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Model-based optimisation for enhanced training of individuals based on abilities, learning styles and preferences

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We thank the reviewers for their careful reading and valuable suggestions. We have corrected the paper as suggested and provided responses to the comments made.

Response to referee's comments–Reviewer 1

0.1 Response to reviewers comments on thesis

0.1.1 Chapter 1

1. are → is, see page 3, L 1 under section labeled ABSTRACT.
2. model → modal, see page *ii*, L 2 (L 1 in old thesis).
3. *Fully-able* → *fully-able*, see page *ii*, L −6 (L −8 in old thesis).
4. e.g → e.g., see page 1, L 9.
5. [6, 7, 8, 1] → [1, 6, 7, 8], see page 2, L 2.
6. Able-bodied vs → able-bodied versus, see page 2, L 10.
7. Kawai et al. [8] → Kawai et al. [9], see page 2, L 12.
8. user → user's, see page 2, L 14.
9. 'assumed → assumed,', see page 2, L −11.
10. compared to → from what is available in, see page 2, L −10.
11. is this the best reference you have for ANN's?

    My reply: I have added other references.

    In thesis: I have added references [48, 54] to the thesis, see page 2, L −6.
12. is → are, see page 2, L −6.
13. The sentence, 'This is a feedback mechanism to the ANN' has been deleted, see page 2, L −2.
14. CSIR → C.S.I.R, see page 3, L 4.
15. 'particular → particular,', see page 3, L −3.
16. trainees → trainee's, see page 5, L 1, 3.
17. '... an individual in the current literature are discussed.' → '... an individual are discussed.', see page 5, L 14.
18. One 'of' has been deleted, see page 5, L −3.

0.1.2 Chapter 2

1. given → put, see page 7, L 4.
2. is → are, see page 7, L 5.
3. users → users', see page 8, L 11.
4. students → students', see page 8, L −12.
5. '... ontological structures and ...' → 'ontological structures of data and...', see page 8, L −8.
6. was then → has, see page 9, L 2.
7. 'However → However,', see page 9, L 3.
8. Panjawaraninda → Panjawaranonda, see page 9, L −5, −8.
9. Bloch → Blochl, see page 9, L −11.
10. as 'one-size-fits-all' → as a 'one-size-fits-all', see page 9, L 11.
11. on user's → on the user's, see page 9, L 13.
12. an user-centric → a user-centric, see page 9, L −8.
13. system → systems, see page 9, L −2.
14. 'Sonwalkar [26] however → Sonwalkar [26], however,', see page 9, L −2.
15. Villaverdle → Villaverde, see page 10, L 2.
16. methodology to simply identified → methodology that identified, see page 10, L 2.
17. don't understand this sentence, see page 10, L 3.

    In thesis: I have presented the following in the thesis, 'When a trainee uses a number of actions (such as exam revision) in the e-learning environment as input to the ANN, a number of learning styles are predicted as the output', see page 10, L 3.
18. ANN used → ANN is used, see page 10, L 5.

0.1.3 Chapter 3

1. to facts or.

   My reply: The user learns by listening to the content presented.

   In thesis: I have presented the following in the thesis, '... (content presented)', see page 11, L 7.

2. The word ‘types’ has been deleted, see page 11, L 9.

3. ‘Abilities of’ has been deleted, see page 11, L 10.

4. don’t understand?

   My reply: Different languages aid different people who may wish to learn in a language other than the English.

   In thesis: I have presented the following in the thesis, ‘The language aspect of a user aids the user from different linguistic backgrounds, for example, different languages aid different people who may wish to learn in a language other than the English’, see page 11, L −3.

5. classifies → classify, see page 12, L 2 (Page 12, L 2 in old thesis).

6. Dunn → Dunn and Dunn, see page 12, L 8 (Page 12, L 8 in old thesis).

7. suite → aid, see page 12, L 9 (Page 12, L 9 in old thesis).

8. Flemming → Fleming, see page 12, L 11 (Page 12, L 12 in old thesis).

9. What does ‘This’ refer to.

   My reply: The sentence ‘The reason behind ... schools of thought’ has been deleted, see page 12, L 14 (Page 12, L 14 in old thesis).

10. ‘bored with implementation’ has been deleted, see page 13, L 1 (Page 13, L 4 in old thesis).

11. Trainee’s → Trainees, see page 13, L −10 (Page 13, L −7 in old thesis).

12. *cannot See*, → *cannot See*, see page 13, L −5 (Page 13, L −2 in old thesis).

13. determines → determine, see page 14, L 1 (Page 14, L 4 in old thesis).

14. is → are, see page 14, L 3 (Page 14, L 6 in old thesis).

15. Table 3.1 is centered and aligned, see page 14.

16. Table 3.2 is centered and aligned, see page 14.

17. a qualification → a tertiary qualification, see page 15, L 6 (Page 15, L 6 in old thesis).

18. are → is, see page 15, L −6 (Page 15, L −6 in old thesis).

19. Table 3.3 is centered and aligned, see page 16.

20. why not say ‘blind’ or ‘visually impaired’?

