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Quality of assessment of prior learning (APL) in university programmes: perceptions of candidates, tutors and assessors

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Formal diplomas and certificates have been accepted as proof that students may receive exemption for parts of their educational programme. Nowadays, though, it is socially desirable that informal and non-formal learning experiences are also recognised. Assessment of prior learning (APL) addresses this issue. In APL, the candidate's knowledge, skills or competences required in informal and non-formal learning are measured against a standard to determine whether they match the learning objectives. Although APL is frequently used in workplaces and vocational education, it is practised less in universities, and research is lacking in this context. This study aims to evaluate the first APL procedure in an academic computer science programme, and an adjusted APL procedure in an educational science masters programme. This is done from the perspective of the APL candidates, tutors and assessors, using the theoretical framework by Baartman et al. (2006). The computer science participants comprised 23 candidates from a police software company, four tutors and four assessors. From educational science, nine candidates, two tutors and two assessors participated. The results show that the APL procedure in educational science is viewed significantly more positively than that in computer science; further, the computer science assessors differ considerably from the other participants in their perceptions relating to the quality criterion 'cognitive complexity'. Explanations for the difference between the two programmes are discussed in this article and assessor and tutor training highly recommended.

Keywords: prior learning assessment; perceptions; higher education

Introduction

Formal diplomas and certifications are accepted as proof that candidates can be exempted from parts of the educational programmes they plan to attend. The developments of contemporary society, however, emphasise that informal and non-formal learning experiences can provide candidates with competences, knowledge and skills that match the profile of their prospective educational programme (Colardyn and Bjørnavold 2004). Assessment of prior learning (APL) in this sense is expected to enhance candidates' motivation. In this article, we address the perceptions of candidates, tutors, and assessors towards procedures for assessing and crediting prior learning in university education. We first elaborate on the theoretical background of recognising prior learning and quality requirements, then describe the context of this study and examine the perceptions of the main actors.

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Finally, in view of our findings we provide recommendations for the design of procedures to assess and credit prior learning.

Until recently, university policies and procedures did not address the issue of recognising informal and non-formal learning. However, the importance of establishing systems for doing so has been acknowledged as a key issue in lifelong learning policy within Europe (European Commission 2000). The entire scope of individuals' knowledge and experience, irrespective of where the learning took place, should be taken into account. The underlying idea is that there are similarities between experiential (i.e., non-formal and informal) and academic learning, and that possible differences between the two can be readily overcome (Harris 2006). Non-formal learning is characterised by an intentional learning objective within a structured context, such as in schools or classes, but without legally or socially recorded certification. Examples may include workplace training and non-accredited courses such as a non-certified typing course. Informal or non-sponsored learning (Blinkhorn 1999) is unintentional, unstructured and does not lead to certification. Learning is undertaken on one's own initiative, individually or collectively, without externally imposed criteria or the presence of an institutionally authorised instructor (Livingstone 2000). Examples include volunteer activities, life experiences, self-instruction, family responsibilities and hobbies.

Procedures for assessing and crediting prior formal, informal and non-formal learning enable lifelong learners to enter educational programmes at a level adjusted to their existing competence profiles. These procedures are known by many different terms with varying explanations of their exact meaning (Joosten-ten Brinke et al. 2008). For example, the emphasis on non-formal and informal learning is clearly expressed in accreditation of prior experiential learning (APEL), but not explicitly for prior learning assessment (PLA), prior learning assessment and recognition (PLAR), recognition of prior learning (RPL), accreditation of prior learning (APL), assessment of prior learning (APL) and valuation and validation of prior learning (VPL). Although Andersson and Fejes (2005) use the term RPL in their article, they prefer that of 'validation', based on the French *Validation des Acquis de l'Expérience* (VAE). As shown by Joosten-ten Brinke et al. (2008), authors use the same terms and their abbreviations in different ways (see Bélanger and Mount 1998; Blinkhorn 1999; Cleary et al. 2002; Cretchley and Castle 2001; Donoghue et al. 2002; Freed 2006; Harvey 2004; Nyatanga et al. 1998; Konrad 2001; Scholten and Teuwsen 2002; Starr-Glass and Schwartzbaum 2003; Pouget and Osborne 2004; Duvekot 2005). It is clear that many types of learning can be the object of assessment (formal, non-formal and informal) with differing meanings (skills, competences); moreover, it is not directly possible to deduce the type of learning involved from the abbreviation used.

