# Assistant for Instructional Design (AID): development and validation

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**Acknowledgements**

We are much obliged to the Army, Air force and Marine Training & Instruction organization in the Netherlands to participate in the research. Not only during the experiment, but also during the preliminary studies and expert meetings. Hereby staff OTCO (The Commander of the Army Education & Training organization by LCol. G. Vermeulen, bd. & Maj. J. Kuppens) did a great job in facilitating us during the research. We thank Major Lock for his efforts in arranging meetings to validate AID with potential users in his school. Finally we thank Martin van Schaik for his never lasting support and effort during the research.

**Running head**: Assistant for Instructional Design

**Paper presented at the Conference for Research on Vocational Education and Training for International Comparison and as International Comparison**

# Assistant for Instructional Design (AID): development and validation


## Abstract

The purpose of this article is to introduce and validate AID (Assistant for Instructional Design), a tool that supports educational developers in selecting appropriate educational concepts. Due to periodical job rotation within the military, educational developers are not always experts in the educational field and are consequently unaware of the different types of educational concepts that are available to teach with. AID has been developed over the course of several years, as a support for educational developers. It incorporates both theoretical and practical criteria related to selecting a suitable concept for an educational program. Subsequently, it provides support in the actual concretization of the educational program. In continuance of two pilots, AID has been tested by 29 instructors in training. The results show that AID is an effective tool for advising educational developers. It can be concluded that AID can provide valuable support for the development of new educational programs. (150 words)


***Keywords:*** *educational development, instructional design, support, aid, educational concepts, military, instructors, job rotation, army, instrument.*

## Introduction

Choosing suitable educational concepts for instruction can be challenging for educational developers (Muraida & Spector, 1993). An educational concept can be defined as a 'model' or a 'worked out' idea of how to offer certain content (theoretical or practical) to students. In general, educational developers will be reluctant to use new or unknown educational concepts because they lack knowledge of the implementation strategies and the prerequisites for those concepts. This often causes them to fall back on concepts that have been used before by their predecessors, based on practical considerations such as availability of the instructional contents and know-how. Such an approach is reported by Odenthal, et al., (2000). They relate what they call 'intuitive' teaching to earlier experiences. This means that proficiency at developing suitable educational learning environments is inhibited not only by available time and domain of expertise, but also by the restrictive nature of common practice.

The system of periodical job rotations within the military poses additional challenges for the educational developer because they lead to continuous shifts in tasks and responsibilities (Jans & Frazer-Jans, 2004). Internal job rotations are defined as lateral transfers of employees between jobs and/or teams within an organization (Van Vianen, et al., 2003). Aside from advantages like flexibility, adaptability, job-based experimental learning, and non-linear careers (Burke & Moore, 2000; Jans & Frazer-Jans, 2004), some disadvantages of job rotation can be identified: First, the likelihood increases that employees do not (yet) have the necessary expertise to fulfill the position they hold. Second, if a position is filled for a limited period of time (two to six years according to Jans & Frazer-Jans, 2004), this does not allow enough time for practitioners to grow in their function and perform optimally.

When we consider the post of educational developer, this post is regularly filled by domain experts such as instructors that are specialists in their field, but not necessarily experienced in educational design (Boot, 2005; Verstegen, 2004; Verstegen, Pilot & Barnard, 2006; Muraida & Spector, 1993). These educational developers are therefore often forced to manage their jobs with limited knowledge of the domain, unaware of the newest developments in the field. Moreover, they have limited time to become familiar with the

field of pedagogy in all its facets. A final problem is the inherent vagueness of the instructional design world itself. Even among experts, the implementational details of many educational concepts are not agreed upon (Theunissen, Melis & Veldhuis, in prep). Many slight to moderate differences exist between the executions of several concepts. This makes it even harder for any educational developer to choose and implement an educational concept. Altogether, these inhibiting factors suggest that educational developers would benefit from relevant support to assist them in performing their tasks competently. For novices in the field of educational design, support is required to assist them in choosing suitable educational concepts for each educational program they design. Moreover, vague and often ill-defined educational concepts should be clarified to smooth and simplify implementation of these concepts. Even for more experienced educational developers, a clear and definite implementational strategy for educational concepts will provide a beacon by which the entire organization can be guided and consensus can be reached. What is needed really, is 'the expert in a box'. This paper presents such an expert, called Assistant for Instructional Design (AID). After a description of AID and its workings, this paper will continue to describe the validation of AID: A preliminary study which validates the appropriateness of the vignettes used in the study, and two pilot studies are conducted. The pilot studies validate its user friendliness and the unassailability of the educational concepts used by AID. Finally, the validation of the tool AID itself will be described after which conclusions and discussion follows.