    My reply: *cannot See*. We have used ‘*cannot See*’ throughout the thesis. If blind was used it would confuse the reader, see page 16, L 5 (Page 16, L 5 in old thesis).

21. Table 3.4 is centered and aligned, see page 17.

22. why not say 'deaf' or 'hearing-impaired'?

    My reply: *cannot Hear*. We have used '*cannot Hear*' throughout the thesis. If deaf was used it would confuse the reader, see page 17, L 1 (Page 17, L 1 in old thesis).

23. and becomes → and it becomes, see page 17, L −5 (Page 17, L −5 in old thesis).

24. Empty spaces have been filled up, see bottom of page 18.

25. model → modal, see page 18 (Page 19 in old thesis), in the heading.

26. presents → present, see page 18, L 8 (Page 19, L 6 in old thesis).

27. 'Finally → Finally,', see page 18, L 12 (Page 19, L 10 in old thesis).

28. Table 3.5 is centered and aligned, see page 18 (Page 19 in old thesis).

29. hands,moving → hands, moving. In Table 3.5, page 18 (page 19 in old thesis).

30. spacing on Page 18, L −3 (Page 19, L −7 in old thesis) cannot be avoided because set B is on the following L.

31. n being?

    My reply: the size of E_i will be clarified with an example used later on, see page 19, L 3 (Page 19, L −2 in old thesis).

32. i.e. → where, see page 19, L 3 (Page 19, L −2 in old thesis).

33. Table 3.5 is centered and aligned, see page 20 (Page 19 in old thesis).

34. correlated measures. What does this mean?

    My reply: The matrix F_j can contain diagonal entries the remaining are zero, see page 19, L 6 (Page 20, L 2 in old thesis).

35. Let the → Let G be the, see page 19, L −2 (Page 20, L 8 in old thesis).

36. Table 3.7 is centered and aligned, see page 20 (Page 21 in old thesis).

37. braille → Braille, see in Table 3.7, row L −5 on page 20 (Page 21 in old thesis).

38. fully-able with → fully-able user with, see page 21, L 9 (Page 22, L 6 in old thesis).

39. The word 'and' has been deleted, see page 21, L 15 (Page 22, L 11 in old thesis).

40. cell → component, see page 22, L 2 (Page 22, L −2 in old thesis).

41. (3.9), (3.6) → (3.9) and (3.6), see page 22, L −7 (Page 23, L 8 in old thesis).

42. 'The full stop' has been removed, see page 22, L 12 (Page 23, L 8 in old thesis).

43. outputs → output, see page 22, L −2 (Page 23, L −6 in old thesis).

44. Duplicate [1] has been removed, see page 22, L −1 (Page 23, L −5 in old thesis).

45. Coetzee et al. model and/or further → Coetzee et al.' s model and/or improve, see page 23, L 2 (Page 23, L −3 in old thesis).

0.1.4 Chapter 4

1. to → for, see page 24, L 1 (Page 25, L 1 in old thesis).

2. systems → system, see page 24, L 7 (Page 25, L 7 in old thesis).

3. process → processes, see page 24, L −6 (Page 25, L −6 in old thesis).

4. structure on → description of, see page 24, L −4 (Page 25, L −4 in old thesis).

5. approximator → approximation, see page 24, L −2 (Page 25, L −2 in old thesis).

6. These are → These layers are, see page 25, L 4 (Page 26, L 3 in old thesis).

7. Input layer → The input layer, see page 25, L 4 (Page 26, L 4 in old thesis).

8. Figures → figures, see page 25, L 8 (Page 26, L 8 in old thesis).

9. A lot of → Many, see page 26, L 3 (Page 27, L 3 in old thesis).

10. well → best, see page 26, L 7 (Page 27, L 7 in old thesis).

11. Is logistic the correct term?

    My reply: logistic is the correct term, see reference [2], see page 26, L 7 (Page 27, L 7 in old thesis).

12. 'is' has been removed, see page 26, L 12 (Page 27, L 12 in old thesis).

13. What does the j refer to? In the figure they use $w_{1,1}, ..., w_{1,R}$, also b and n.

    My reply: j refers to the number of layers in the Neural Network. b_j refers to the bias and n refers to the net input.

    In thesis: I have presented the following in the thesis, '... where j is the number of layers in the Neural Network, b is the bias and n refers to the net input', see page 27, L −2 (Page 28, L −2 in old thesis).

14. Typically, on would use a special notation for vectors, say, $\vec{b}$.

    In thesis: $b \rightarrow \vec{b}$, see page 28, L 3, 4 (Page 29, L 3, 4 in old thesis).

15. layer S neuron is → layer of S neurons is, see page 30, L 3 (Page 31, L 3 in old thesis).

16. 'ANN' → 'ANN,', see page 32, L 4 (Page 33, L 4 in old thesis).

17. using Levenberg-Marquardt → using the Levenberg-Marquardt, see page 33, L 7 (Page 34, L 7 in old thesis).

18. of sigmoid → of a sigmoid, see page 33, L 7 (Page 34, L 7 in old thesis).

19. Levenberg-Marquardt algorithm: since it is used in the study, it would be useful to have a brief description of it.

    My reply: The Levenberg-Marquardt algorithm. I have now presented a brief description on page 33, section 4.4.