In this article, we use the term assessment of prior learning (APL), and the definition put forth by Colardyn and Bjørnavold (2004) of identifying, assessing and recognising a wider range of skills and competences that people develop throughout their lives and in different contexts. For formal learning, there is a separate credit exchange programme; occasionally, though, it can only be recognised in combination with informal learning. In such cases, candidates must first apply the credit exchange procedure on formal learning before turning to the APL procedure.

APL consists of four stages (Joosten-ten Brinke et al. 2008; New Zealand Qualification Authority 2001; Wilcox and Brown 2002), set out below.

1. In the learner profiling (or identification and initiation) phase, the educational institute gathers information about the learner's personal information and needs. This profile is often the basis on which institutes select learners for the procedure. To create the profile, the institute must have transparent and operationalized descriptions of the educational programme; that is, the learning objectives (competences, skills and knowledge) must be clearly set out. In this first phase, the institute also informs the learner of the steps and the expectations of the procedure.
2. In the gathering and presenting evidence (or documentation and preparation) phase, learners collect evidence about previous qualifications and experience to support their claim. This means assessment standards derived from the learning objectives should be available, and the evidence presented by the learner should meet these standards. This is usually shown by means of a portfolio.
3. In the assessment phase, a trained assessor evaluates the learner's portfolio based on the given assessment standards to determine whether accreditation of prior learning should be considered.
4. The final 'recognition' phase involves verification by the relevant department. The slight difference between the concept of 'accreditation' and 'validation' emphasised by Pouget and Osborne (2004) should be noted here. The latter is more general, in the sense of 'giving value'. The validated result will then be set out in a disposition.

APL has increasingly been used and acknowledged in industry and vocational education, but is still in its infancy in university education (Thomas et al. 2000). Until now, little research has been available on APL's organisation for academic purposes, its effects on exemption policy, the time investment of universities and the experiences of candidates, tutors and assessors.

The purpose of this article is to evaluate the first APL procedure in a computer science programme and an adjusted APL procedure in an educational science masters programme from the perspective of the candidates, tutors and assessors. The evaluation design is based on the following question: How do APL candidates, assessors and tutors perceive the quality of the APL instruments and their task fulfilment?

Before addressing this question, we first define the concept of quality, then describe the context of this study and the development and organization of the computer science and educational science APL procedures.

Quality criteria for APL

APL is a specific form of assessment that learners take prior to the formal start of an educational programme. Naturally, it should satisfy quality requirements such as reliability and validity. According to Johnston (2004), the interpretive reliability approach best suits APL assessment, given that the ideal, objective assessment of an APL portfolio is virtually impossible. Discussion between assessors about local values and standards is important, as is consequential validity (i.e., the consequences of the interpretation of scores in relation to the impact on further learning of the APL candidate). Johnston (2004) argues that reliability and validity are better used

as warrants rather than final guarantors. In addition, Baartman et al. (2006) argue in favour of edumetric rather than psychometric quality criteria; the former do more justice to the characteristics of competency assessment by emphasizing flexibility and authenticity as well as the integration of assessments. Baartman et al. (2006) built their framework on findings from other assessment researchers (see Benett 1993; Dierick and Dochy 2001; Hambleton 1996; Linn et al. 1991), who used the psychometric quality requirements of reliability and validity. Their framework consists of 12 basic quality criteria, set out here in the context of APL:

1. Fitness for purpose: APL fits the purpose and objectives of the educational programme.
2. Transparency: internal procedures should be clear to the candidates, and assessments transparent and convincing. This means that candidates should be aware of the assessment criteria, its organization and objective, and the possible results.
3. Acceptability: APL participants – candidates, assessors, tutors, programme managers, examination committee members and the labour market – accept the APL procedure, instruments, and results.
4. Comparability: the procedure is consistent, standardised and comparable for all candidates.
5. Fairness: bias may not influence the process. Candidates from different backgrounds should be treated equally.
6. Cognitive complexity: candidates must demonstrate the acquisition of higher cognitive skills at level of the educational programme.
7. Costs and efficiency: APL should be feasible and practicable, and the costs involved realistic.
8. Reproducibility of decisions: APL has various assessment times and should make use of different perspectives to reach a final decision.
9. Fitness for self-assessment: the assessment type stimulates self-assessment and reflection.
10. Meaningfulness: APL should meet the needs of the candidates but also have surplus value for the educational institute.
11. Educational consequences: APL should be implemented only if positive effects are expected and negative aspect can be minimised.
12. Authenticity: in general terms, the tasks candidate have to fulfil should have direct links with the future practice (Gulikers et al. 2004). In APL, this means candidates should be assessed on the extent to which they have fulfilled certain tasks in practice related to their educational programme of choice. According to Andersson (2006), authentic assessment is the central method in APL given its aim to assess competences in a natural setting.

