*

---

### Description

Create a markdown list for answer options

### Usage

```
mdlist(vect, solutions = NULL, gaps = NULL)
```

### Arguments

| | |
|---|---|
| vect | A string or numeric vector of answer options for single/multiple choice task. |
| solutions | An integer value, optional; indexes of right answer options in vect. |
| gaps | numeric or string vector, optional; provides primitive gap description if there is a need to build a list of gaps. |

### Value

A markdown list.

### See Also

[gap_text()](), [gap_numeric()](), [dropdown()]()

### Examples

```
#list for multiple choice task
mdlist(c("A", "B", "C"), c(2, 3))
# it returns:
#- A
#- *B*
#- *C*
#list of gaps
mdlist(c("A", "B", "C"), c(2, 3), c(1, 2, 3))
# it returns:
#- A <gap>1</gap>
#- *B* <gap>2</gap>
#- *C* <gap>3</gap>
```

---

modalFeedback *Create object [ModalFeedback](#)*

---

### Description

Create object [ModalFeedback](#)

### Usage

```
modalFeedback(content = list(), title = character(0), show = TRUE)
```

### Arguments

content     A character string or a list of character strings to form the text of the question, which may include HTML tags.

title       A character value, optional, representing the title of the modal feedback window.

show        A boolean value, optional, determining whether to show (TRUE) or hide (FALSE) the modal feedback. Default is TRUE.

### Value

An object of class [ModalFeedback](#)

### Examples

```
fb <- modalFeedback(content = "Model answer", title = "Feedback")
```

---

ModalFeedback-class *Class "ModalFeedback"*

---

### Description

Class ModalFeedback is responsible for delivering feedback messages to the candidate, regardless of whether the answer was correct or incorrect.

### Slots

outcome_identifier A character representing the unique identifier of the outcome declaration variable that relates to feedback. Default is "FEEDBACKMODAL".

show A boolean value, optional, determining whether to show (TRUE) or hide (FALSE) the modal feedback. Default is TRUE.

title A character value, optional, representing the title of the modal feedback window.

content A list of character content to form the text of the modal feedback, which can include HTML tags.

identifier A character value representing the identifier of the modal feedback item. Default is "modal_feedback".

## Examples

```
fb <- new("ModalFeedback",
          title = "Possible solution",
          content = list("<b>Some explanation</b>"))
```

---

multipleChoice                *Create object [MultipleChoice](#)*

---

## Description

Create object [MultipleChoice](#)

## Usage

```
multipleChoice(
  identifier = generate_id(),
  title = identifier,
  choices,
  choice_identifiers = paste0("Choice", LETTERS[seq(choices)]),
  content = list(),
  prompt = "",
  points = 1,
  feedback = list(),
  orientation = "vertical",
  shuffle = TRUE,
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

| | |
|---|---|
| identifier | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| title | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| choices | A character vector defining a set of answer options in the question. |
| choice_identifiers | A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list. |
| content | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| prompt | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |

points          A numeric vector, required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback        A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

orientation     A character, determining whether to place answers in vertical or horizontal mode. Possible values:

                • "vertical" - Default,
                • "horizontal".

shuffle         A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

calculator      A character, optional, determining whether to show a calculator to the candidate. Possible values:

                • "simple"
                • "scientific".

files           A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

## Value

An object of class MultipleChoice

## Examples

```
mc_min <- multipleChoice(choices = c("option1", "option2", "option3"),
                         points = c(0, 0.5, 0.5))

mc <- multipleChoice(identifier = "id_task_1234",
                     title = "Multiple Choice Task",
                     content = "<p>Pick up the right options</p>",
                     prompt = "Plain text, can be used instead of content",
                     points = c(0, 0.5, 0.5),
                     feedback = list(new("WrongFeedback",
                                         content = list("Wrong answer"))),
                     calculator = "scientific-calculator",
                     files = "text_book.pdf",
                     choices = c("option 1", "option 2", "option 3"),
                     choice_identifiers = c("ChoiceA", "ChoiceB", "ChoiceC"),
                     shuffle = TRUE,
                     orientation = "vertical")
```

MultipleChoice-class        *Class "MultipleChoice"*

**Description**

Class MultipleChoice is responsible for creating multiple choice assessment task according to QTI 2.1.

**Slots**

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as TextGap, TextGapOpal, NumericGap, or InlineChoice.

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

choices A character vector defining a set of answer options in the question.

choice_identifiers A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list.

shuffle A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

orientation A character, determining whether to place answers in vertical or horizontal mode. Possible values:

- "vertical" - Default.
- "horizontal"

## Examples

```
mc <- new("MultipleChoice",
          identifier = "id_task_1234",
          title = "Multiple Choice Task",
          content = list("<p>Pick up the right options</p>"),
          prompt = "Plain text, can be used instead of content",
          points = c(1, -1, 1, -1),
          feedback = list(new("WrongFeedback", content = list("Wrong answer"))),
          calculator = "scientific-calculator",
          files = "text_book.pdf",
          choices = c("option 1", "option 2", "option 3", "option 4"),
          choice_identifiers = c("ChoiceA", "ChoiceB", "ChoiceC", "ChoiceD"),
          shuffle = TRUE,
          orientation = "vertical")
```

---

multipleChoiceTable  *Create object [MultipleChoiceTable](#)*

---

## Description

Create object [MultipleChoiceTable](#)

## Usage

```
multipleChoiceTable(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
  points = 1,
  rows,
  rows_identifiers,
  cols,
  cols_identifiers,
  answers_identifiers,
  answers_scores = NA_real_,
  shuffle = TRUE,
  shuffle_rows = TRUE,
  shuffle_cols = TRUE,
```

```
  feedback = list(),
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

| | |
|---|---|
| `identifier` | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| `title` | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| `content` | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| `prompt` | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| `points` | A numeric value, optional, representing the number of points for the entire task. It can also be calculated as the sum of points for individual answers, when provided. Default is 1. |
| `rows` | A character vector specifying answer options defined in rows of the table. |
| `rows_identifiers` | A character vector, optional, specifies identifiers of the rows of the table |
| `cols` | A character vector specifying answer options defined in columns of the table. |
| `cols_identifiers` | A character vector, optional, specifies identifiers of the columns of the table. |
| `answers_identifiers` | A character vector specifying couples of identifiers that combine the correct answers. |
| `answers_scores` | A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options. |
| `shuffle` | A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is `TRUE`. |
| `shuffle_rows` | A boolean value, optional, determining whether to randomize the order of the choices only for the first elements of the answer tuples. Default is `TRUE`. |
| `shuffle_cols` | A boolean value, optional, determining whether to randomize the order of the choices only for the second elements of the answer tuples. Default is `TRUE`. |
| `feedback` | A list containing feedback message-object [ModalFeedback](#) for candidates. |
| `calculator` | A character, optional, determining whether to show a calculator to the candidate. Possible values:<br>• "simple"<br>• "scientific". |
| `files` | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

### Value

An object of class [MultipleChoiceTable](#)

### Examples

```
mt_min <- multipleChoiceTable(content = "<p>\"Multiple choice table\" task</p>",
                       rows = c("alfa", "beta", "gamma", "alpha"),
                       rows_identifiers = c("a", "b", "g", "aa"),
                       cols = c("A", "B", "G", "a"),
                       cols_identifiers = c("as", "bs", "gs", "aas"),
                 answers_identifiers = c("a as", "b bs", "g gs", "aa as", "a aas", "aa aas"))

mt <- multipleChoiceTable(identifier = "id_task_1234",
                   title = "Table with many possible answers in rows and cols",
                   content = "<p>\"Multiple choice table\" task</p>",
                   prompt = "Plain text, can be used instead of the content",
                   rows = c("alfa", "beta", "gamma", "alpha"),
                   rows_identifiers = c("a", "b", "g", "aa"),
                   cols = c("A", "B", "G", "a"),
                   cols_identifiers = c("as", "bs", "gs", "aas"),
                 answers_identifiers = c("a as", "b bs", "g gs", "aa as", "a aas", "aa aas"),
                   answers_scores = c(1, 0.5, 0.1, 1, 0.5, 1),
                   shuffle_rows = FALSE,
                   shuffle_cols = TRUE)
```

---

MultipleChoiceTable-class

*Class "MultipleChoiceTable"*

---

### Description

Class `MultipleChoiceTable` is responsible for creating assessment tasks according to the QTI 2.1 standard with a table of answer options, where many correct answers in each row and column are possible.