20. The ANN → In our work the ANN, see page 35, L 1 (Page 35, L 1 in old thesis).

21. used. As → used, as, see page 36, L 6 (Page 36, L 6 in old thesis).

22. $Unif$ means Uniform distribution, see page 36, L 10 (Page 36, L 10 in old thesis).

23. E → E, see page 36, L 12 (Page 36, L 12 in old thesis).

24. it's not really an equation.

    My reply: This is not a mathematical equation, but can be used as an equation number of an expression, see page 36 in footnote.

25. there → these, see page 37, L 2 (Page 37, L 2 in old thesis).

26. Why not 0, see page 37, L 2 (Page 37, L 2 in old thesis).

    My reply: This was done to indicate that there is a relationship between the abilities, e.g. *can See* and *can Read*.

27. of learning → of the learning, see page 37, L 8 (Page 37, L 8 in old thesis).

28. set, → set, see page 37, L 10 (Page 37, L 10 in old thesis).

29. equation (4.11) → equation (4.13), see page 37, L 14 (Page 37, L 14 in old thesis).

30. is → are, see page 37, L −11 (Page 37, L −11 in old thesis).

31. *and* → and, see page 37, L −8 (Page 37, L −8 in old thesis).

32. is → are, see page 37, L −8 (Page 37, L −8 in old thesis).

33. This is because the first → The first, see page 38, L 2 (Page 38, L 2 in old thesis).

34. Why these values?

    My reply: The values are chosen with the limit of 50, such that they do not overpower the direct relationship, see page 38, L 6 (Page 38, L 6 in old thesis).

35. equation (3.6) → equation (3.2), see page 38, L 8 (Page 38, L 8 in old thesis).

36. non-linear → linear, see page 38, L 15 (Page 38, L 15 in old thesis).

37. the → a, see page 38, L −11 (Page 38, L −11 in old thesis).

38. tired) → tired),, see page 38, L −10 (Page 38, L −10 in old thesis).

39. state → state,, see page 38, L −9 (Page 38, L −9 in old thesis).

40. values → value, see page 38, L −7 (Page 38, L −7 in old thesis).

41. value → values, see page 38, L −4 (Page 38, L −4 in old thesis).

42. base-line matrix. What does this mean?

    My reply: A matrix which will be our initial matrix that will be used each time a state needs to be calculated, see page 39, L 6 (Page 39, L 6 in old thesis).

43. preffered → preferred, see page 39, L 7 (Page 39, L 7 in old thesis).

44. is → is,, see page 39, L 9 (Page 39, L 9 in old thesis).

45. 75. Since → 75, since, see page 39, L 10 (Page 39, L 10 in old thesis).

46. 10% to 30%.

    My reply: Chosen to scale down since the direct relationship was scaled down, see page 39, L 14 (Page 39, L 14 in old thesis).

47. [54], for → [54] for, see page 39, L −4 (Page 39, L −4 in old thesis).

0.1.5 Chapter 5

1. the non-linear → the results of the non-linear, see page 41, L 1 (Page 41, L 1 in old thesis).

2. associated with → produced by, see page 41, L 3 (Page 41, L 3 in old thesis).

3. horizontal → vertical, see page 41, L −3 (Page 41, L −4 in old thesis).

4. vertical → horizontal, see page 41, L −1 (Page 41, L −2 in old thesis).

5. cost value. What does the 'cost' refer to?

   In thesis: I have presented the following in the thesis, 'The cost value allows for the identification of the appropriate HCI components for a specific user profile', see page 42, L 1 (Page 41, L −4 in old thesis).

6. The title has been shortened so that the page number is now readable. Top of page 42.

7. Figure 5.2 → In Figure 5.2, see page 42, L 3 (Page 42, L 1 in old thesis).

8. in → on, see page 42, L 5 (Page 42, L 3 in old thesis).

9. example, a → example, if a, see page 42, L 7 (Page 42, L 4 in old thesis).

10. this results → then this results, see page 42, L 7 (Page 42, L 5 in old thesis).

11. The word 'first' has been deleted, see page 42, L 8 (Page 42, L 5 in old thesis).

12. It is confusing when you don't use the same order for visual, aural, etc, in the text as in the figure.

    My Reply: Coetzee et al gave us permission for the use of Figure 5.1, thus the order is different from the order that was already chosen. Bottom of page 42.

13. in → on, see page 44, L −8. (Page 42, L −11 in old thesis).

14. Why? I don't agree. This seems rather subjective.

    My Reply: The non-linear model has predicted that the stylus device should have a higher correlation with a read/write trainee. This prediction is not contradictory in my view, see page 45, L 3. (Page 44, L −1 in old thesis).

15. presents → present, see page 45, L −4. (Page 45, L 5 in old thesis).

16. The empty space have been filled up, see bottom of page 45.

17a. where → were, see page 45, L −2 (Page 46, L 2).

17b. cannot *See* → *cannot See*, see page 45, L −1 (Page 46, L 3 in old thesis).

18. modalities → modality, see page 46, L 6 (Page 46, L 9 in old thesis).