APL at the Open University of the Netherlands (OUNL)

The OUNL has developed an APL procedure primarily based on the credit exchange model (Butterworth 1992; Trowler 1996); learners may receive credit points if informally or non-formally acquired competences match the learning outcomes of an accredited educational programme. The OUNL caters to lifelong learners of 18 years and older, with no admission requirements. If they completed formal higher

education, learners can receive exemptions for parts of the curriculum. The APL procedure, in which informal and non-formal learning is also recognised, started in 2006. With respect to the quality criteria, content specialists, members of the support department, a member of the examination committee, a legal advisor and an APL researcher first developed an APL procedure for the computer science programme. Based on its evaluation, an adjusted APL procedure for the educational science programme was also designed. We first describe the computer science APL procedure, then outline the revisions that led to the educational science procedure.

Figure 1 shows the APL procedure and the timeline for both programmes.

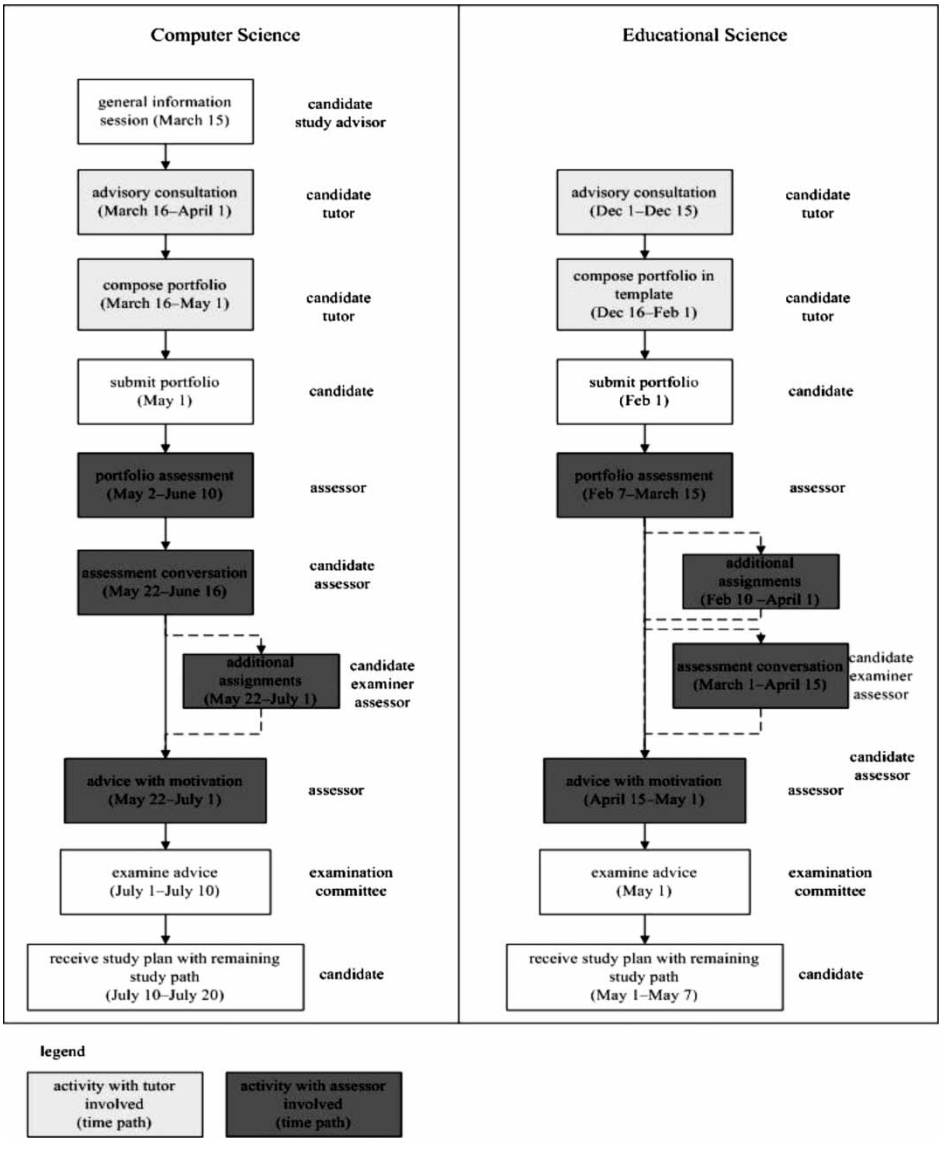

Figure 1. APL-procedure for academic computer science and educational science.

The computer science APL procedure starts with a general information session in which all necessary procedural information is given. Subsequently, interested candidates can request an advisory consultation with a tutor to analyse the programme's final attainment levels in relation to the candidate's capabilities, and discuss the options for evidence provision.

The candidate then starts compiling the portfolio: the first part includes evidence of their formal learning; the second of their informal and non-formal learning. The following information must be included: (a) a curriculum vitae; (b) description of evidence and arguments for its use in relation to the final attainment levels (e.g., the final attainment level might be: 'the candidate has thorough knowledge of and insight in analysis and modelling computer systems'); (c) a short description of the relevant workplace/s; and (d) products or artefacts that serve as evidence. At this stage of the procedure, the tutor supports the candidate by answering questions and helping decide what information can be used as evidence.

The portfolio is then sent to the support department for exemption based on diplomas and certificates and checked for completeness. Two trained assessors evaluate each portfolio using set assessment criteria, and note questions about its content to bring up in the assessment conversation attended by the candidate. The aim of this assessment conversation is to examine certain aspects of the portfolio in depth; the assessors may also ask for additional evidence, such as an essay or programme analysis. In view of all this information, the assessor then takes his or her advice to the examination committee, who determines which modules are exempted and consequently what parts of the programme the candidate must still undertake. The validated result is committed in a disposition and the candidate receives a study plan specifying the remaining study path.