### Slots

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

rows A character vector specifying answer options as row names in the table or the first elements in couples in DirectedPair.

rows_identifiers A character vector, optional, specifying identifiers for answer options defined in rows of the table or identifiers of the first elements in couples in DirectedPair.

cols A character vector specifying answer options as column headers in the table or the second elements in couples in DirectedPair.

cols_identifiers A character vector, optional, specifying identifiers for answer options defined in columns of the table or identifiers of the second elements in couples in DirectedPair.

answers_identifiers A character vector specifying couples of identifiers that combine the correct answers.

answers_scores A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options.

shuffle A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

shuffle_rows A boolean value, optional, determining whether to randomize the order of the choices only in rows. Default is TRUE.

shuffle_cols A boolean value, optional, determining whether to randomize the order of the choices only in columns. Default is TRUE.

mapping Do not use directly; values are initialized automatically. This slot contains a named numeric vector of points, where names correspond to all possible combinations of row and column identifiers.

### Examples

```
mt <- new("MultipleChoiceTable",
          identifier = "id_task_1234",
          title = "Multiple choice table",
          content = list("<p>Match table task</p>",
                         "<i>table description</i>"),
          points = 5,
          rows = c("row1", "row2", "row3"),
          rows_identifiers = c("a", "b", "c"),
          cols = c("alfa", "beta", "gamma"),
          cols_identifiers = c("a", "b", "c"),
          answers_identifiers = c("a a", "b b", "b c"),
          shuffle = TRUE)
```

---

numericGap                    *Create object [NumericGap](#)*

---

### Description

Create object [NumericGap](#)

### Usage

```
numericGap(
  solution,
  response_identifier = generate_id(type = "gap"),
  points = 1,
  placeholder = "",
  expected_length = size_gap(solution),
  tolerance = 0,
  tolerance_type = "absolute",
  include_lower_bound = TRUE,
  include_upper_bound = TRUE
)

gapNumeric(
  solution,
  response_identifier = generate_id(type = "gap"),
  points = 1,
  placeholder = "",
  expected_length = size_gap(solution),
  tolerance = 0,
  tolerance_type = "absolute",
  include_lower_bound = TRUE,
  include_upper_bound = TRUE
)
```

## Arguments

solution   A numeric value containing the correct answer for this numeric entry.

response_identifier

     A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points    A numeric value, optional, representing the number of points for this gap. Default is 1

placeholder  A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine. Default is "".

expected_length

     A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine. Default value is adjusted by solution size.

tolerance   A numeric value, optional, specifying the value for the upper and lower boundaries of the tolerance rate for candidate answers. Default is 0.

tolerance_type A character value, optional, specifying the tolerance mode. Possible values:

      • "exact"
      • "absolute" - Default.
      • "relative"

include_lower_bound

     A boolean value, optional, specifying whether the lower bound is included in the tolerance rate. Default is TRUE.

include_upper_bound

     A boolean value, optional, specifying whether the upper bound is included in the tolerance rate. Default is TRUE.

## Value

An object of class NumericGap

## See Also

[entry()][textGap()][textGapOpal()]

## Examples

```
ng_min <- numericGap(5.1)

ng <- numericGap(solution = 5.1,
                 response_identifier  = "id_gap_1234",
                 points = 2,
                 placeholder = "put your answer here",
                 expected_length = 4,
                 tolerance = 5,
                 tolerance_type = "relative")
```

NumericGap-class *Class "NumericGap"*

#### Description

Class NumericGap is responsible for creating instances of input fields with numeric type of answers in question [Entry](#) type assessment tasks according to the QTI 2.1 standard.

#### Slots

response_identifier A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points A numeric value, optional, representing the number of points for this gap. Default is 1.

placeholder A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine.

expected_length A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine.

solution A numeric value containing the correct answer for this numeric entry.

tolerance A numeric value, optional, specifying the value for the upper and lower boundaries of the tolerance rate for candidate answers. Default is 0.

tolerance_type A character value, optional, specifying the tolerance mode. Possible values:

- "exact"
- "absolute" - Default.
- "relative"

include_lower_bound A boolean value, optional, specifying whether the lower bound is included in the tolerance rate. Default is TRUE.

include_upper_bound A boolean value, optional, specifying whether the upper bound is included in the tolerance rate. Default is TRUE.

#### See Also

[Entry,](#) [TextGap,](#) [TextGapOpal](#) and [InlineChoice.](#)

#### Examples

```
ng <- new("NumericGap",
          response_identifier = "id_gap_1234",
          points = 1,
          placeholder = "use this format xx.xxx",
          solution = 5,
          tolerance = 1,
          tolerance_type = "relative",
          include_lower_bound = TRUE,
          include_upper_bound = TRUE)
```

oneInColTable *Create object [OneInColTable](#)*

## Description

Create object [OneInColTable](#)

## Usage

```
oneInColTable(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
  points = 1,
  rows,
  rows_identifiers,
  cols,
  cols_identifiers,
  answers_identifiers,
  answers_scores = NA_real_,
  shuffle = TRUE,
  shuffle_rows = TRUE,
  shuffle_cols = TRUE,
  feedback = list(),
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

| | |
|---|---|
| identifier | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| title | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| content | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| prompt | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| points | A numeric value, optional, representing the number of points for the entire task. It can also be calculated as the sum of points for individual answers, when provided. Default is 1. |
| rows | A character vector specifying answer options defined in rows of the table. |
| rows_identifiers | |
| | A character vector, optional, specifies identifiers of the rows of the table |

| | |
|---|---|
| cols | A character vector specifying answer options defined in columns of the table. |
| cols_identifiers | |
| | A character vector, optional, specifies identifiers of the columns of the table. |
| answers_identifiers | |
| | A character vector specifying couples of identifiers that combine the correct answers. |
| answers_scores | A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options. |
| shuffle | A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is `TRUE`. |
| shuffle_rows | A boolean value, optional, determining whether to randomize the order of the choices only for the first elements of the answer tuples. Default is `TRUE`. |
| shuffle_cols | A boolean value, optional, determining whether to randomize the order of the choices only for the second elements of the answer tuples. Default is `TRUE`. |
| feedback | A list containing feedback message-object [ModalFeedback](#) for candidates. |
| calculator | A character, optional, determining whether to show a calculator to the candidate. Possible values:<br>    • "simple"<br>    • "scientific". |
| files | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

## Value

An object of class [OneInColTable](#)

## Examples

```
ct_min <- oneInColTable(content = "<p>\"One in column table\" task</p>",
                        rows = c("alfa", "beta", "gamma"),
                        rows_identifiers = c("a", "b", "g"),
                        cols = c("A", "B", "G", "a"),
                        cols_identifiers = c("as", "bs", "gs", "aas"),
                        answers_identifiers = c("a as", "b bs", "g gs", "a aas"))

ct <- oneInColTable(identifier = "id_task_1234",
                    title = "Table with one answer per column",
                    content = "<p>\"One in column table\" task</p>",
                    prompt = "Plain text, can be used instead of the content",
                    rows = c("alfa", "beta", "gamma"),
                    rows_identifiers = c("a", "b", "g"),
                    cols = c("A", "B", "G", "a"),
                    cols_identifiers = c("as", "bs", "gs", "aas"),
                    answers_identifiers = c("a as", "b bs", "g gs", "a aas"),
                    answers_scores = c(1, 0.5, 0.1, 1),
                    shuffle_rows = FALSE,
                    shuffle_cols = TRUE)
```

---

OneInColTable-class          *Class "OneInColTable"*

---

**Description**

Class OneInColTable is responsible for creating assessment tasks according to the QTI 2.1 standard with a table of answer options, where only one correct answer in each column is possible.

**Slots**

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as TextGap, TextGapOpal, NumericGap, or InlineChoice.

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

rows A character vector specifying answer options as row names in the table or the first elements in couples in DirectedPair.

rows_identifiers A character vector, optional, specifying identifiers for answer options defined in rows of the table or identifiers of the first elements in couples in DirectedPair.

cols A character vector specifying answer options as column headers in the table or the second elements in couples in DirectedPair.

cols_identifiers A character vector, optional, specifying identifiers for answer options defined in columns of the table or identifiers of the second elements in couples in DirectedPair.

answers_identifiers A character vector specifying couples of identifiers that combine the correct answers.

answers_scores A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options.

shuffle A boolean value, optional, determining whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

shuffle_rows A boolean value, optional, determining whether to randomize the order of the choices only in rows. Default is TRUE.

shuffle_cols A boolean value, optional, determining whether to randomize the order of the choices only in columns. Default is TRUE.

## Examples

```
mt <- new("OneInColTable",
          identifier = "id_task_1234",
          title = "One in Col choice table",
          content = list("<p>\"One in col\" table task</p>",
                         "<i>table description</i>"),
          points = 5,
          rows = c("row1", "row2", "row3", "row4"),
          rows_identifiers = c("a", "b", "c", "d"),
          cols = c("alfa", "beta", "gamma"),
          cols_identifiers = c("k", "l", "m"),
          answers_identifiers = c("a k", "d l", 'd m'),
          shuffle = TRUE)
```

---

oneInRowTable                    *Create object OneInRowTable*

---

## Description

Create object OneInRowTable

## Usage