19. are compared → compare, see page 46, L 8 (Page 46, L 11 in old thesis).

20. it would be nice to know what 'puff and sip' or 'zoomUi' are.

    In thesis: I have presented the following in the thesis, 'Note that the puff and sip devices have been used to indicate 'yes' and 'no' respectively, while the zoomUi device used to zoom in or zoom out on the screen', see page 41, L 5.

21. i.e. using → i.e. using. The space before 'using' has been deleted, see page 48, L 6 (Page 48, L 11 in old thesis).

22. its → an, see page 48, L 7 (Page 48, L 12 in old thesis).

23. '*kinaestheic* → *kineasthetic*', see page 48, L −11 (Page 48, L −6 in old thesis).

24. *braille* → *Braille*, see page 48, L −5 (Page 49, L 1 in old thesis).

25. and → *and*, see page 49, L 8, 10 (Page 49, L −12, −14 in old thesis).

26. trainee's → trainee, see page 49, L 12 (Page 49, L −10 in old thesis).

27. '*kinaesthetic* → *kineasthetic*', has been changed throughout the thesis.

28. consider touch → consider the touch, see page 51, L 5 (Page 51, L 10 in old thesis).

29. I would expect 'vibrations', to be important, also 'motion', see page 51, L −13 (Page 51, L −8 in old thesis).

    My Reply: The non-linear model has predicted the results shown and this prediction is not contradictory in my view.

30. have → has, see page 52, L 3 (Page 52, L 8 in old thesis).

31. leaning → learning, see page 52, L 4 (Page 52, L 9 in old thesis).

32. cannot → *cannot*, see page 52, L 8 (Page 52, L 13 in old thesis).

33. are → is, see page 51, L 13 (Page 52, L −9 in old thesis).

34. Figure 5.6. SignLanguage → Sign Language, see the title of Figure 5.6 on page 53.

35. The article 'an' has been deleted, see page 54, L 8 (Page 54, L 13 in old thesis).

36. I am surprised that keyboard is lower than mouse, given that the 'average' user uses both most of the time. Side of page 54.

    My Reply: The average user may prefer to use the keyboard and mouse, but in this case the non-linear model has predicted the preference of mouse and keyboard, which is acceptable.

37. that braille → that the Braille, see page 54, L 11 (Page 54, L −13 in old thesis).

38. device → devices, see page 54, L 12 (Page 54, L −13 in old thesis).

39. devices → devices,, see page 54, L 13 (Page 54, L −11 in old thesis).

40. a → the, see page 54, L 13 (Page 54, L −11 in old thesis).

41. The sentence 'The Fully-able trainee does ... puff and sip device' has been deleted, see page 54, L 14 (Page 54, L −10 in old thesis).

42. Finally the → Finally, the, see page 54, L −5 (Page 54, L −1 in old thesis).

43. and → *and*, see page 54, L −4 (Page 55, L 1 in old thesis).

44. became → become, see page 55, L 2 (Page 55, L 6 in old thesis).

45. state context.

    My reply: The various states are introduced in the next section (energetic, lazy, tired, bored).

    In thesis: I have presented the following in the thesis, '... (see the states energetic, bored, lazy, tired in the next section)', see page 57, L 12 (Page 57, L −3 in old thesis).

46. The empty spaces have been filled up, see bottom of page 57.

47. Page 57 (Page 58 in old thesis), in my view this is correct and does not need correcting.

48. has → have, see page 57, L −10 (Page 58, L 1 in old thesis).

49. What does H stand for?

    My reply: H is the user's happiness and is used to evaluate the user's performance and place him in a state.

    In thesis: I have presented the following in the thesis, 'Thus let H be the happiness of a particular user. The H value is then sent to the trigger mechanism, which evaluates the users performance and places him in a particular state', see page 57, L −4 (Page 58, L 7 in old thesis).

50. cannot → *cannot*, see page 59, L 6 (Page 59, L 6 in old thesis).

51. indicating , but not explaining.

    In thesis: I have presented the following in the thesis, 'A comparison with Figure 5.4 shows that these importance values are different in Figure 5.9. In Figure 5.4 the modality audio has an importance value of 100. Thus different states bring about a change in the modalities suggested to the trainee, indicating the clear effects of the state bored', see page 59, L −10 (Page 61, L 2 in old thesis).

52. Surely a read/write trainee would continue using braille.

    My reply: This is not necessarily true. The trainee would have the option of braille or any other devices that are active, as indicated on Figure 5.9, see page 60, L 1 (Page 61, L 9 in old thesis).

53. considers trainee's → considers the trainee's, see page 61, L 7 (Page 61, L −10 in old thesis).

54. not convincing.

    My reply: In addressing points 51 and 52 above, this should change the reviewers comment, see page 61, L 14 (Page 61, L −3 in old thesis).

55. 'and this is inline with the fact that the trainee cannot hear' has been deleted, see page 61, L −3 (Page 63, L 6 in old thesis).

56. The sentence has been edited. '...has 100 importance value against ...' → 'has an importance value of 100 against ...', see page 61, L −2 (Page 63, L 7 in old thesis).