After evaluating this APL procedure for educational science, the following revisions were suggested: (1) tutors ought to be cautious about voicing their expectations of the result to the candidate to avoid influencing the rest of the procedure; (2) the portfolio structure should be simplified to encourage more appropriate evidence and arguments; (3) the additional assignment, if necessary, should be given before the assessment conversation; (4) candidates should only be invited to an assessment conversation if the portfolio assessment gives cause; and (5) the assessment criteria should be described more transparently.

Aim of the study

The main players in the APL procedure are the candidate, the tutor and the assessors. In order to evaluate the quality of the procedure from their perspective, the following question needs addressing: How do APL candidates, assessors and tutors perceive the quality of the instruments and their task fulfilment?

Method

Participants

Two domains in which APL was used were available for evaluation: computer science and educational science.

Computer science

23 employees (19 men and 4 women) of a police software company who had signed up for the bachelor's programme in computer science (for which there are no admission requirements) participated voluntarily in the first APL procedure. The APL procedure resulted in exemptions ($M = 2.96$ modules; $SD = 2.70$). Four tutors (two men and two women) were available for support, while four assessors (three men and one woman) evaluated the candidates.

Educational science

Nine candidates (four men and five women) participated in the second, adjusted APL procedure. These candidates were selected on the basis of their request for admission to the programme. The results were as follows: not admitted ($n = 1$), admitted without exemptions ($n = 2$), and admitted with exemptions ($n = 6$; number of exemptions: $M = 2.7$ modules, $SD = 1.25$). Two tutors (two women) and two assessors (two women) were involved.

Materials

Questionnaires

Both an intake questionnaire and a post-APL questionnaire were developed. The intake questionnaire was used to gain insight into the candidate's knowledge of and experience with APL, expected support and experience with portfolio assessment, and to rank their expectation of the required skills of an assessor and tutor. It consisted of 16 open-ended questions, 36 multiple-choice questions, two ranking questions and three numeric questions.

The post-APL questionnaire was developed to evaluate the procedure and consisted of statements indicating the quality criteria in relation to its procedure, and the task fulfilment of the participants. Items included from the questionnaire used by Baartman et al. (2006) were adjusted for APL. This questionnaire included open-ended and numeric questions as well as questions on a five-point Likert scale varying from 'strongly disagree' to 'strongly agree'.