```
oneInRowTable(
  identifier = generate_id(),
  title = identifier,
  content = list(),
  prompt = "",
```

```
    points = 1,
    rows,
    rows_identifiers,
    cols,
    cols_identifiers,
    answers_identifiers,
    answers_scores = NA_real_,
    shuffle = TRUE,
    shuffle_rows = TRUE,
    shuffle_cols = TRUE,
    feedback = list(),
    calculator = NA_character_,
    files = NA_character_
)
```

## Arguments

identifier           A character representing the unique identifier of the assessment task. By default,
                     it is generated as 'id_task_dddd', where dddd represents random digits.

title                A character representing the title of the XML file associated with the task. By
                     default, it takes the value of the identifier.

content              A character string or a list of character strings to form the text of the question,
                     which may include HTML tags.

prompt               An optional character representing a simple question text, consisting of one
                     paragraph. This can supplement or replace content in the task. Default is "".

points               A numeric value, optional, representing the number of points for the entire task.
                     It can also be calculated as the sum of points for individual answers, when pro-
                     vided. Default is 1.

rows                 A character vector specifying answer options defined in rows of the table.

rows_identifiers
                     A character vector, optional, specifies identifiers of the rows of the table

cols                 A character vector specifying answer options defined in columns of the table.

cols_identifiers
                     A character vector, optional, specifies identifiers of the columns of the table.

answers_identifiers
                     A character vector specifying couples of identifiers that combine the correct
                     answers.

answers_scores       A numeric vector, optional, where each number determines the number of points
                     awarded to a candidate if they select the corresponding answer. If not assigned,
                     the individual values for correct answers are calculated from the task points and
                     the number of correct options.

shuffle              A boolean value, optional, determining whether to randomize the order in which
                     the choices are initially presented to the candidate. Default is TRUE.

shuffle_rows         A boolean value, optional, determining whether to randomize the order of the
                     choices only for the first elements of the answer tuples. Default is TRUE.

| | |
|---|---|
| shuffle_cols | A boolean value, optional, determining whether to randomize the order of the choices only for the second elements of the answer tuples. Default is TRUE . |
| feedback | A list containing feedback message-object [ModalFeedback](#) for candidates. |
| calculator | A character, optional, determining whether to show a calculator to the candidate. Possible values: |
| | • "simple" |
| | • "scientific". |
| files | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

## Value

An object of class [OneInRowTable](#)

## Examples

```
rt_min <- oneInRowTable(content = "<p>\"One in row table\" task</p>",
                        rows = c("alfa", "beta", "gamma", "alpha"),
                        rows_identifiers = c("a", "b", "g", "aa"),
                        cols = c("A", "B", "G"),
                        cols_identifiers = c("as", "bs", "gs"),
                        answers_identifiers = c("a as", "b bs", "g gs", "aa as"))

rt <- oneInRowTable(identifier = "id_task_1234",
                    title = "Table with one answer per row",
                    content = "<p>\"One in row table\" task</p>",
                    prompt = "Plain text, can be used instead of the content",
                    rows = c("alfa", "beta", "gamma", "alpha"),
                    rows_identifiers = c("a", "b", "g", "aa"),
                    cols = c("A", "B", "G"),
                    cols_identifiers = c("as", "bs", "gs"),
                    answers_identifiers = c("a as", "b bs", "g gs", "aa as"),
                    answers_scores = c(1, 0.5, 0.1, 1),
                    shuffle_rows = FALSE,
                    shuffle_cols = TRUE)
```

---

OneInRowTable-class     *Class "OneInRowTable"*

---

## Description

Class OneInRowTable is responsible for creating assessment tasks according to the QTI 2.1 standard with a table of answer options, where only one correct answer in each row is possible.

**Slots**

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the Entry type, it must also contain at least one instance of Gap objects, such as TextGap, TextGapOpal, NumericGap, or InlineChoice.

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the Entry type, it is calculated as the sum of the gap points by default.
- For tasks of the DirectedPair, the default is calculated as 0.5 points per pair.
- For tasks of the MatchTable type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the MultipleChoice type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the choices. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

rows A character vector specifying answer options as row names in the table or the first elements in couples in DirectedPair.

rows_identifiers A character vector, optional, specifying identifiers for answer options defined in rows of the table or identifiers of the first elements in couples in DirectedPair.

cols A character vector specifying answer options as column headers in the table or the second elements in couples in DirectedPair.

cols_identifiers A character vector, optional, specifying identifiers for answer options defined in columns of the table or identifiers of the second elements in couples in DirectedPair.

answers_identifiers A character vector specifying couples of identifiers that combine the correct answers.

answers_scores A numeric vector, optional, where each number determines the number of points awarded to a candidate if they select the corresponding answer. If not assigned, the individual values for correct answers are calculated from the task points and the number of correct options.

shuffle A boolean value, optional, determining whether to randomize the order in which the
choices are initially presented to the candidate. Default is TRUE.

shuffle_rows A boolean value, optional, determining whether to randomize the order of the
choices only in rows. Default is TRUE.

shuffle_cols A boolean value, optional, determining whether to randomize the order of the
choices only in columns. Default is TRUE.

### Examples

```
mt <- new("OneInRowTable",
          identifier = "id_task_1234",
          title = "One in Row choice table",
          content = list("<p>\"One in row\" table task</p>",
                         "<i>table description</i>"),
          points = 5,
          rows = c("row1", "row2", "row3", "row4"),
          rows_identifiers = c("a", "b", "c", "d"),
          cols = c("alfa", "beta", "gamma"),
          cols_identifiers = c("k", "l", "m"),
          answers_identifiers = c("a k", "b l", "c l", "d m"),
          shuffle = TRUE)
```

---

opal                      *Create an Opal LMS Connection Object*

---

### Description

This helper function initializes an Opal object, a subclass of LMS, representing a connection to the
Opal Learning Management System (LMS).

### Usage

```
opal(api_user = NA_character_, endpoint = NA_character_)
```

### Arguments

api_user          A character string specifying the API username.

endpoint          A character string specifying the API endpoint for the LMS.

### Value

An object of class Opal, inheriting from LMS, which can be used to interact with the Opal LMS API.

---

`Opal-class`                              *Class Opal*

---

#### Description

The `Opal` class represents a specific implementation of a Learning Management System (LMS) that extends the abstract `LMS` class. This class is designed to facilitate interactions with the Opal LMS API.

#### Slots

`name` A character string representing the name/identifier of the LMS. Defaults to `"Opal"`.

`api_user` A character string specifying the API username for authentication.

`endpoint` A character string containing the API endpoint of the Opal LMS. This can be set using the environment variable RQTI_API_ENDPOINT with Sys.setenv(RQTI_API_ENDPOINT='xxxxxxxxxxxxxxx') or placed in the `.Renviron` file.

#### See Also

[LMS-class](#) for the parent class.

---

`ordering`                              *Create object [Ordering](#)*

---

#### Description

Create object [Ordering](#)

#### Usage

```
ordering(
  identifier = generate_id(),
  title = identifier,
  choices,
  choices_identifiers = paste0("Choice", LETTERS[seq(choices)]),
  content = list(),
  prompt = "",
  points = 1,
  points_per_answer = TRUE,
  shuffle = TRUE,
  feedback = list(),
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

| | |
|---|---|
| `identifier` | A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits. |
| `title` | A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier. |
| `choices` | A character vector containing the answers. The order of answers in the vector represents the correct response for the task. |
| `choices_identifiers` | |
| | A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list. |
| `content` | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| `prompt` | An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "". |
| `points` | A numeric value, optional, representing the number of points for the entire task. Default is 1. |
| `points_per_answer` | |
| | A boolean value indicating the scoring method. If `TRUE`, each selected answer will be scored individually. If `FALSE`, only fully correct answers will be scored with the maximum score. Default is `TRUE`. |
| `shuffle` | A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is `TRUE`. |
| `feedback` | A list containing feedback messages for candidates. Each element of the list should be an instance of either ModalFeedback, CorrectFeedback, or WrongFeedback class. |
| `calculator` | A character, optional, determining whether to show a calculator to the candidate. Possible values: |
| | • "simple" |
| | • "scientific". |
| `files` | A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam. |