57. has → have, see page 63, L 8 (Page 63, L −11 in old thesis).

58. doesn't convince me. A bored person may prefer video.

    My reply: In this case, a bored trainee may prefer screen over video, but according to the non-linear model, he also has video suggested to him at a lower preference than screen, see page 63, L 15 (Page 63, L −11 in old thesis).

59. It would have been much easier for the reader if you used tables for this comparison, bottom of page 63.

    My reply: Comparison are given later in tables in section 5.4.

60. microphone?

    My reply: This device is used to speak. Thus a trainee who has recently become disabled, may still prefer to speak, see page 63, L −9 (Page 64, L 1 in old thesis).

61. is → are, see page 65, L −5 (Page 66, L 4 in old thesis).

62. surely you should compare Fig 5.12 to Fig 5.7.

    My reply: In this instance Fig 5.12 is compared to Fig 5.10 and shows the affects of an extra variable in the system. Later on, in section 5.4, we have compared the different states. Bottom of page 66.

63. which are?

    My reply: The three different modalities are the screen device, microphone and keyboard. These are listed and explained in the paragraphs that follow, see page 68, L 3 (Page 68, L 3 in old thesis).

64. are → is, see page 68, L 4 (Page 68, L 4 in old thesis).

65. 0 all → 0 for all, see page 68, L 9 (Page 68, L 9 in old thesis).

66. What is the explanation?

    In thesis: I have presented the following in the thesis, 'A comparison with Figure 5.4 shows that these importance values are different. In this case, Figure 5.4 also has a value of 100 for the aural trainee, but has non-zero values for the remaining learning styles, thus indicating the clear effects of the state lazy', see page 68, L −12 (Page 68, L −12 in old thesis).

67. then → than, see page 70, L 5 (Page 70, L 2 in old thesis).

68. more than?

    In thesis: a more → an, see page 70, L 5 (Page 70, L 3 in old thesis).

69. modalities however → modalities are however, see page 70, L 10 (Page 70, L 7 in old thesis).

70. It would be helpful to say how different.

    In thesis: I have presented the following in the thesis, 'In Figure 5.5 the modality video has a value of 100 for the visual trainee, but has importance values of 33 for the remaining learning styles. This indicates the clear effects of the state lazy', see page 70, L −2 (Page 70, L −5 in old thesis).

71. trainee. While → trainee, while, see page 72, L 3 (Page 70, L −3 in old thesis).

72. device, a → device, has a, see page 72, L 4 (Page 70, L −2 in old thesis).

73. in what way? The reader cannot be expected to page to and fro the whole time.

    In thesis: I have presented the following in the thesis, 'The values of these modalities are different to the values predicted by the non-linear model without feedback, see Figure 5.5, except for the learning style kineasthetic in which both have a value of 100. In Figure 5.5, it is noted that the remaining learning styles have values of 33', see page 72, L 5 (Page 70, L −1 in old thesis).

74. has → have, see page 72, L 10 (Page 72, L 4 in old thesis).

75. modalities however → modalities are however, see page 72, L 11 (Page 72, L 5 in old thesis).

76. how?

    My reply: Earlier clarification given in point 70 and 73 should now indicate the effect the change of a trainee's state, see page 72, L 12 (Page 72, L 6 in old thesis).

77. Languagey → Language, see page 72, L −8 (Page 72, L 13 in old thesis).

78. The sentence 'The values of .... and Figure 5.14' has been deleted, see page 72, L −5 (Page 72, L −11 in old thesis).

79. how?

    In thesis: show → shows, see page 73, L 1 (Page 72, L −5 in old thesis).

80. values however → values are however, see page 73, L 2 (Page 72, L −4 in old thesis).

81. trainees. It → trainees, it, see page 73, L 4 (Page 72, L −2 in old thesis).

82. surely you should compare the two states: lazy and not lazy.

    My reply: The 'not lazy' state is the 'energetic' state, see page 73, L 5 (Page 72, L −1 in old thesis).

83. as?

    In thesis: I have presented the following in the thesis, 'The value is the same for the aural learning style when comparing Figure 5.6 and Figure 5.15 but the values differ for the remaining learning styles', see page 73, L 14 (Page 73, L 9 in old thesis).

84. cannot you say anything more about this?

    In thesis: I have presented the following in the thesis, 'A different set of modalities are suggested to the trainee depending on the state the trainee is in. Thus each state gives a new suggestion that may aid the trainee', see page 73, L −5 (Page 73, L −8 in old thesis).

85. Figure 5.16 because, the → Figure 5.16, because the, see page 75, L −2 (Page 74, L 2 in old thesis).

86. Sees → See, see page 77, L 10 (Page 76, L 10 in old thesis).

87. How does this help us.

    My reply: A visual trainee can listen to the content in a visual manner.

    In thesis: I have presented the following in the thesis, '..., who can listen to the content in a visual manner', see page 77, L −12 (Page 76, L −12 in old thesis).

88. these → the, see page 77, L −9 (Page 76, L −10 in old thesis).

89. no, I don't agree.

    My reply: The non-linear model has predicted this result and this prediction is not contradictory in my view, see page 78, L 2 (Page 77, L 2 in old thesis).