Table 1 provides examples of items for each quality criterion and Cronbach's alpha.

Time registrations

The candidates, tutors and assessors registered the time they spent on APL activities.

Procedure

After showing interest in the APL procedure, candidates, tutors and assessors were asked to fill in the intake questionnaire. Candidates were then instructed to contact the tutor for an individual advisory consultation, and given six weeks to compose their portfolio; meanwhile, the assessors were being trained. After the assessment conversations, the candidates, tutors and assessors filled in the online post-APL questionnaire. The time registrations were updated throughout the procedure.

Table 1. Examples of the Likert-scale items related to quality criteria.

Quality criteria (no. of items; Cronbach's alpha)	Example of Likert-scale items in the questionnaire
(1) Fitness for purpose (# = 4; α = .81)	The type of assessment in this procedure fits the objectives of the educational programme
(2) Transparency (# = 25; α = .91)	The structure of the portfolio was clear
(3) Acceptability (# = 12; α = .89)	There is a social basis for APL
(4) Comparability and (8) Reproducibility of decisions (# = 5; α = .91)	Differences in procedures are well-founded
(5) Fairness (# = 7; α = .83)	I had the possibility to complain
(6) Cognitive complexity (# = 4; α = .68)	The candidates were capable to deliver evidence at the required level
(7) Costs and efficiency (# = 6; α = .76)	The instruments were available on time.
(9) Fitness for self-assessment (# = 5; α = .72)	My expectation was realistic
(10) Meaningfulness (# = 4; α = .64)	The goal of APL is known
(11) Educational consequences (# = 2; α = .50)	I have faith in the educational consequences
(12) Authenticity (# = 1)	The APL standard is a reflection of my work

Data analysis

First, the quality criteria scales were analysed for reliability using Cronbach's alpha (see Table 1). Items reducing reliability were removed from the scales. Per quality criterion, mean scores and standard deviations were calculated for each educational programme and group of participants (candidates, tutors and assessors). An independent sample *t*-test was done to compare the mean scores of the groups. Means are calculated with respect to time registrations.

Results

Intake questionnaire

Three tutors and two assessors from the computer science programme and two tutors and two assessors from educational science filled in the intake questionnaire. They had worked an average of 18.8 and 8.3 years respectively for the institute. Thirty candidates (83.3% male, 16.7% female) for computer science and eight candidates (62.5% male, 37.5% female) for educational science filled in the intake questionnaire. The average age of the computer science candidates was 37.2 years ($SD = 6.9$), their average working time per week 35.8 hours ($SD = 4.8$) and average study time per week 10.4 hours ($SD = 3.6$). The average age of the educational science candidates was 44.0 years ($SD = 17.7$), the average working time per week 33.1 hours ($SD = 13.0$) and average study time per week 12.4 hours ($SD = 6.9$).

Answers to the questions about familiarity with APL, reasons for using APL, experience with portfolio assessment and expected amount of support are given in Table 2.

Most educational science tutors, assessors and candidates were already familiar with APL and portfolio assessment. Gaining credit for their experience was the most

Table 2. Results of the intake questionnaire: percentages per group.

	Computer science		Educational science	
Question	Staff	Candidate	Staff	Candidate
Are you familiar with APL?				
Not familiar at all	20.0	90.0	0.0	12.5
Heard of it	80.0	10.0	50.0	12.5
Used it before	0.0	0.0	75.0	75.0
Why do candidates use APL?				
Gain credits for experience	100.0	80.0	75.0	62.5
Combine work/study	100.0	53.3	75.0	37.5
Shorten study path	80.0	23.3	50.0	37.5
Save time	80.0	73.3	50.0	25.0
Save money	40.0	0.0	50.0	12.5
Satisfy employer	0.0	6.7	25.0	0.0
Change career	0.0	0.0	25.0	50.0
Prior experience with portfolio assessment	0.0	0.0	50.0	25.0
Preference for portfolio assessment	40.0	3.3	25.0	75.0
How much support do you expect candidates need?				
No support	0.0	0.0	0.0	0.0
Limited support	0.0	43.3	25.0	62.5
Reasonably high support	100.0	33.3	75.0	25.0
A lot of support	0.0	3.3	0.0	0.0
Don't know	0.0	20.0	0.0	12.5

frequently mentioned reason candidates from both programmes used APL. The tutors and assessors in both domains expect more need for support than the candidates, although some candidates in both domains did not know in advance what to expect.