## Value

An object of class Ordering

## Examples

```
ord_min <- ordering(prompt = "Set the right order:",
                    choices = c("Step1", "Step2", "Step3"))

ord <- ordering(identifier = "id_task_1234",
             title = "Order Task",
             choices = c("Step1", "Step2", "Step3"),
```

```
choices_identifiers = c("a", "b", "c"),
content = "<p>Set the right order</p>",
prompt = "Plain text, can be used instead of content",
points = 2,
points_per_answer = FALSE,
shuffle = FALSE,
feedback = list(new("WrongFeedback",
                              content = list("Wrong answer"))),
calculator = "scientific-calculator",
files = "text_book.pdf")
```

---

Ordering-class              *Class "Ordering"*

---

### Description

Class `Ordering` is responsible for creating assessment task according to QTI 2.1., where candidate has to place answers in a specific order

### Slots

identifier A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

title A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

content A list of character content to form the text of the question, which can include HTML tags. For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

prompt An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the [Entry](#) type, it is calculated as the sum of the gap points by default.
- For tasks of the [DirectedPair](#), the default is calculated as 0.5 points per pair.
- For tasks of the [MatchTable](#) type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the [MultipleChoice](#) type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the `choices`. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

feedback A list containing feedback messages for candidates. Each element of the list should be an instance of either [ModalFeedback](#), [CorrectFeedback](#), or [WrongFeedback](#) class.

calculator A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class [QtiMetadata](#) that holds metadata information about the task.

choices A character vector containing the answers. The order of answers in the vector represents the correct response for the task.

choices_identifiers A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically. By default, identifiers are generated automatically according to the template "ChoiceL", where L is a letter representing the alphabetical order of the answer in the list.

shuffle A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

points_per_answer A boolean value indicating the scoring method. If TRUE, each selected answer will be scored individually. If FALSE, only fully correct answers will be scored with the maximum score. Default is TRUE.

## Examples

```
ord <- new("Ordering",
           identifier = "id_task_1234",
           title = "order",
           content = list("<p>Put these items in a right order</p>"),
           prompt = "",
           points = 2,
           feedback = list(),
           choices = c("first", "second", "third"),
           choices_identifiers = c("ChoiceA", "ChoiceB", "ChoiceC"),
           shuffle = TRUE,
           points_per_answer = TRUE)
```

---

prepareQTIJSFiles-methods

*Prepare files to render them with QTIJS*

---

## Description

Prepare files to render them with QTIJS

## Usage

```
prepareQTIJSFiles(object, dir = NULL)

## S4 method for signature 'AssessmentItem'
prepareQTIJSFiles(object, dir = "")
```

```
## S4 method for signature 'AssessmentSection'
prepareQTIJSFiles(object, dir = NULL)

## S4 method for signature 'AssessmentTest'
prepareQTIJSFiles(object, dir = NULL)

## S4 method for signature 'character'
prepareQTIJSFiles(object, dir = NULL)
```

## Arguments

object      an instance of AssessmentItem, AssessmentTest, AssessmentTestOpal, Assess-
            mentSection, or string path to xml, rmd or md files

dir         QTIJS path

---

prepare_renderer          *Prepare QTIJS renderer*

---

## Description

Starts server for QTIJS, returns path of QTIJS and the url of the server.

## Usage

```
prepare_renderer()
```

---

publishCourse          *Publish a course on LMS*

---

## Description

Publish a course on LMS

## Usage

```
publishCourse(object, course_id)
```

## Arguments

object      An S4 object of class LMS that represents a connection to the LMS.

course_id   A character string with course id in the LMS.

## Value

Status code of the HTTP request.

publishCourse,missing-method

*Publish a course on LMS*

### Description

This method publishes the course by its course id on Learning Management System (LMS). If no LMS connection object is provided, it attempts to guess the connection using default settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

### Usage

```
## S4 method for signature 'missing'
publishCourse(object, course_id)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class LMS that represents a connection to the LMS. |
| course_id | A character string with course id in the LMS. |

### Value

Status code of the HTTP request.

publishCourse,Opal-method

*Publish a course on LMS Opal*

### Description

Publish a course on LMS Opal

### Usage

```
## S4 method for signature 'Opal'
publishCourse(object, course_id)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class Opal that represents a connection to the LMS. |
| course_id | A character string with course id in the LMS. |

### Value

Status code of the HTTP request.

---

qtiContributor          *Constructor function for class QtiContributor*

---

## Description

Creates object of [QtiContributor](#)-class

## Usage

```
qtiContributor(
  name = Sys.getenv("RQTI_AUTHOR"),
  role = "author",
  contribution_date = ifelse(name != "", Sys.Date(), NA_Date_)
)
```

## Arguments

name                A character string representing the name of the author.

role                A character string kind of contribution. Possible values: author, publisher,
                    unknown, initiator, terminator, validator, editor, graphical designer, technical
                    implementer, content provider, technical validator, educational validator, script
                    writer, instructional designer, subject matter expert. Default is "author".

contribution_date

                    A character string representing date of the contribution. Default is the current
                    system date, when contributor is assigned.

## Examples

```
creator= qtiContributor("Max Mustermann", "technical validator")
```

---

QtiContributor-class    *Class QtiContributor*

---

## Description

This class stores metadata information about contributors.

## Slots

name  A character string representing the name of the author. By default it takes value from envi-
      ronment variable 'RQTI_AUTHOR'.

role  A character string kind of contribution. Possible values: author, publisher, unknown, initia-
      tor, terminator, validator, editor, graphical designer, technical implementer, content provider,
      technical validator, educational validator, script writer, instructional designer, subject matter
      expert. Default is "author".

contribution_date  A character string representing date of the contribution. Default is the current
      system date.

---

| qtijs_path | *shortcut for the correct QTIJS path* |
| --- | --- |

---

### Description

shortcut for the correct QTIJS path

### Usage

```
qtijs_path()
```

---

| qtiMetadata | *Constructor function for class QtiMetadata* |
| --- | --- |

---

### Description

Creates object of [QtiMetadata](#)-class

### Usage

```
qtiMetadata(
  contributor = list(),
  description = "",
  rights = Sys.getenv("RQTI_RIGHTS"),
  version = NA_character_
)
```

### Arguments

| | |
| --- | --- |
| contributor | A list of objects [QtiContributor](#)-type that holds metadata information about the authors. |
| description | A character string providing a textual description of the content of this learning object. |
| rights | A character string describing the intellectual property rights and conditions of use for this learning object. By default it takes value from environment variable 'RQTI_RIGHTS'. |
| version | A character string representing the edition/version of this learning object. |

### Examples

```
creator= qtiMetadata(qtiContributor("Max Mustermann"),
                     description = "Task description",
                     rights = "This file is Copyright (C) 2024 Max
                     Mustermann, all rights reserved.",
                     version = "1.0")
```

---

QtiMetadata-class          *Class QtiMetadata*

---

**Description**

This class stores metadata information such as contributors, description, rights and version for QTI-compliant tasks or tests.

**Slots**

contributor A list of objects [QtiContributor]-type that holds metadata information about the authors.

description A character string providing a textual description of the content of this learning object.

rights A character string describing the intellectual property rights and conditions of use for this learning object. By default it takes value from environment variable 'RQTI_RIGHTS'.

version A character string representing the edition/version of this learning object.

---

qti_contributor          *Constructor function for class QtiContributor*

---

**Description**

Creates object of [QtiContributor]-class

**Usage**

```
qti_contributor(
  name = Sys.getenv("RQTI_AUTHOR"),
  role = "author",
  contribution_date = ifelse(name != "", Sys.Date(), NA_Date_)
)
```

**Arguments**

name          A character string representing the name of the author.

role          A character string kind of contribution. Possible values: author, publisher, unknown, initiator, terminator, validator, editor, graphical designer, technical implementer, content provider, technical validator, educational validator, script writer, instructional designer, subject matter expert. Default is "author".

contribution_date

A character string representing date of the contribution. Default is the current system date, when contributor is assigned.

### Examples

```
creator= qti_contributor("Max Mustermann", "technical validator")
```

---

qti_metadata *Constructor function for class QtiMetadata*

---

### Description

Creates object of [QtiMetadata](#)-class

### Usage

```
qti_metadata(
  contributor = list(),
  description = "",
  rights = Sys.getenv("RQTI_RIGHTS"),
  version = NA_character_
)
```

### Arguments

| | |
|---|---|
| contributor | A list of objects [QtiContributor](#)-type that holds metadata information about the authors. |
| description | A character string providing a textual description of the content of this learning object. |
| rights | A character string describing the intellectual property rights and conditions of use for this learning object. By default it takes value from environment variable 'RQTI_RIGHTS'. |
| version | A character string representing the edition/version of this learning object. |

### Examples

```
creator= qti_metadata(qtiContributor("Max Mustermann"),
                      description = "Task description",
                      rights = "This file is Copyright (C) 2024 Max
                      Mustermann, all rights reserved.",
                      version = "1.0")
```

---

render_opal    *Render Rmd directly in Opal via API*

---

### Description

Render Rmd directly in Opal via API

### Usage

```
render_opal(input, ...)
```

### Arguments

input           (the path to the input Rmd document)

...             required for passing arguments when knitting

### Details

Customize knit function in the Rmd file using the following YAML setting after the word knit `knit:`
`rqti::render_opal.`

### Value

A list with the key, display name, and URL of the resource in Opal.