90. tell us how they are different.

    In thesis: I have presented the following in the thesis, 'The values in Figure 5.5 are 33 for the modality zoomui, while they are 0 in Figure 5.18', see page 79, L −11 (Page 78, L −11 in old thesis).

91. Languagey → Language, see page 80, L 2 (Page 78, L −1 in old thesis).

92. modalities different → modalities are different, see page 81, L 3 (Page 80, L 1).

93. Fully-able → Fully-able and can understand *Sign Language* is considered, see page 81, L 5 (Page 80, L 3 in old thesis).

94. how different?

    In thesis: I have presented the following in the thesis, 'In Figure 5.6 one finds that eyetracker has a value of 50 for the four learning styles', see page 81, L −10 (Page 80, L −12 in old thesis).

95. too generic.

    My reply: The sentence has been changed. One can clearly note that different states bring about different suggestions of modalities, see page 81, L −1 (Page 80, L −5 in old thesis).

96. why?

    My reply: The trainee may prefer to zoom in on text to make it easier to read, see page 83, L 1 (Page 80, L −2 in old thesis).

97. I don't agree.

    My reply: In my view, the non-linear model predictions are accurate, see page 83, L 1 (Page 80, L −2 in old thesis).

98. explained → described, see page 83, L 7 (Page 82, L 4 in old thesis).

99. similar → identical, see page 83, L 8 (Page 82, L 5 in old thesis).

100. In Tables 5.1 - 5.4, cannot Hear and use SL → cannot, Hear and use SL, see page 86 (Page 85, in old thesis).

101. what do you mean?

My reply: The sentence 'It is noted ... profiles in Table 5.2' has been deleted, see page 85, L −7 (Page 85, L 4 in old thesis).

102. It doesn't convince me.

My reply: This result is obtained from the non-linear model and in my view is accurate, see page 85, L −1 (Page 86, L 4 in old thesis).

103. trainee states → trainee's state, see page 86, L 5 (Page 87, L 2 in old thesis).

104. lazy, → lazy;, see page 86, L −1 (Page 87, L 5 in old thesis).

105. trainee that cannot Hear and use Sign Language → trainee that cannot, Hear and use Sign Language, see page 87, L 5 (Page 88, L 3 in old thesis).

106. touch and feel → touch screen, see page 87, L 6 (Page 88, L 4 in old thesis).

107. changes → change, see page 88, L 3 (Page 88, L 8 in old thesis).

108. may be, but not necessarily.

My reply: This prediction by the non-linear model is correct in my view, see page 88, L −1 (Page 88, L 11 in old thesis).

109. new section.

In thesis: A new section, 'Conclusion', has been added, see page 89 (Page 88, middle of page).

110. What does this mean?

My reply: Both models suggested the same modality most of the time, see page 89, L 2 (Page 88, L −10 in old thesis).

In thesis: I have presented the following in the thesis, '... i.e. both models suggested the same modality most of the time'.

111. for example?

My reply: The linear model suggested the stylus for the kineasthetic trainee, while the non-linear model suggested the stylus for the read/write trainee.

In thesis: I have presented the following in the thesis, '... for example, the linear model suggested the stylus for the kineasthetic trainee, while the non-linear model suggested the stylus for the read/write trainee', see page 89, L 4 (Page 88, L −9 in old thesis).

112. which limitations?

In thesis : limitations → discrepancies, see page 89, L −3 (Page 89, L −9 in old thesis).

113. suggested. An → suggested, an, see page 90, L 2 (Page 88, L −4 in old thesis).

114. quite a sweeping statement.

My reply: Since being involved in the calculations, my viewpoint is that the non-linear model with feedback is an alternate method to the linear model.

In thesis: 'the model of choice → an alternative model', see page 90, L 7 (Page 88, L −3 in old thesis).

0.1.6 Conclusion

1. What does this mean?

   My reply: Both models suggested the same modality most of the time, see page 91, L 8 (Page 90, L 8 in old thesis).

2. in my opinion, a kineasthetic trainee may well prefer a stylus, while a read/write person might prefer a keyboard and screen over a stylus.

   My reply: The nonlinear model has predicted this result and this prediction is not contradictory in my view, see page 90, L 11 (Page 91, L 11 in old thesis).

3. this is to generic.

   In thesis: I have presented the following in the thesis, 'The model presented in thesis can be used as an alternative to the model in the literature', see page 91, L −6 (Page 90, L −5 in old thesis).

4. The model suggested, hence can handle this → The model suggested can thus handle this, see page 91, L −1 (Page 90, L −1 in old thesis).

5. e.g.

   In thesis: I have presented the following in the thesis, '... for example, 'cannot See', 'cannot Hear', 'fully-able' and 'cannot Hear and cannot use Sign Language", see page 92, L 1 (Page 91, L 1 in old thesis).

6. realistic.

   My reply: From my view, the non-linear model is realistic in its predictions, see page 91, L 2 (Page 90, L 2 in old thesis).

7. cases i.e. by → cases, i.e., by, see page 92, L −8 (Page 91, L −4 in old thesis).