## AID

AID supports the educational developer in choosing suitable educational concepts. The development of AID is inspired by bridging the gap between the complex theories of instructional design, the available computer-based technologies, and on the other hand, shortages of expertise in courseware design of military subject matter experts. AID advises the developer from a database of the most up to date concepts. Input such as preconditions, desired organizational aspects and educational content is used by AID to generate an advice. This advice consists of more than just an indication of a suitable educational concept; it also provides suggestions and guidance for implementation.

## The educational concepts embedded in AID

The educational concepts that are at the basis of the advisory tool AID have been selected from contemporary academic literature. For this purpose, a systematic meta-review has been conducted (Theunissen et al, in prep; Theunissen, Melis, Veldhuis & Bots, 2005). From the meta-review, several concepts have been identified that describe instructional design for an educational purpose. Seven of these were compatible with realistic educational settings in the military and were hence selected. Two additional concepts, that are commonly used in military context, were included so as to ensure a good fit with military educational practice. The nine selected concepts have been analyzed in order to identify all differentiated aspects of that specific type of instruction (see Table 1).

### Table 1: The concepts

| Concept | Description |
|---|---|
| ***Case based learning*** | A case describes a certain realistic or hypothetical situation. The description itself is structured and provides anchors by explaining relevant information / depictures, facts, processes and / or prerequisites. This information benefits the student in actively practicing a realistic case-study (Williams, 1992) |
| ***Problem based learning*** | Students are confronted with a realistic problem or situation in a (simulated) work environment. Not much structure is provided if any at all. This means that the students (groups) are responsible for their own learning process and must be self-regulating. They practice their problem solving skills as well as gather essential knowledge and skills that they need to solve the problem. (Brandon & Majumdar, 1997; Lohman, 2002). |
| ***Competence based learning*** | Students practice in realistic 'work like' settings where they acquire knowledge, skills and attitudes in an integrative way. The focus hereby is on acquiring new, obtainable competencies (Veldhuis, Van de Laak & Van Berlo, 2002). |
| ***Learning on-the-job*** | The student learns while he / she is working and thus performing the actual job that will be required of him or her. Sometimes this 'learning' takes place in a simulated work environment. The focus is on acquiring new knowledge, skills and attitudes. (Smith & O'Neil, 2003). |
| ***Part task learning*** | A complex skill is learned / being practiced by splitting the complex skill in smaller separate parts for the student to practice one at a time. |
| ***Organizational learning*** | In the work environment discussions are organized about specific work / task related subjects. These discussions could be face-to-face meetings and / or electronic discussions (via Internet or Intranet). Participants themselves get connected to each other or a moderator invites them to take part, and manages the discussion (Laehteenmaeki, Toivonen & Mattila, 2001). |
| ***Frontal learning*** | Teaching 'knowledge' to a group by oration. Frequently used classical strategies are lectures and instruction in class. |

| | |
|---|---|
| ***E-learning/ self learning*** | Learning, exclusively supported by electronic equipment (like computers, mobile tools). Learners could learn the electronic content on their own initiative and responsibility. The content is being distributed via a network, like Internet (Vann, 1996; Welsh, Wanberg, Brown & Simmering, 2003). |
| ***E-learning/ supported learning*** | A combination of e-learning and other concepts as described above (such as case based learning via Internet). Learning is being supported and moderated during the learning process at a distance. (Welsh, Wanberg, Brown & Simmering, 2003; Burgess & Russell, 2003). |