### Examples

```
file <- system.file("exercises/sc1.Rmd", package='rqti')
render_opal(file)
```

---

render_qtijs    *Render an RMD/xml file or rqti-object as qti xml with QTIJS*

---

### Description

Generates the qti xml file via rmd2xml. The xml is copied into the QTIJS folder of the package
which transforms the xml into HTML. Finally, the HTML is displayed and the user can have a
preview of the exercise or exam.

### Usage

```
render_qtijs(input, preview_feedback = FALSE, ...)
```

## Arguments

input      (the path to the input Rmd/md/xml document or [AssessmentItem](#), [AssessmentTest](#), [AssessmentTestOpal](#), [AssessmentSection](#) object)

preview_feedback

     A boolean value; optional. Set `TRUE` value to always display a model feedback (for example, as a model answer). Default is `FALSE`.

...      required for passing arguments when knitting

## Details

Requires a running QTIJS server, which can be started with start_server(). When loading the package rqti, a server is started automatically.

The preview is automatically loaded into the RStudio viewer. Alternatively you can just open the browser in the corresponding local server which is displayed when rendering. Since the function is supposed to be called via the Knit-Button in RStudio, it defaults to the RStudio viewer pane.

Customize knit function in the Rmd file using the following YAML setting after the word knit `knit: rqti::render_qtijs`.

## Value

An URL of the corresponding local server to display the rendering result.

## Examples

```
file <- system.file("exercises/sc1.Rmd", package='rqti')
render_qtijs(file)
```

---

render_xml          *Render a single xml file with QTIJS*

---

## Description

Uses QTIJS to render a single xml file in the RStudio viewer pane with a local server.

## Usage

```
render_xml(input)
```

## Arguments

input      input file

## Value

nothing, has side effects

---

render_zip                      *Render a zipped qti archive with QTIJS*

---

### Description

Uses QTIJS to render a zipped qti archive in the RStudio viewer pane with a local server.

### Usage

```
render_zip(input)
```

### Arguments

input            input file

### Value

nothing, has side effects

---

rmd2xml                      *Create qti-XML task file from Rmd (md) description*

---

### Description

Create XML file for question specification from Rmd (md) description according to qti 2.1 infro-
mation model

### Usage

```
rmd2xml(file, path = getwd(), verification = FALSE)
```

### Arguments

file             A string of path to file with markdown description of question.
path             A string, optional; a folder to store xml file. Default is working directory.
verification     A boolean value, optional; enable validation of the xml file. Default is FALSE.

### Value

The path string to the xml file.

### Examples

```
## Not run:
# creates folder with xml (side effect)
rmd2xml("task.Rmd", "target_folder", TRUE)

## End(Not run)
```

---

rmd2zip *Create test zip file with one task xml file from Rmd (md) description*

---

### Description

Create zip file with test, that contains one xml question specification generated from Rmd (md) description according to qti 2.1 information model

### Usage

```
rmd2zip(file, path = getwd(), verification = FALSE)
```

### Arguments

| | |
|---|---|
| file | A string of path to file with markdown description of question. |
| path | A string, optional; a folder to store xml file. Default is working directory. |
| verification | A boolean value, optional; enable validation of the xml file. Default is FALSE. |

### Value

The path string to the zip file.

### Examples

```
## Not run:
# creates folder with zip (side effect)
rmd2zip("task.Rmd", "target_folder", TRUE)

## End(Not run)
```

---

section *Create a section as part of a test content*

---

### Description

Create an AssessmentSection rqti-object as part of a test content

### Usage

```
section(
  content,
  n_variants = 1L,
  seed_number = NULL,
  id = NULL,
  by = "variants",
  selection = NULL,
```

```
  title = character(0),
  time_limits = NA_integer_,
  visible = TRUE,
  shuffle = FALSE,
  max_attempts = NA_integer_,
  allow_comment = TRUE
)
```

## Arguments

| | |
|---|---|
| content | A character vector of Rmd, md, xml files, task- or section-objects. |
| n_variants | An integer value indicating the number of task variants to create from Rmd files. Default is 1. |
| seed_number | An integer vector, optional, specifying seed numbers to reproduce the result of calculations. |
| id | A character value, optional, serving as the identifier of the assessment section. |
| by | A character with two possible values: "variants" or "files", indicating the type of the test structure. Default is "variants". |
| selection | An integer value, optional, defining how many children of the section are delivered in the test. Default is NULL, meaning "no selection". |
| title | A character value, optional, representing the title of the section. If not provided, it defaults to identifier. |
| time_limits | An integer value, optional, controlling the amount of time a candidate is allowed for this part of the test. |
| visible | A boolean value, optional, indicating whether the title of this section is shown in the hierarchy of the test structure. Default is TRUE. |
| shuffle | A boolean value, optional, responsible for randomizing the order in which the assessment items and subsections are initially presented to the candidate. Default is FALSE. |
| max_attempts | An integer value, optional, enabling the maximum number of attempts allowed for a candidate to pass this section. |
| allow_comment | A boolean value, optional, enabling candidates to leave comments on each question of the section. Default is TRUE. |

## Value

An object of class [AssessmentSection](#).

## See Also

[test()](#), [test4opal()](#)

## Examples

```
sc <- new("SingleChoice", prompt = "Question", choices = c("A", "B", "C"))
es <- new("Essay", prompt = "Question")
# Since ready-made S4 "AssessmentItem" objects are taken, in this example a
#permanent section consisting of two tasks is created.
s <- section(c(sc, es), title = "Section with nonrandomized tasks")

# Since Rmd files with randomization of internal variables are taken,
#in this example 2 variants are created with a different seed number for each.
path <- system.file("rmarkdown/templates/", package='rqti')
file1 <- file.path(path, "singlechoice-simple/skeleton/skeleton.Rmd")
file2 <- file.path(path, "singlechoice-complex/skeleton/skeleton.Rmd")
s <- section(c(file1, file2), n_variants = 2,
title = "Section with two variants of tasks")
```

---

singleChoice *Create object [SingleChoice](#)*

---

## Description

Create object [SingleChoice](#)

## Usage

```
singleChoice(
  identifier = generate_id(),
  title = identifier,
  choices,
  choice_identifiers = paste0("Choice", LETTERS[seq(choices)]),
  solution = 1,
  content = list(),
  prompt = "",
  points = 1,
  feedback = list(),
  orientation = "vertical",
  shuffle = TRUE,
  calculator = NA_character_,
  files = NA_character_
)
```

## Arguments

identifier     A character representing the unique identifier of the assessment task. By default,
               it is generated as 'id_task_dddd', where dddd represents random digits.

title          A character representing the title of the XML file associated with the task. By
               default, it takes the value of the identifier.

choices        A character vector defining a set of answer options in the question.

choice_identifiers

> A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list.

solution

> A numeric value, optional. Represents the index of the correct answer in the choices slot. By default, the first item in the choices slot is considered the correct answer. Default is 1.

content

> A character string or a list of character strings to form the text of the question, which may include HTML tags.

prompt

> An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is "".

points

> A numeric value, optional, representing the number of points for the entire task. Default is 1.

feedback

> A list containing feedback messages for candidates. Each element of the list should be an instance of either [ModalFeedback](), [CorrectFeedback](), or [WrongFeedback]() class.

orientation

> A character, determining whether to place answers in vertical or horizontal mode. Possible values:
>
> - "vertical" - Default,
> - "horizontal".

shuffle

> A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

calculator

> A character, optional, determining whether to show a calculator to the candidate. Possible values:
>
> - "simple"
> - "scientific".

files

> A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

## Value

An object of class [SingleChoice]()

## Examples

```
sc_min <- singleChoice(prompt = "Question?",
                       choices = c("Answer1", "Answer2", "Answer3"))


sc <- singleChoice(identifier = "id_task_1234",
                   title = "Single Choice Task",
                   content = "<p>Pick up the right option</p>",
                   prompt = "Plain text, can be used instead of content",
                   points = 2,
                   feedback = list(new("WrongFeedback",
                                       content = list("Wrong answer"))),
                   calculator = "scientific-calculator",
```

```
                           files = "text_book.pdf",
                           choices = c("option 1", "option 2", "option 3"),
                           choice_identifiers = c("ChoiceA", "ChoiceB", "ChoiceC"),
                           shuffle = TRUE,
                           orientation = "vertical",
                           solution = 2)
```

---

SingleChoice-class          *Class "SingleChoice"*

---

### Description

Class `SingleChoice` is responsible for creating single-choice assessment tasks according to the QTI 2.1 standard.