0.1.7 Bibliography

1. pages? Added pages 11 − 16, see page 93, reference [1].

2. pages? Added pages 1642 − 1656, see page 93, reference [2].

3. is there more information. Added IEEE Multimedia, see page 93, reference [5].

4. Introdunction → Introduction, see page 94, reference [11] (Page 93, reference [10] in old thesis).

5. State-of the-art → State-of-the-art, see page 94, reference [13] (Page 93, reference [12] in old thesis).

6. The word 'disambignation' is correct, see page 94, reference [14] (Page 93, reference [13] in old thesis).

7. pages? Added pages $104 - 113$, see page 94, reference [18] (Page 93, reference [17] in old thesis).

8. Brusilivsky → Brusilovsky, see page 95, reference [20] (Page 93, reference [19] in old thesis).

9. 'Heterogenous learning in the doppelganger user modeling system. user modeling...' → 'Heterogenous learning in the Doppelganger user modeling system. User modeling ...', see page 95, reference [23] (Page 94, reference [22] in old thesis).

10. thailand → Thailand, see page 95, reference [24] (Page 94, reference [23] in old thesis).

11. Peter Honey is correct, see page 96, reference [32] (Page 95, reference [31] in old thesis).

12. Experiantial → Experiential, see page 96, reference [34] (Page 95, reference [33] in old thesis).

13. Vark → VARK, see page 96, reference [35] (Page 95, reference [34] in old thesis).

14. Report on current status quo → Intelligent Environments for Independent Living, see page 97, reference [42] (Page 96, reference [41] in old thesis).

15. accessed → Accessed, see page 96, reference [46] (Page 97, reference [45] in old thesis).

16. neural- network-based → neural-network-based, see page 97, reference [49] (Page 96, reference [48] in old thesis).

17. 'Rand Afrikaans University, South Africa' has been added, see page 98, reference [51] (Page 96, reference [50] in old thesis).

18. Reference '[53]' has been removed and replaced with '[54]'. 'Neighborhood Based Levenberg-Marquardt Algorithm for Neural Network Training [54]', see page 98.

0.2 Analysis of Work Performed

0.2.1 General Comments

Paragraph 1. It is not clear to me exactly what the student did. For Example, on page 5 he states 'Results were obtained by implementing both the non-linear learning model and the non-linear learning model with feedback'. On page 40, he states 'The training of the ANN was carried out in Matlab'. Does this mean he programmed the ANN himself or did he use an existing ANN and train it for the particular problem.

My reply: See section 0.3.2, comment (1).

Paragraph 2. The student also generated data. Only on the final page is the reader told that the data was artificial and that future work could include using real-life test cases. The section on data generation (Section 4.4.1) is not well-written and therefore not easy to follow. Statements are also not well-defined, eg, '$E(i) = E(can\ Hear) \sim Unif(\{0, 1\})$'. Therefore I don't know how much confidence I can have in the data. Another question arises regarding the number of hidden layers. In Section 4.4.2, the student states that this number is determined via trail-and-error and 'A total of 15 units was found to be appropriate for the study carried our here.' How was this determined?

My reply: See section 0.3.2, comment (2).

Paragraph 3. The student ran a large number of experiments. He presents and analyses the results. The presentation is repetitive, but often doesn't add any information. For example, he gives a figure and then lists the information that is already in the figure. Then he states that the figure differs from another figure. It would be more useful to give the two figures and then give a table that contains those values from the two figures that he wants to highlight. The analysis is not convincing. For example, in Section 5.5.2 he considers a trainee who is hearing-impaired. He states that vibration and motion are of no importance to this trainee, but the microphone is important. He continues that this makes intuitive sense, but one could argue the opposite.

My reply: See section 0.3.2, comments (5) and (6).

0.3 Appraisal of Dissertation

0.3.1 Minor comments and my reply

3.1.1. Typographical errors. There are many errors, eg, the word 'kineasthetic' is misspelt many times. I have indicated these errors on the hardcopy and will submit it to the Faculty Office.

My reply: The reviewer is correct and the typographical errors have been fixed according to the corrections made by the reviewer in the hardcopy, see section 0.1 for more detail.

3.1.2. Grammatical errors. There are many errors. eg, singular is often used instead of plural and vice versa. I have indicated these errors on the hardcopy.

My reply: All errors indicated on the hardcopy have been corrected, see section 0.1 for more detail.

3.1.3. Formatting errors. I have indicated these errors on the hardcopy.

(1) All tables should be centered, but some, eg, Table 3.1 is not.

(2) In a table column, one normally places text left-justified and numbers right-justified. In this document, the text is usually right-justified, eg, in Table 3.1

(3) In some cases, eg, Table 3.2, the text goes past the right edge of the page. This can and should be avoided.

(4) In several places, eg, on page 18, there is a big blank space at the bottom of the page. This can and should be avoided.

(5) The running head of Section 5.1 is so long that it overwrites the page number. This can be avoided.

My reply: The reviewer is correct.

(1) All tables have been centered, i.e. Tables $3.1 - 3.7$ and Tables $5.1 - 5.4$.