Analyses of these concepts pointed out that there is not always consensus about the exact focus, meaning, and didactical approach of these concepts. Authors vary in the way they describe or use the educational concepts (Theunissen et al, in prep; Theunissen et al, 2005; Martin, Massy & Clarke, 2003; Davis, 1994). For instance, Problem Based learning is the result of the process of understanding a problem, according to Brandon & Majumdar (1997). The problem hereby is 'the engine' to develop / acquire logic reasoning and problem solving skills. Williams (1992) describes Problem Based learning as instruction in a rich meaningful context, manifested as a problem or case description. Lohman (2002) combines these two definitions by focusing on acquiring problem solving capacities through realistic problems. Within these interpretations of Problem Based Learning there are slight but significant differences. These differences could lead to misconceptions between educational developers and vagueness with regard to the implementation of problem based learning within organizations. It is also possible that two different educational concepts have mutual characteristics. An example is that concepts such as learning on-the-job and Problem Based Learning could both include (simulated) problems. Similarities between concepts can cause confusion as it can be harder to differentiate them from each other.

## Generating an advice with AID

For every educational concept, several characteristic aspects have been defined. For example, the desired role of the instructor, or the type of skill taught. AID incorporates these aspects by assigning values to the separate aspects of the concepts. The weight of each value has been determined by combining the theoretical findings (Theunissen et al, 2005; Theunissen et al, in prep) and additional knowledge of educational experts. AID

draws on the input that is given by the educational developers who answer a set of 14 questions. See table 2 for an overview of the type of questions. These questions generally focus on which requirements need to be met, which prerequisites are available, and what characteristics are found in the analyzed learning situation. For each answer, a set of values is distributed over the concepts, making them suitable for the desired type of instructional environment. Each answer leads to a score per question and in combination with the scores on other questions, results in an overall score. AID automatically matches the scores, produced by the user, with the preset values of the implemented 'ideal' concepts.

**Table 2: Questions asked in AID**

| | |
|---|---|
| 1 | Number of attending students |
| 2 | Amount of courses offered per year |
| 3 | Main learning goals (knowledge, skills, attitude) |
| 4 | Roll of the instructor during the course (e.g. coaching, supervising) |
| 5 | Activities at the start of the course (e.g. introduction of the exercises, personal learning objectives) |
| 6 | Person responsible for what is learned (e.g. student, instructor, combination) |
| 7 | Necessity to work with fellow students |
| 8 | Educational history of students (e.g. familiar with on-the-job learning) |
| 9 | Direction of feedback (e.g. instructor to student) |
| 10 | Manner of feedback (e.g. directly about achievements, by means of discussion) |
| 11 | Assessment methods |
| 12 | Necessity to track the progress of students |
| 13 | Availability of a system to track progress of students |
| 14 | Availability of digital content for such a system |

The questions are all directed at gaining insight in the type of instructional environment that a developer needs. A final computation of the input then leads to the assignment of the highest value to one concept; this is the concept that is most suitable, the 'best fit'.

**Preliminary efforts: Validation of appropriateness of the vignettes**

As a first step towards the validation of AID, nine different descriptions of specific learning situations have been constructed. These descriptions can be seen as vignettes. The vignettes depict a prototypical learning situation within military training and instruction (see Table 3 for an example). These vignettes were validated in three workshops. Thirty-eight Training & Instruction experts of the Royal Netherlands Army, Navy and Air Force were asked to judge all nine vignettes on their usefulness for their organization. There was consensus about the representativeness and practibility of the vignettes (Theunissen et al, 2005; Melis & Veldhuis, 2006). A sample of three vignettes was chosen to describe three different educational concepts (out of the nine possible vignettes that described educational concepts). The vignettes were selected to represent a diversity of several educational concepts with at the same time, some mutual characteristics. This way, it could be tested if AID is capable of distinguishing between the different concepts. The first vignette described 'part task learning', the second 'problem based learning', and the third 'learning on-the-job' (see Table 3 for an example of part of a vignette).