### Slots

`identifier` A character representing the unique identifier of the assessment task. By default, it is generated as 'id_task_dddd', where dddd represents random digits.

`title` A character representing the title of the XML file associated with the task. By default, it takes the value of the identifier.

`content` A list of character content to form the text of the question, which can include HTML tags. For tasks of the [Entry](#) type, it must also contain at least one instance of Gap objects, such as [TextGap](#), [TextGapOpal](#), [NumericGap](#), or [InlineChoice](#).

`prompt` An optional character representing a simple question text, consisting of one paragraph. This can supplement or replace content in the task. Default is `""`.

`points` A numeric value, optional, representing the number of points for the entire task. Default is 1, but pay attention:

- For tasks of the [Entry](#) type, it is calculated as the sum of the gap points by default.
- For tasks of the [DirectedPair](#), the default is calculated as 0.5 points per pair.
- For tasks of the [MatchTable](#) type, it can also be calculated as the sum of points for individual answers, when provided.
- For tasks of the [MultipleChoice](#) type, points is numeric vector and required. Each number in this vector determines the number of points that will be awarded to a candidate if they select the corresponding answer. The order of the scores must match the order of the `choices`. It is possible to assign negative values to incorrect answers. All answers with a positive score are considered correct.

`feedback` A list containing feedback messages for candidates. Each element of the list should be an instance of either [ModalFeedback](#), [CorrectFeedback](#), or [WrongFeedback](#) class.

`calculator` A character, optional, determining whether to show a calculator to the candidate. Possible values:

- "simple"
- "scientific"

files A character vector, optional, containing paths to files that will be accessible to the candidate during the test/exam.

metadata An object of class QtiMetadata that holds metadata information about the task.

choices A character vector defining a set of answer options in the question.

choice_identifiers A character vector, optional, containing a set of identifiers for answers. By default, identifiers are generated automatically according to the template "ChoiceD", where D is a letter representing the alphabetical order of the answer in the list.

shuffle A boolean value indicating whether to randomize the order in which the choices are initially presented to the candidate. Default is TRUE.

orientation A character, determining whether to place answers in vertical or horizontal mode. Possible values:

- "vertical" - Default.
- "horizontal"

solution A numeric value, optional. Represents the index of the correct answer in the choices slot. By default, the first item in the choices slot is considered the correct answer. Default is 1.

## Examples

```
sc <- new("SingleChoice",
          identifier = "id_task_1234",
          title = "Single Choice Task",
          content = list("<p>Pick up the right option</p>"),
          prompt = "Plain text, can be used instead of content",
          points = 2,
          feedback = list(new("WrongFeedback", content = list("Wrong answer"))),
          calculator = "scientific-calculator",
          files = "text_book.pdf",
          choices = c("option 1", "option 2", "option 3", "option 4"),
          choice_identifiers = c("ChoiceA", "ChoiceB", "ChoiceC", "ChoiceD"),
          shuffle = TRUE,
          orientation = "vertical",
          solution = 2)
```

---

start_server                  *Start QTIJS on a local server*

---

## Description

This function starts an http server with the QTIJS renderer. The renderer performs the conversion of qti.xml into HTML.

## Usage

```
start_server()
```

## Details

The server has to be started manually by the user, otherwise the Knit Button will not work. The Button starts a new session and invoking a server there does not make much sense.

## Value

The URL string for QTIJS server.

## Examples

```
## Not run:
# Initiated server in qtiViewer folder
start_server()
# Initiated server in a specific folder provided by the user. This folder
# contains the QTI renderer
start_server("/pathToTheQtiRenderer/")

## End(Not run)
```

---

stop_server                    *Stop QTIJS local server*

---

## Description

Stop QTIJS local server

## Usage

```
stop_server()
```

## Value

nothing, has side effects

---

test                           *Create a test*

---

## Description

Create an AssessmentTest `rqti`-object.

## Usage

```
test(
  content,
  identifier = "test_identifier",
  title = "Test Title",
  time_limit = 90L,
  max_attempts = 1L,
 academic_grading = c(`1.0` = 0.95, `1.3` = 0.9, `1.7` = 0.85, `2.0` = 0.8, `2.3` =
  0.75, `2.7` = 0.7, `3.0` = 0.65, `3.3` = 0.6, `3.7` = 0.55, `4.0` = 0.5, `5.0` = 0),
  grade_label = c(en = "Grade", de = "Note"),
  table_label = c(en = "Grade", de = "Note"),
  navigation_mode = "nonlinear",
  submission_mode = "individual",
  allow_comment = TRUE,
  rebuild_variables = TRUE,
  contributor = list(),
  description = "",
  rights = Sys.getenv("RQTI_RIGHTS"),
  version = "0.0.9"
)
```

## Arguments

| | |
|---|---|
| content | A list containing [AssessmentSection](#) objects. |
| identifier | A character value indicating the identifier of the test file. Default is 'test_identifier'. |
| title | A character value, optional, representing the file title. Default is 'Test Title'. |
| time_limit | An integer value, optional, controlling the time given to a candidate for the test in minutes. Default is 90 minutes. |
| max_attempts | An integer value, optional, indicating the maximum number of attempts allowed for the candidate. Default is 1. |
| academic_grading | |
| | A named numeric vector that defines the grade table shown to the candidate as feedback at the end of the test. The default is the German grading system: gt <- c("1.0" = 0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" = 0.7, "3.0" = 0.65, "3.3" = 0.6, "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade corresponds to a minimum percentage score required to achieve it. To hide the grading table at the end of the test, set this parameter to NA_real_. |
| grade_label | A character value, optional; a short message that shows with a grade in the final feedback; for multilingual use, it can be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default. |
| table_label | A character value, optional; a concise message to display as the column title of the grading table in the final feedback; for multilingual use, it can be a named vector with two-letter ISO language codes as names (e.g., c(en="Grade", de="Note")); during test creation, it takes the value for the language of the operating system; c(en="Grade", de="Note")is default. |

navigation_mode

> A character value, optional, determining the general paths that the candidate may have during the exam. Two mode options are possible: - 'linear': Candidate is not allowed to return to previous questions. - 'nonlinear': Candidate is free to navigate; used by default.

submission_mode

> A character value, optional, determining when the candidate's responses are submitted for response processing. One of two mode options is possible: - 'individual': Submit candidates' responses on an item-by-item basis; used by default. - 'simultaneous': Candidates' responses are submitted all together by the end of the test.

allow_comment    A boolean, optional, enabling the candidate to leave comments in each question. Default is TRUE.

rebuild_variables

> A boolean, optional, enabling the recalculation of variables and reshuffling the order of choices for each item-attempt. Default is TRUE.

contributor    A list of objects [QtiContributor](#)-type that holds metadata information about the authors.

description    A character string providing a textual description of the content of this learning object.

rights    A character string describing the intellectual property rights and conditions of use for this learning object. By default it takes value from environment variable 'RQTI_RIGHTS'.

version    A character string representing the edition/version of this learning object.

## Value

An [AssessmentTest](#) object.

## See Also

[test4opal()](#), [section()](#), [AssessmentTest](#), [AssessmentSection](#)

## Examples

```
sc <- new("SingleChoice", prompt = "Question", choices = c("A", "B", "C"))
es <- new("Essay", prompt = "Question")
s <- section(c(sc, es), title = "Section with nonrandomized tasks")
t <- test(s, title = "Example of the Exam")
```

---

**test4opal**                    *Create a test for LMS OPAL*

---

### Description

Create an AssessmentTestOpal `rqti`-object.