The tutors and assessors were asked to rank the importance of their skills in APL and also to self-assess them. The last column of Table 3 shows the mean score (weak = 1, lower than mean = 2, mean = 3, above mean = 4, very well = 5) of this self-assessment, as well as a full overview. The computer science participants rated domain knowledge and skills as most important, while those from educational science rated the judgmental and evaluation skills highest. Giving follow-up advice was rated as having low importance for both domains, and both ranked writing motivational reports as the lowest. The mean scores on the self-assessment for these skills varied little. The highest score for the computer science participants was domain knowledge and skills, judgmental skills and motivation of decisions; the educational science participants scored themselves highly on observational and judgmental skills.

The results of the post-APL questionnaire are presented in Table 4. For both programmes, the mean score and standard deviation are given for each quality criterion for all participants. The results of the independent sample *t*-test show that the educational science APL procedure is perceived significantly more positively that that for computer science.

Table 3. Ranking of required skills of assessor in APL.

Required skills	Ranking*		Mean self-assessment	
	Computer science	Educational science	Computer science	Educational science
Domain knowledge and skills (assessor/tutor)	1.60/1.40	0.50/0.50	3.6/3.4	2.75/2.75
Judgmental skill (assessor)	1.40	2.75	3.6	3.75
Communicative skill (tutor)	1.40	1.00	3.8	3.25
Motivation (tutor)	1.20	0.75	3.6	3.50
Knowledge of APL procedure (tutor)	1.00	1.50	2.8	3.00
Feedback skills (assessor/tutor)	0.60/0.60	0.25/1.50	3.4/3.6	2.75/3.00
Observational skill (assessor)	0.40	0.75	3.2	4.0
Motivation of decisions (assessor)	0.40	0.25	3.6	2.5
Portfolio development support (tutor)	0.40	0.75	2.6	2.50
Interview skill (assessor)	0.20	0.00	3.2	3.5
Evaluation skill (assessor)	0.20	1.25	3.4	3.25
Giving follow-up advice (assessor)	0.00	0.00	3.2	2.75
Writing motivational reports (assessor)	0.00	0.00	3.0	2.25

Notes: *number of respondents x ranking / # answers; **answers given on 5-point Likert scale from weak to very good skill.

Because of the low reliability of the educational consequences scale ($\alpha = .50$) and the number of items for authenticity ($\# = 1$), these were analysed on item level. The mean scores and standard deviations are presented in Table 5. The results

Table 4. Mean scores and standard deviations on quality criteria scales.

Quality criterion	Computer science			Educational science				
	N	*M*	*SD*	*N*	*M*	*SD*	*t*	*df*
(1) Fitness for purpose	21	3.31	1.09	9	4.03	.51	−2.46*	27.7
(2) Transparency	21	3.23	.79	9	4.08	.28	−4.28*	27.4
(3) Acceptability	21	3.14	.90	9	4.09	.86	−2.69*	28
(4) Comparability and (8) Reproducibility	8	3.28	.95	4	4.31	.28	−2.82*	9.0
(5) Fairness	17	3.66	.70	7	4.68	.69	−3.24*	22
(6) Cognitive complexity	21	3.05	.96	8	4.19	.39	−4.52*	26.7
(7) Costs and efficiency	21	3.49	.78	9	3.93	.45	−1.94*	25.1
(9) Fitness for self-assessment	21	3.38	.77	9	4.19	.41	−2.95*	28
(10) Meaningfulness	21	3.39	.79	9	4.56	.68	−2.19*	28

Notes: *$p < .01$.

Table 5. Mean scores on Likert-scale items related to quality criteria 'educational consequences' and 'authenticity'.

	Computer science			Educational science		
Quality criterion	*N*	*M*	*SD*	*N*	*M*	*SD*
(11) Educational consequences						
I have faith in the educational consequences	19	3.42	1.17	1	5.00	.00
APL is suitable for future use	19	3.89	1.10	9	4.56	.53
(12) Authenticity						
The APL standard is a reflection of my work	10	2.90	1.45	5	4.20	.45

of the independent sample *t*-test show significant differences on these items between computer science and educational science: 'I have faith in the educational consequences' (t (18) = −1.32, $p < .01$), 'APL is suitable for future use' (t (26) = −1.69, $p < .01$) and 'The APL standard is a reflection of my work' (t (11) = −2.60, $p < .01$).