**Table 3: Part of vignette C -Learning on-the-job- (translated from the Dutch version)**

| |
|---|
| At the engineer school, 3 students will participate in a course on handling vibratory rollers. In the first part of this course, the theoretical background on this subject has been covered. So when entering this course, the students already have theoretical knowledge on different types of soil, vibratory techniques and compaction techniques. This part of the course will focus on the application of their knowledge and skills in a practical setting.<br><br>The students learn as they work alongside professional engineers. By joining the engineers on the actual work floor, the students experience the practical elements of the job. This gives them the opportunity to gain practical experience in applying their skills, but also to acquire new specialist expertise. Each student is paired with two experienced engineers. The students' primarily theoretical knowledge on how to manage a vibratory roller can now be applied in practice, under the watchful eye of the engineers. The students are given ample space and opportunity to independently handle problematic situations or carry out certain tasks. The engineers will assist in fine-tuning and correcting the students' work and give advice when necessary. |

| |
|---|
| Through regular consultation, the students can benefit form the expert knowledge of the engineers as well as from each other. Two times a week, the students gather with their supervisor. This provides them with the opportunity to exchange experiences, acknowledge lessons-learned, and discuss difficulties. The supervisor discusses the progress of the students by asking questions about their experiences and newly acquired knowledge. The supervisor also inquires after possible difficulties or obstacles…. |

## Study 1: Pilot study with experts

### Method

Three educational experts were selected based on their broad educational expertise. All three experts have a Ph D in educational sciences and work in the field of educational research and development for over 10 years. They were asked to judge the 3 vignettes.

All experts were asked to read the 3 vignettes and determine which educational concept was described in the vignette based on their expertise and experience (Figure 1). To support them in their choice, they were handed a page with a short list of definitions of the nine educational concepts used in AID, similar to the list in Table 1. The opinions of the three experts were compared with each other in order to establish the soundness of the content of the vignettes.

Per vignette the educational experts made a first and second best choice in determining which educational concept the vignette described. When the experts' choice matched the concept that was intended, we called this a 100% match. Because some concepts have such strong resemblances, it was decided to note if the experts' choice was an acceptable match. An acceptable match would be the choice for a concept that has strong resemblances with the actually described concept. An example would be choosing Case Based Learning when Problem Based Learning was intended. If the chosen concept had very little or no resemblance to the intended concept, the choice was rated as having a low match.

### Results

In Table 4, the results of the experts are presented. Every choice has been entered in the appropriate cell. The grey cells are those that would ideally contain most enters.

**Tabel 4: Results of educational experts**

| | **Vignette A Part Task Learning** | | **Vignette B Problem Based Learning** | | **Vignette C Learning on-the-job** | |
|---|---|---|---|---|---|---|
| | 1st choice | 2nd choice | 1st choice | 2nd choice | 1st choice | 2nd choice |
| 100% match | Expert 1<br>Expert 2<br>Expert 3 | | | Expert 1<br>Expert 2<br>Expert 3 | Expert 1<br>Expert 3 | Expert 1 |
| Acceptable match | | Expert 2<br>Expert 3 | Expert 1<br>Expert 2<br>Expert 3 | | Expert 2 | Expert 2 |
| Low match | | Expert 1 | | | | Expert 3 |

For vignette A all experts agreed that the described concept was indeed 'part task learning', as was intended. The second choice of two of the experts was an acceptable match. For vignette B, all three experts chose the acceptable match as a first choice and chose the intended concept (100% match) as a second choice. For vignette C one expert again chose the acceptable match as a first choice and the 100% match as a second choice. But two of them chose the intended concept first before they made a second choice. Only twice, the experts chose a concept that was considered a low match with the described educational concepts. On both occasions, they selected this as a second choice.

## Study 2: Pilot study with non-experts

### Method

Next, we asked three 'non-experts' to read the same three vignettes as in the previous study to test how useful AID would be for a novice in the field of instructional design. One non-expert had completed middle vocational school and two had completed higher vocational school but all three were unschooled in educational sciences. They were asked to use AID by filling in all the questions based on the content of the vignettes. Afterwards, and during using AID, they were asked to comment on how they experienced using the instrument, and what aspects could be improved for usability benefit. By asking the non-expert's opinion, insight was gained in the difficulties that may arise due to a lack of user-friendliness in the interface or unfamiliarity with educational vocabulary. AID generated

two advices based on the answers of the non-experts, of which the first is the best match, followed by the second-best match. It was expected that AID would generate an advice for the non-experts that corresponded with the concept described in the vignette. The outcome of this pilot study gives insight in the usefulness of AID for a novice in the field of education.