### Usage

```
test4opal(
  content,
  identifier = "test_identifier",
  title = "Test Title",
  time_limit = 90L,
  max_attempts = 1L,
  files = NULL,
  calculator = NULL,
 academic_grading = c(`1.0` = 0.95, `1.3` = 0.9, `1.7` = 0.85, `2.0` = 0.8, `2.3` =
  0.75, `2.7` = 0.7, `3.0` = 0.65, `3.3` = 0.6, `3.7` = 0.55, `4.0` = 0.5, `5.0` = 0),
  grade_label = c(en = "Grade", de = "Note"),
  table_label = c(en = "Grade", de = "Note"),
  navigation_mode = "nonlinear",
  submission_mode = "individual",
  allow_comment = TRUE,
  rebuild_variables = TRUE,
  show_test_time = TRUE,
  mark_items = TRUE,
  keep_responses = FALSE,
  contributor = list(),
  description = "",
  rights = Sys.getenv("RQTI_RIGHTS"),
  version = "0.0.9"
)
```

### Arguments

| | |
|---|---|
| content | A list containing [AssessmentSection](#) objects. |
| identifier | A character value indicating the identifier of the test file. Default is 'test_identifier'. |
| title | A character value, optional, representing the file title. Default is 'Test Title'. |
| time_limit | An integer value, optional, controlling the time given to a candidate for the test in minutes. Default is 90 minutes. |
| max_attempts | An integer value, optional, indicating the maximum number of attempts allowed for the candidate. Default is 1. |
| files | A character vector, optional; paths to files that will be accessible to the candidate during the test/exam. |

calculator          A character, optional; determines whether to show a calculator to the candidate.
                    Possible values:

                    • 'simple'
                    • 'scientific'. Default is NULL.

academic_grading

                    A named numeric vector that defines the grade table shown to the candidate as
                    feedback at the end of the test. The default is the German grading system: gt
                    <- c("1.0" = 0.95, "1.3" = 0.9, "1.7" = 0.85, "2.0" = 0.8, "2.3" = 0.75, "2.7" =
                    0.7, "3.0" = 0.65, "3.3" = 0.6, "3.7" = 0.55, "4.0" = 0.5, "5.0" = 0) Each grade
                    corresponds to a minimum percentage score required to achieve it. To hide the
                    grading table at the end of the test, set this parameter to NA_real_.

grade_label         A character value, optional; a short message that shows with a grade in the
                    final feedback; for multilingual use, it can be a named vector with two-letter
                    ISO language codes as names (e.g., c(en="Grade", de="Note")); during test cre-
                    ation, it takes the value for the language of the operating system; c(en="Grade",
                    de="Note")is default.

table_label         A character value, optional; a concise message to display as the column ti-
                    tle of the grading table in the final feedback; for multilingual use, it can be a
                    named vector with two-letter ISO language codes as names (e.g., c(en="Grade",
                    de="Note")); during test creation, it takes the value for the language of the op-
                    erating system; c(en="Grade", de="Note")is default.

navigation_mode

                    A character value, optional, determining the general paths that the candidate
                    may have during the exam. Two mode options are possible: - 'linear': Candidate
                    is not allowed to return to previous questions. - 'nonlinear': Candidate is free to
                    navigate; used by default.

submission_mode

                    A character value, optional, determining when the candidate's responses are
                    submitted for response processing. One of two mode options is possible: -
                    'individual': Submit candidates' responses on an item-by-item basis; used by
                    default. - 'simultaneous': Candidates' responses are submitted all together by
                    the end of the test.

allow_comment       A boolean, optional, enabling the candidate to leave comments in each question.
                    Default is TRUE.

rebuild_variables

                    A boolean, optional, enabling the recalculation of variables and reshuffling the
                    order of choices for each item-attempt. Default is TRUE.

show_test_time      A boolean, optional, determining whether to show candidate elapsed processing
                    time without a time limit. Default is TRUE.

mark_items          A boolean, optional, determining whether to allow candidate marking of ques-
                    tions. Default is TRUE.

keep_responses      A boolean, optional, determining whether to save the candidate's answers from
                    the previous attempt. Default is FALSE.

contributor         A list of objects [QtiContributor](QtiContributor)-type that holds metadata information about the
                    authors.

| description | A character string providing a textual description of the content of this learning object. |
| rights | A character string describing the intellectual property rights and conditions of use for this learning object. By default it takes value from environment variable 'RQTI_RIGHTS'. |
| version | A character string representing the edition/version of this learning object. |

## Value

An [AssessmentTestOpal](#) object

## See Also

[test()](#), [section()](#), [AssessmentTestOpal](#), [AssessmentSection](#)

## Examples

```
sc <- new("SingleChoice", prompt = "Question", choices = c("A", "B", "C"))
es <- new("Essay", prompt = "Question")
s <- section(c(sc, es), title = "Section with nonrandomized tasks")
t <- test4opal(s, title = "Example of the Exam",
show_test_time = FALSE)
```

---

textGap                                      *Create object [TextGap](#)*

---

## Description

Create object [TextGap](#)

## Usage

```
textGap(
  solution,
  response_identifier = generate_id(type = "gap"),
  points = 1,
  placeholder = "",
  expected_length = size_gap(solution),
  case_sensitive = FALSE
)

gapText(
  solution,
  response_identifier = generate_id(type = "gap"),
  points = 1,
  placeholder = "",
  expected_length = size_gap(solution),
  case_sensitive = FALSE
)
```

## Arguments

solution      A character vector containing the values considered as correct answers.

response_identifier

> A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points      A numeric value, optional, representing the number of points for this gap. Default is 1

placeholder      A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine. Default is "".

expected_length

> A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine. Default value is adjusted by solution size.

case_sensitive  A boolean value, determining whether the evaluation of the correct answer is case sensitive. Default is FALSE.

## Value

An object of class TextGap

## See Also

[entry()][numericGap()][textGapOpal()]

## Examples

```
tg_min <- textGap("answer")

tg <- textGap(solution = "answer",
              response_identifier  = "id_gap_1234",
              points = 2,
              placeholder = "put your answer here",
              expected_length = 20,
              case_sensitive = TRUE)
```

---

TextGap-class      *Class "TextGap"*

---

## Description

Class TextGap is responsible for creating instances of input fields with text type of answers in question Entry type assessment tasks according to the QTI 2.1 standard.

**Slots**

response_identifier A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

points A numeric value, optional, representing the number of points for this gap. Default is 1.

placeholder A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine.

expected_length A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine.

solution A character vector containing the values considered as correct answers.

case_sensitive A boolean value, determining whether the evaluation of the correct answer is case sensitive. Default is FALSE.

**See Also**

Entry, NumericGap, TextGapOpal and InlineChoice.

**Examples**

```
tg <- new("TextGap",
          response_identifier = "id_gap_1234",
          points = 2,
          placeholder = "do not put special characters",
          expected_length = 20,
          solution = c("answer", "answerr", "aanswer"),
          case_sensitive = FALSE)
```

---

textGapOpal                *Create object TextGapOpal*

---

**Description**

Create object TextGapOpal

**Usage**

```
textGapOpal(
  solution,
  response_identifier = generate_id(type = "gap"),
  points = 1,
  placeholder = "",
  expected_length = size_gap(solution),
  case_sensitive = FALSE,
  tolerance = 0
)

gapTextOpal(
```

```
    solution,
    response_identifier = generate_id(type = "gap"),
    points = 1,
    placeholder = "",
    expected_length = size_gap(solution),
    case_sensitive = FALSE,
    tolerance = 0
)
```

## Arguments

solution          A character vector containing the values considered as correct answers.

response_identifier

                  A character value representing an identifier for the answer. By default, it is
                  generated as 'id_gap_dddd', where dddd represents random digits.

points            A numeric value, optional, representing the number of points for this gap. De-
                  fault is 1

placeholder       A character value, optional, responsible for placing helpful text in the text input
                  field in the content delivery engine. Default is "".

expected_length

                  A numeric value, optional, responsible for setting the size of the text input field
                  in the content delivery engine. Default value is adjusted by solution size.

case_sensitive    A boolean value, determining whether the evaluation of the correct answer is
                  case sensitive. Default is FALSE.

tolerance         A numeric value defining how many characters will be taken into account to
                  tolerate spelling mistakes in the evaluation of candidate answers. Default is 0.

## Value

An object of class [TextGapOpal](TextGapOpal)

## See Also

[entry()][numericGap()][textGap()]

## Examples

```
tgo_min <- textGapOpal("answer")

tgo <- textGapOpal(solution = "answer",
            response_identifier  = "id_gap_1234",
            points = 2,
            placeholder = "put your answer here",
            expected_length = 20,
            case_sensitive = TRUE,
            tolerance = 2)
```

---

TextGapOpal-class          *Class "TextGapOpal"*

---

## Description

Class `TextGapOpal` is responsible for creating instances of input fields with text type of answers in question [Entry](#) type assessment tasks according to the QTI 2.1 standard for LMS Opal.

## Slots

`response_identifier` A character value representing an identifier for the answer. By default, it is generated as 'id_gap_dddd', where dddd represents random digits.

`points` A numeric value, optional, representing the number of points for this gap. Default is 1.

`placeholder` A character value, optional, responsible for placing helpful text in the text input field in the content delivery engine.

`expected_length` A numeric value, optional, responsible for setting the size of the text input field in the content delivery engine.

`solution` A character vector containing the values considered as correct answers.

`case_sensitive` A boolean value, determining whether the evaluation of the correct answer is case sensitive. Default is `FALSE`.