The analyses were repeated separately for each group of participants: candidates, tutors and assessors. The candidates' perceptions differed significantly on transparency (t (15.4) = −3.58, $p < .01$), fairness (t (16) = −2.40, $p < .01$), cognitive complexity (t (17.7) = −3.69, $p < .01$), fitness for self-assessment (t (16) = −2.52, $p < .01$) and authenticity (t (11.8) = −2.60, $p < .01$). At the same time, the tutors' perceptions differed significantly on transparency (t (4) = −2.99, $p < .01$) and educational consequences (t (3.0) = −4.70, $p < .01$). The assessors' perceptions are only significantly different on cognitive complexity (t (4) = −2.82, $p < .01$). The mean scores and standard deviations for these scales are presented in Table 6.

Within the computer science programme, significant differences were found between participant groups. On cognitive complexity the candidates and the assessors' perceptions differ significantly (t (15) = −3.16, $p < .01$), as do that of the tutors and assessors (t (6) = −3.00, $p < .01$). In addition, on meaningfulness

Table 6. Significant differences between educational programmes per domain and participant group.

		Computer science			Educational science		
Participant group	Quality criterion	*N*	*M*	*SD*	*N*	*M*	*SD*
Candidates	Transparency	13	3.42	.67	5	4.14	.18
	Fairness	13	3.56	.78	5	4.54	.80
	Cognitive complexity	13	3.33	.82	5	4.33	.33
	Fitness for self-assessment	13	3.39	.67	5	4.24	.53
	Authenticity	10	2.90	1.45	5	4.20	.45
Tutors	Transparency	4	3.33	.39	2	4.21	.06
	Educational consequences	4	3.88	.48	2	5.00	.00
Assessors	Cognitive complexity	4	1.83	.88	2	3.75	.00

there is a significant difference between the candidates and tutors (t (15) = −3.28, $p < .01$). Within the educational science programme, no significant differences were found between the participant groups. Table 7 shows the means and standard deviations of the participant groups per programme.

The time registrations showed that the assessors spent their time on portfolio assessment, preparation for the assessment conversation, the assessment conversation itself, and the composing of its result. An overview of assessors' time investment is shown in Table 8. The total time for the computer science assessors was 2.37 hours per candidate; for the educational science assessors, 4.79 hours per candidate.

Conclusion and discussion

Assessment of prior learning aligned with the educational programme is expected to enhance the candidates' motivation in starting such programmes. The candidates in these studies were typical APL candidates, characterised by years of work experience and a positive attitude to learning (based on average study hours per week). APL motivates such candidates by giving them the opportunity to gain credit for experience, combine work and study, and save time by shortening the study path.

This article addressed the perceptions of the three groups of actors in APL procedures: the candidates, tutors and assessors. Our primary conclusion is that the perception of the educational science APL procedure is significantly more positive for all three groups than that for the computer science participants. It may be that the procedural revisions undertaken for educational science were successful, and that the computer science procedure needs improvement. In addition, there should be more training for tutors and assessors in the required knowledge and skills for APL, such as supporting portfolio development, giving follow-up advice, writing motivational reports and generally understanding the whole APL procedure. In the following, these conclusions are discussed in relation to the quality criteria for assessment by Baartman et al. (2006).

Our main conclusion, that APL is perceived more positively in educational science than in computer science, is based on comparing the perceptions on the different quality scales. The mean perception scores of the computer science participants are all between three and four, and with the given standard deviations, we know that there are participants with a negative perception. Still, one might question what indeed a desirable score is. Mean scores of three or lower represent non-supportive perceptions; scores higher than three are supportive. Although scores

Table 7. Means and standard deviations for participant groups on significant results.

		Candidates			Assessors			Tutors		
Programme	Quality criterion	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
Computer science	Cognitive complexity	13	3.33	.82	4	1.83	.88			
	Cognitive complexity				4	1.83	.88	4	3.33	.47
	Meaningfulness	13	3.52	.69				4	4.75	.50

Table 8. The time investment of assessors in APL (in minutes).