**Results**

AID did not immediately generate the expected advices for vignettes A and B. The expected advice did surface once as a second-best fit for vignette A and once more for vignette B. Also an acceptable match was generated four times. Vignette C gave results that were as expected, generating the 100% match for all three non-experts' first advice. While using AID, and afterwards, the non-experts were asked how they experienced using AID. Non-experts said to be confused at times due to the educational jargon used in the questions that AID posed. They also noted that some questions were unclear to them, sometimes being too lengthy. These remarks have been used to update and improve the AID interface before continuing with the validation with the instructors in training.

## Study 3. Validation

**Method**

An experiment was conducted to validate if AID worked successfully. Twenty-nine instructors (N = 29) in training were asked to use AID by filling in the questions after reading the same vignettes that were used in the pilot studies (Figure 1). In four groups of 7 or 8 persons each, the instructors in training first received brief instructions on the way AID works and the aim of the validation. It was stressed that the validation focused not on testing *their* knowledge, but on testing the instrument. All subjects were assigned their own laptop and were instructed to carefully read one vignette at a time and then answer the questions posed by AID. This was repeated for all three vignettes. After finishing the questions for each vignette, they were shown the first advice (the best fit) that had been generated by AID. The data that were collected totaled 174 advices; a first advice per participant per vignette (87 advices), and a second advice per participant per vignette

(another 87 advices). The second advice thus was registered by us, but not shown to the participants.

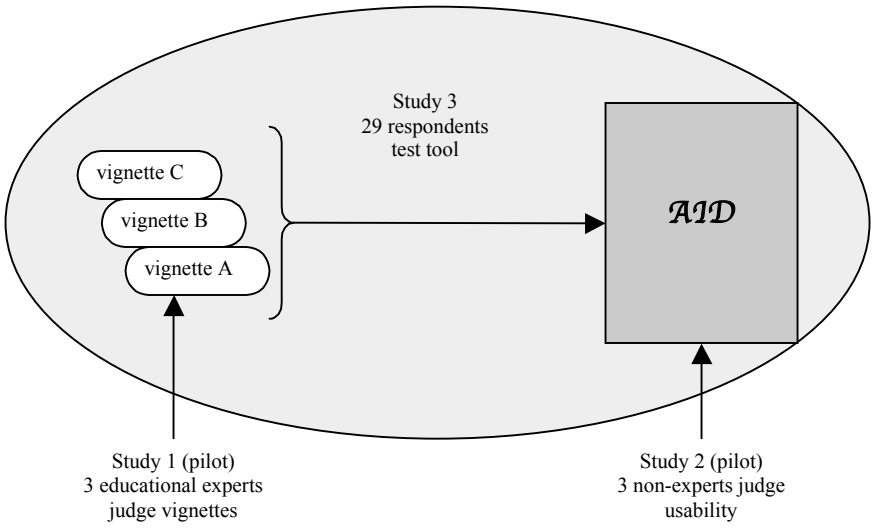


Figure 1: Schematic overview of the study

Every individual advice was compared to the advice that AID would have been expected to generate. For example, if vignette A described 'Part Task Learning', it was expected that AID would advise this same concept. The first and second advice (best and second-best fit) that was generated by every subject for vignette A was compared to this expected advice.

**Results Study 3**

The results of the validation with instructors in training are reported by means of two approaches. In the first approach, only the first two advices (best-fit and second-best-fit) generated by AID are considered. This gives insight in the practical usefulness of AID as in reality it will only give a first and second advice to its user. In the second approach, the entire ranking (1st until 9th advice) is considered. This data gives insight in AID's

proficiency at assigning higher rankings to more suitable concepts and subsequently lower rankings to less suitable concepts.

The first approach brought up the following results. Figure 2 shows whether AID generated the intended advice for each vignette. For Vignette A (Part Task Learning), 83 % of the respondents received the intended concept as a best fit. In combination with the second advice (second-best fit) a total of 93 % of the respondents were presented with the intended advice. The results for vignette C (Learning on-the-job) showed that 69 % of the users of AID got the intended concept as a best fit. Together with the second-best fit, 79 % of the respondents, in total, received the expected advice. Finally, Vignette B (Problem Based Learning), led to more divers outcomes. Only 31 % received the intended concept as a best fit, and in combination with the second-best fit, 41 % received the intended advice produced by AID. This means that for vignette B, AID did not generate as strong results as for vignette A and C. In the interpretation of the data, the outcomes were tested for potentially confounding factors such as age, rank, years of teaching experience and arms. None of these proved a confounding factor, and thus no corrections were made.