`tolerance` A numeric value defining how many characters will be taken into account to tolerate spelling mistakes in the evaluation of candidate answers. Default is `0`.

## See Also

[Entry](#), [NumericGap](#), [TextGap](#) and [InlineChoice](#).

## Examples

```
tgo <- new("TextGapOpal",
          response_identifier = "id_gap_1234",
          points = 2,
          placeholder = "do not put special characters",
          expected_length = 20,
          solution = "answer",
          case_sensitive = FALSE,
          tolerance = 1)
```

updateCourseElementResource

*Update the referenced learning resource of a course element in the LMS*

### Description

Update the referenced learning resource of a course element in the LMS

### Usage

```
updateCourseElementResource(object, course_id, ...)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class LMS that represents a connection to the LMS. |
| course_id | A character string with course id in the LMS. |
| ... | Additional arguments to be passed to the method, if applicable. |

### Value

Response of the HTTP request.

updateCourseElementResource,missing-method

*Update the referenced learning resource of a course element in the LMS*

### Description

This method updates the learning resource by its course id on Learning Management System (LMS). If no LMS connection object is provided, it attempts to guess the connection using default settings (e.g., environment variables). If the connection cannot be established, an error is thrown.

### Usage

```
## S4 method for signature 'missing'
updateCourseElementResource(object, course_id, ...)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class LMS that represents a connection to the LMS. |
| course_id | A character string with course id in the LMS. |
| ... | Additional arguments to be passed to the method, if applicable. |

**Value**

Response of the HTTP request.

---

updateCourseElementResource,Opal-method

*Update the referenced learning resource of a course element in the LMS Opal*

---

### Description

Update the referenced learning resource of a course element in the LMS Opal

### Usage

```
## S4 method for signature 'Opal'
updateCourseElementResource(
  object,
  course_id,
  node_id,
  resource_id,
  publish = TRUE
)
```

### Arguments

| | |
|---|---|
| object | An S4 object of class LMS that represents a connection to the LMS. |
| course_id | A character string with the course ID. You can find this in the course's details (Resource ID) in the LMS. |
| node_id | A character string with the course element ID. This can be found, for example, in the course editor under the "Title and Description" tab of the respective course element in the LMS Opal. |
| resource_id | A character string wiht the ID of the resource. This can be found in the details view of the desired resource within the LMS. |
| publish | A boolean value that determines whether the course should be published after the resource is updated. If TRUE (default), the course will be published immediately after the update. If FALSE, the course will not be published automatically, leaving it in an unpublished state until manual publication. |

### Value

The response of the HTTP request made to update the resource. If the course is published, an additional message about the publishing status is returned.

---

upload2LMS *Upload content to LMS*

---

### Description

This is a generic function that handles the process of uploading content to a Learning Management System (LMS). The content can be in the form of an AssessmentTest, AssessmentTestOpal, AssessmentItem object, or a file in Rmd, Markdown, zip or XML format.

This is a method that handles the process of uploading content to a Learning Management System (LMS). The content can be in the form of an AssessmentTest, AssessmentTestOpal, AssessmentItem object, or a file in Rmd, Markdown, zip or XML format.

This is a generic function that handles the process of uploading content to LMS Opal. The content can be in the form of an AssessmentTest, AssessmentTestOpal, AssessmentItem object, or a file in Rmd, Markdown, zip or XML format.

### Usage

```
upload2LMS(object, test, ...)

## S4 method for signature 'LMS'
upload2LMS(object, test, ...)

## S4 method for signature 'Opal'
upload2LMS(
  object,
  test,
  display_name = NULL,
  access = 4,
  overwrite = TRUE,
  open_in_browser = TRUE,
  as_survey = FALSE
)
```

### Arguments

| | |
|---|---|
| object | An S4 object representing the LMS, such as an instance of the [Opal] class. |
| test | An [AssessmentTest], [AssessmentTestOpal] or [AssessmentItem] objects, or a character string with path to Rmd/md, zip or XML files. |
| ... | Additional arguments to be passed to the method, if applicable. |
| display_name | A length one character vector to entitle resource in OPAL; file name without extension or identifier of the object by default; optional. |
| access | An integer value, optional; it is responsible for publication status, where 1 - only those responsible for this learning resource; 2 - responsible and other authors; 3 - all registered users; 4 - registered users and guests. Default is 4. |

| overwrite | A boolean value. If `TRUE`, and a file with the specified display name already exists, it will be overwritten. Default is `TRUE`. |
| open_in_browser | |
| | A boolean value; optional; it controls whether to open a URL in default browser. Default is `TRUE`. |
| as_survey | A boolean value, optional. If `TRUE`, the resource will be treated as a survey; if `FALSE`, as a test. Default is `FALSE`. |

---

upload2opal                    *Upload a resource on OPAL*

---

### Description

Function `upload2opal()` takes full prepared zip archive of QTI-test or QTI-task and uploads it to the OPAL.

### Usage

```
upload2opal(
  test,
  display_name = NULL,
  access = 4,
  overwrite = TRUE,
  endpoint = NULL,
  open_in_browser = TRUE,
  as_survey = FALSE,
  api_user = NULL
)
```

### Arguments

| test | A length one character vector of [AssessmentTest,](#) [AssessmentTestOpal](#) or [As-sessmentItem](#) objects, Rmd/md or XML files; required. |
| display_name | A length one character vector to entitle file in OPAL; file name without extension by default; optional. |
| access | An integer value, optional; it is responsible for publication status, where 1 - only those responsible for this learning resource; 2 - responsible and other authors; 3 - all registered users; 4 - registered users and guests. Default is 4. |
| overwrite | A boolean value; if the value is `TRUE`, if only one file with the specified display name is found, it will be overwritten. Default is `TRUE`. |
| endpoint | A string of endpoint of LMS Opal; by default it is got from environment variable `RQTI_API_ENDPOINT`. To set a global environment variable, you need to call `Sys.setenv(RQTI_API_ENDPOINT='xxxxxxxxxxxxxxx')` or you can put these command into .Renviron. |

open_in_browser

A boolean value; optional; it controls whether to open a URL in default browser. Default is `TRUE`.

as_survey    A boolean value; optional; it controls resource type (test r survey). Default is `FALSE`.

api_user    A character value of the username in the OPAL.

## Value

A list with the key, display name, and URL of the resource in Opal.

## Examples

```
file <- system.file("exercises/sc1.Rmd", package='rqti')
upload2opal(file, "task 1", open_in_browser = FALSE)
```

---

verify_qti                    *Verify QTI XML against XSD Schema QTI v2.1*

---

## Description

This function validates a QTI XML document against the IMS QTI v2.1.2 XSD schema.

## Usage

```
verify_qti(doc, extended_scheme = FALSE)
```

## Arguments

doc    A character string representing the path to the XML file or an `xml2` document object.

extended_scheme

A boolean value that controls the version of the XSD schema used for validation. If `TRUE`, the extended version is used, allowing additional tags in the XML (e.g., `details`). Default is `FALSE`.

## Value

A logical value indicating whether the XML document is valid according to the schema. If invalid, returns an object detailing the validation errors.

## Examples

```
## Not run:
# Validate an XML file
result <- verify_qti("path/to/your/qti.xml")

## End(Not run)
```

---

wrongFeedback                    *Create object [WrongFeedback](#)*

---

### Description

Create object [WrongFeedback](#)

### Usage

```
wrongFeedback(content = list(), title = character(0), show = TRUE)
```

### Arguments

| | |
|---|---|
| content | A character string or a list of character strings to form the text of the question, which may include HTML tags. |
| title | A character value, optional, representing the title of the feedback window. |
| show | A boolean value, optional, determining whether to show (TRUE) or hide (FALSE) the feedback. Default is TRUE. |

### Value

An object of class [WrongFeedback](#)

### Examples

```
wfb <- wrongFeedback(content = "Some comments", title = "Feedback")
```

---

WrongFeedback-class        *Class "WrongFeedback"*

---

### Description

Class WrongFeedback is responsible for delivering feedback messages to the candidate in case of an incorrect answer on the entire exercise.

### Slots

outcome_identifier A character representing the unique identifier of the outcome declaration variable that relates to feedback. Default is "FEEDBACKMODAL".

show A boolean value, optional, determining whether to show (TRUE) or hide (FALSE) the modal feedback. Default is TRUE.

title A character value, optional, representing the title of the modal feedback window.

content A list of character content to form the text of the modal feedback, which can include HTML tags.

identifier A character value representing the identifier of the modal feedback item. Default is "incorrect".

## Examples

```
wfb <- new("WrongFeedback",
          title = "Wrong answer",
          content = list("<b>Some demonstration</b>"))
```

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