	Computer science			Educational science		
Activity	*N*	*M*	*SD*	*N*	*M*	*SD*
Portfolio assessment	3	80.7	68.1	2	165.0	21.2
Preparation assessment conversation	3	12.0	9.8	2	60.0	.00
Assessment conversation	3	45.0	25.9	2	52.5	10.6
Writing motivational reports	2	7.5	3.5	2	10.0	.00
Total	3	142.7	107.9	2	287.5	10.6

between three and four tend to represent supportive perception, they remain inconclusive.

One explanation for the lower perceptions in computer science could be related to the criterion fitness for purpose. Compared to those in educational science, the computer science participants were unfamiliar with APL and portfolio assessment. Yet the educational science candidates with less knowledge of APL and portfolio assessment still scored higher on the perception scales. It should be noted that the procedural revisions – one of them involving portfolio structure – supported the fitness for purpose criterion. The portfolio for computer science was based on the APL credit exchange approach, which implies that achieved and proven competences are exchanged for course credits by way of exemption from part of the programme. The adjustments to the educational science portfolio took a more developmental approach, emphasising the reflection on the achieved competences in relation to future learning (Butterworth 1992).

We recommend that future portfolios be structured according to Bloor and Butterworth (1990): (1) summary of APL application; (2) overview of competences; (3) reflective writing piece evaluating experience in light of programme criteria; and (4) evidence to support APL application. That step (3) was not part of the computer science procedure may have affected perceptions of it.

An alternative explanation for the more positive educational science perceptions may be that its participants were in general more positive than their computer science counterparts. However, the intake questionnaire does not provide evidence of this. In relation to acceptability, however, it should be taken into account in developing APL procedures. In both domains, candidates, assessors and tutors knew why APL was being used, and supported it. However, in computer science there was less acceptance of the assessment criteria and instruments. Revisions of these aspects as well as learning objective comprehensibility had been made for educational science, which therefore improved the fitness for self-assessment in that the candidates were better equipped to provide self-assessment.

These revisions also particularly influenced the transparency of the procedure. The portfolio structure for educational science gave more transparency to appropriate evidence and reflections on it, and described the assessment criteria more clearly than for computer science. Furthermore, training for assessors and tutors made clearer the issue of where the tasks of the tutor stop and those of the assessor start. Educational science tutors was trained to be cautious in voicing their expectations of the result for the candidate so as not to influence the rest of the procedure and APL's meaningfulness in general.

Fairness was perceived less favourably in computer science than in educational science. This may be due to less congruent cooperation between assessors and the tutor. In the revised procedure, the candidates undertook an assessment conversation only if their portfolio gave cause for it. In a follow-up study (Joosten-ten Brinke et al. in press), assessors evaluate this revision as both important and fair.

The decision to carry out an assessment conversation also directly influenced the costs effectiveness. In both domains, time investment by the tutors and assessors is perceived as too high. Undertaking assessment conversations only when necessary made the procedure more efficient. Further, it might be possible to erect certain barriers for candidates entering APL procedures such as a motivation test or a minimum of work experience. Additionally, the benefits of a general information session at the start of the procedure may be subject to follow-up research, given that the absence of this session in the educational science procedure did not seem to influence perception of it.

Finally, the ratings of the assessors and tutors' skills and knowledge differed greatly between the two domains, though the mean self-assessment scores varied little. Both domains scored lowest the skill 'writing motivational reports'. Given that many skills appear to be important to competent assessors or tutors, it would be desirable to select people for these roles who already have certain competences, or to train them in these. Training will positively influence the comparability and reproducibility of decisions.

Some recommendations with regard to the set up of our study are in order. First, a main shortcoming was the small number of participants. Although this small sample size enabled us to make revisions in the educational science APL procedure, we aim to replicate this study with a larger sample. Second, one may question whether the results are indeed the consequence of revision. The educational science participants showed more faith in the educational consequences of APL, and evaluated it more favourably as a suitable instrument for future use. Revisions will be undertaken for computer science and their effect investigated in the near future.

This study has shown that APL is perceived as an instrument that positively effects learner motivation in university education. However, support for candidates in composing their portfolios and arguments (including the use of portfolio examples) as well as portfolio assessment in APL need more research. Similarly, further development of APL procedures in the university context is desirable. Should these procedures meet the quality criteria, students will benefit from educational programmes built on the results of an optimally designed APL procedure. It is up to universities to use these procedures.

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