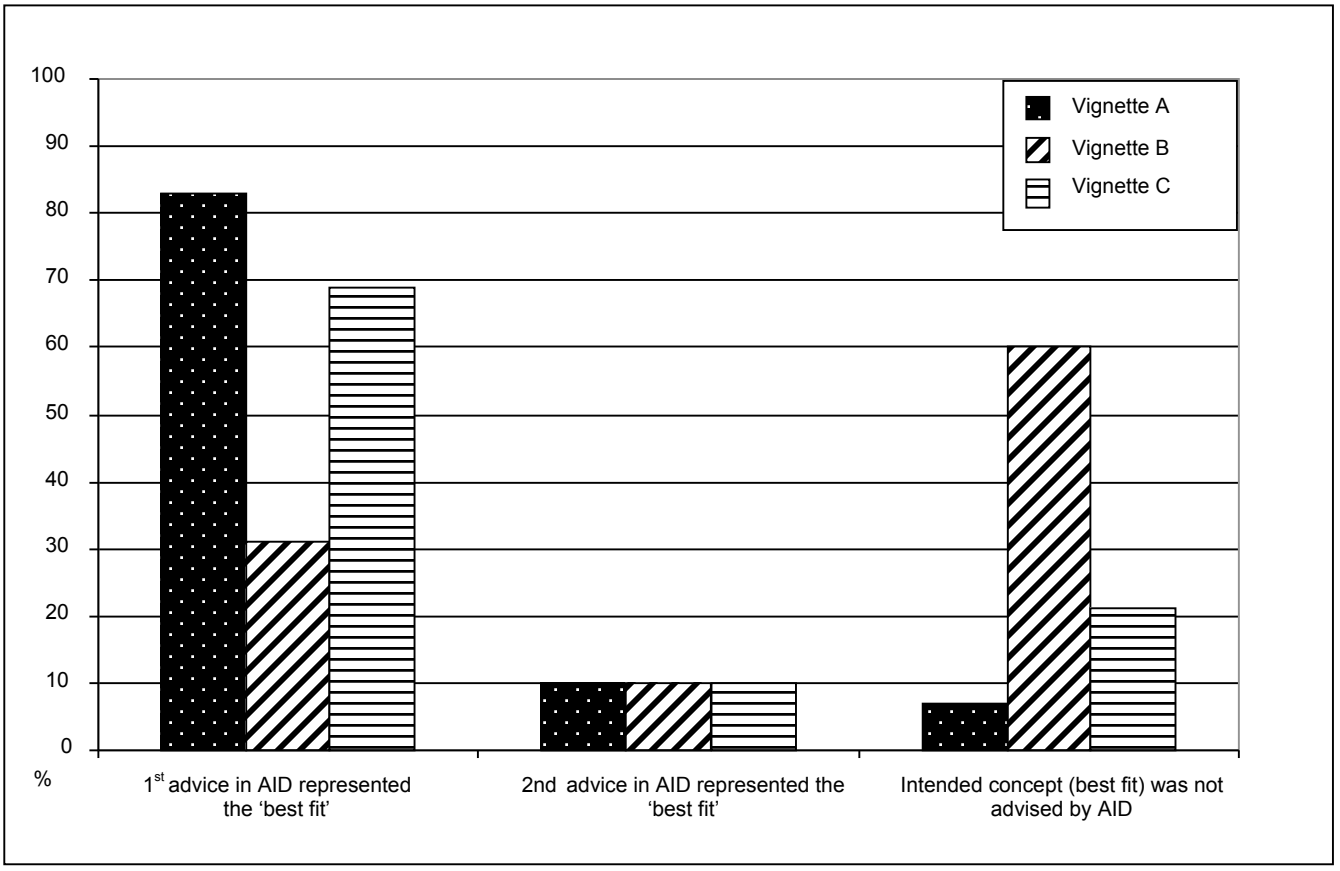


Figure 2: Vignettes advised by AID

The second approach uses the entire dataset generated by AID, thus disregarding the fact that a user is given only a first and second advice. In order to establish the best-fit, second-best fit and so on, every concept is assigned a certain value that is expressed in percentages. The concept that is assigned the highest percentage is labeled the best-fit and is given as a first advice. Percentage scores must, however, be seen as *relative* scores. Table 5 shows an example of the relativity of the percentage scores. As can be seen, the percentage score of 58.8% for participant 11 receives the highest ranking. This same score would generate a 6$^{th}$ place in the ranking of the percentage scores of participant 3. More importantly, the distance *between* the percentage-scores can greatly vary per participant. The percentage scores of participant 3 demonstrate that concepts can be closely clustered with as little as a tenth of a percentage between them. This would indicate that a concept that has a third-place ranking will not be advised by AID despite a relatively high match.

**Table 5: Example of differences in percentage scores between participants**

| Participant 3 vignette B | | | Participant 11 vignette B | | |
|---|---|---|---|---|---|
| **Ranking** | **Concept** | **Match** | **Ranking** | **Concept** | **Match** |
| 1 | Part Task Learning | 81.0% | 1 | Competency Based Learning | 58.8% |
| 2 | Competency Based Learning | 77.2% | 2 | Learning on the Job | 58.7% |
| 3 | Problem Based Learning | 72.5% | 3 | Organisational Learning | 56.4% |
| 4 | Learning on the Job | 63.8% | 4 | Part Task Learning | 53.6% |
| 5 | Case Based Learning | 60.1% | 5 | Case Based Learning | 51.8% |
| 6 | Organisational Learning | 53.6% | 6 | Problem Based Learning | 44.4% |
| 7 | Frontal Learning | 31.2% | 7 | Frontal Learning | 29.6% |
| 8 | E-learning / Self learning | 19.5% | 8 | E-learning / Self learning | 28.3% |
| 9 | E-learning / Supported learning | -30.7% | 9 | E-learning / Supported learning | -26.7% |

In table 6, all the percentage scores for every concept have been added up. The resulting scores represent the total percentage that has been attributed to every concept. As vignette A describes a Part Task Learning environment, it is expected that this concept will have the highest overall percentage score (as is the case). In table 6, the cells with the highest percentage scores are dashed. The boxes that would ideally contain the highest percentage (the intended concepts) are marked by the black run-around. Consistent with the earlier findings (figure 3), the intended concepts for vignette A and C have the highest percentage score, and are thus the best match. For vignette B, the intended concept was Problem Based Learning which matched with 59.8 %, and was the second-highest score. The highest score was generated for Part Task Learning with a 4.1% difference. Though the percentage score for the intended concept was not the highest, it's second place does indicate that AID has filtered Problem Based Learning from the other concepts and assigned relatively high values to it.

**Table 6: Percentage scores per concept for the three vignettes**

| | **Vignette A** | **Vignette B** | **Vignette C** |
|---|---|---|---|
| | **Part Task Learning** | **Problem Based learning** | **Learning on the Job** |
| **Part Task Learning** | **72.4%** | **63.9%** | **55.7%** |
| **Problem Based learning** | **31.4%** | **59.8%** | **29.0%** |
| **Learning on the Job** | **57.9%** | **47.6%** | **58.4%** |
| **Competency Based Learning** | **58.7%** | **54.5%** | **49.3%** |
| **Case Based Learning** | **50.5%** | **56.2%** | **43.6%** |
| **Organisational Learning** | **39.6%** | **45.7%** | **28.2%** |
| **Frontal learning** | **42.3%** | **30.9%** | **33.1%** |
| **E-learning / self learning** | **37.2%** | **20.7%** | **33.3%** |
| **E-learning / supported learning** | **-21.5%** | **-45.1%** | **-41.9%** |

## Conclusions and discussion

The study with educational experts shows that they largely supported the content of the vignettes as describing the intended educational concepts. For vignette B, which described 'Problem Based Learning' the least convincing results are found. The judgment of the experts, even on Problem Based Learning, corresponds with the findings from literature (Theunissen et al, 2005; Theunissen et al, in prep; Martin, Massy & Clarke, 2003; Davis, 1994) where it is noted that there are strong resemblances between several concepts. The choices of the experts confirm this. The results of the study with non-experts brought up that the terminology was not defined well enough for inexperienced users. Based on these findings AID was adapted to improve user friendliness. Changes that were made were mostly directed at clarifying jargon or ambiguous terms. Also the interface was changed slightly so that it was more orderly. This enables the users to quickly oversee the scope of the question and the possible answers that can be chosen. These improvements were implemented before the validation in study 3 was conducted. This validation with the instructors in training has shown that AID can generate suitable advices for its users. Noticeably, Part Task Learning has been generated as a best- or second-best fit relatively often in all three vignettes. To a lesser extent, the same is found for Competency Based Learning and Learning on the Job. This might pertain to the content of the concepts themselves (with a high resemblance to other concepts).

The results from this validation point towards the aspects of AID that can be improved. One problem that has surfaced in the validation of AID is that the content of some educational concepts have certain resemblances. Three educational concepts were chosen to validate AID. Consideration for the effort demanded from the participants and time-contraints did not allow for the validation to be done with all 9 concepts. Thus, not all educational concepts have been used to put AID to the test. This limitation might have been nullified by the fact that the selected vignettes represented a diversity of concepts that at the same time shared characteristics. Part Task Training for example is in some ways comparable to several other concepts such as Problem Based Learning, and Learning on-the-job. As can be seen in the results of the validation with the 29 instructors in training, Part Task Training generates high relative percentage scores for all three vignettes. It is

necessary that similar educational concepts are contrasted sharply by AID so that the most suitable concept will be advised, and not a concept that has certain similarities, but is not the most suitable choice. In order for AID to effectively distinguish between certain concepts, some supplementary questions should be added that will help differentiate between the different concepts. These questions should focus on the unique characteristic(s) of each concept. For example, in order to distinguish between Part Task Learning and other concepts, a question can be added to which the answer can immediately exclude Part Task Learning as an option. An example of such a question would be if it is necessary that the student learns to integrate smaller tasks within a whole task. If the answer is affirmative, then Part Task Learning is not likely to be the best choice and can be discarded. Detailed questions that are directed at one specific educational concept will improve the distinctive ability of AID.

Altogether, AID has proven to be a promising tool for instructional design. It offers assistance in selecting the most suitable educational concept directed at the specific needs and prerequisites for the educational setting that is required. Possibilities for implementation lie within both the training of educational developers, as well as on the work floor. When educational developers are trained for their new posts, they can explore the different educational concepts by using AID. Study 3 showed the usefulness of AID for such a targetgroup. Once on-the-job, AID can assist them in selecting appropriate educational concepts and support their choice with additional information on the required preconditions. In addition, AID can solve some of the uncertainties that are associated with resemblances between educational concepts. As is evident from literature (Theunissen et al., 2005), there is never an exact definition for any educational concept. This leads to fine distinctions in practical implementation of these concepts. This is confirmed by our finding that the three consulted educational experts differed in opinion when it came to identifying specific educational concepts. Although this is a collective problem in the educational field, AID could create an opening for organizations to standardize both theoretical and implementational values of these concepts. When all educational developers handle the same principles and definitions of concepts in designing their educational settings, it will be possible to implement the various educational concepts consistently. Another

implementational opportunity of AID is that it can be tuned in on the organization that it is used for. This means that the tool's interface can be directed at its users, incorporating customary terminology and organizational norms.

A limitation of study 3 is that the participants were instructors in training and not educational developers themselves. This means that, though the participants had reasonable if not good understanding of the domain, the target users of AID could not be used to validate AID. Therefore, educational developers should be asked to work with AID and give their opinion on the functionality and benefits of AID. It can then be assessed if educational developers will be able to do their job better due to the assistance provided by AID. Its use will be of particular value to educational developers that require some (initial) guidance in selecting appropriate educational concepts. As mentioned before, military educational developers are subject to frequent job-rotations (Jans & Frazer-Jans, 2004) and are not always highly experienced in developing educational instructions (Verstegen, 2004, Verstegen, Pilot & Barnard, 2006). AID can provide the necessary support and give any educational developer access to contemporary educational expertise.

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