(2) The text in the tables have been left-justified and numbers right-justified, i.e. Tables $3.1 - 3.7$ and Tables $5.1 - 5.4$.

(3) Tables $3.2 - 3.4$ and $5.1 - 5.4$ ran past the edge of the page. This issue has been rectified.

(4) The blank space on page 18 has been fixed.

(5) The running head of Section 5.1 does not overwrite the page number.

3.1.4. Notation. I have indicated these errors on the hardcopy. Some are:

(1) Section 4.2.2, page 28: what does j refer to.

(2) Section 4.2.2, page 28, and elsewhere: the notation b is used for a vector. Typically one would use $\vec{b}$.

My reply:

3.1.4. Notation. I have indicated these errors on the hardcopy. Some are:

(1) In Section 4.2.2, page 28, j refers to the number of layers in the Neural Network.

(2) The notation for b was replaced by $\vec{b}$, see page 27 (Page 28 in old thesis).

3.1.5. Cross-references in text. I have indicated these errors on the hardcopy.

(1) Section 4.4.1, page 37: immediately after (4.11) there is a reference to 'equation (4.11)'. This cannot be right.

(2) Section 4.4.2, page 38, in the second paragraph there is a reference to 'equation (3.6)'. This cannot be right.

(3) Chapter 5: the terms visual, read/write, aural, kineasthetic are used in many figures in this order. However, in Figure 5.1 and in the text in Section 5.1, they are used in a different order. This is unnecessarily confusing.

My reply:

(1) In Section 4.4.1, page 37, the reviewer is correct, and the correct equation is now referenced.

(2) Section 4.4.2, page 38, equation (3.6) was stated. The equation was incorrectly stated and has been changed to equation (3.2).

(3) In Chapter 5, Figure 5.1 was taken with permission from Coetzee et al. The format presented on the figures is different.

3.1.6. Referencing errors. I have indicated these errors on the hardcopy. The errors fall in two categories:

(1) The name used in the text is completely different from the name in the bibliography. For example, on page 2 the student writes 'Kawai et al [8] ...', but in the bibliography, [8] is a paper by Tomlinson and others.

(2) The name used in the text is a variation on the name in the bibliography. For example, on page 9, the student refers to a Bloch, but in the bibliography, the name is Blochl.

Since perfect referencing can be achieved automatically by proper use of the software (TEX), this is unacceptable.

My reply:

(1) The incorrect referencing e.g. [8] was rectified. It is now [9], a paper by Kawai et al.

(2) The typographical errors where made in the thesis and have been fixed according to the bibliography (see page 9).

3.1.7. Bibliography errors. I have indicated these errors on the hardcopy. Many entries in the bibliography are not correct or complete.

My reply: The reviewer is correct. Many errors have been fixed, these references are [1, 2, 5, 11, 14, 18, 20, 23, 24, 35, 42, 49, 51, 54], see the bibliography section on page 93 (Page 92 in old thesis).

0.3.2 Major concerns and my reply

(1) Please make clear whether the student programmed the ANN himself or used an existing ANN and train it for this particular problem.

My reply: It is now made clear that the student programmed the ANN himself in Matlab with the aid of the built in functions.

In thesis: I have presented the following in the thesis, 'The programming of the ANN was carried out in Matlab by Viren Govender with the aid of the built in functions found in Matlab.', see page 40, L 8 (Page 40, L 7 in old thesis).

(2) How was the total of 15 units found to be appropriate?

My reply: This was found by running many experiments (trial-and-error experimentation), as suggested by Baum & Haussle [55].

(3) The Levenberg-Marquardt algorithm is used in this study (see page 34). It would be useful to have a brief description of it. The same applies to the term 'sigmoid activation function'.

My reply: Section 4.4, the Levenberg-Marquardt algorithm is now added to the thesis. The term 'sigmoid activation function' is explained in Section 4.2.1.

(4) Section 5.1, page 41: the axes in the text describing Figure 5.1 don't correspond to the axes in Figure 5.1.

My reply: The reviewer is correct, the axes have been corrected according to the reviewers guidance.

(5) In several places the student makes a statement that seems very subjective. I have indicated them on the hardcopy. Two Examples:

(a) Section 5.1, on page 44: the statement 'the stylus device should have a higher correlation with the read/write trainee than with the kineasthetic trainee' seems rather subjective. However, it is used to support the statement that the non-linear model is better than the linear model.

(b) (Already stated in Section 2) Section 5.5.2, on page 51: Here a trainee who is hearing-impaired is considered. The statement is made that vibrations and motion are of no importance to this trainee, but the microphone is important. The student continues that this makes intuitive sense, but one could argue the opposite.

My reply:

(a) & (b) The reviewer suggested that the student should state objectively that this research is a first attempt to use a non-linear model (with feedback) for training of individuals. Thus the model gives results that can be interpreted in more than one way.

(6) Section 5.3, page 61: Figure 5.9 is discussed. The statement 'These value are however different in Figure 5.4, indicating the effect ...'. Such a situation, where two figures are compared, occurs very often in the text. It would be very useful to have page numbers indicated for the figures; this can be done TEX. Then the reader would not have to page to and fro to try and find the figures. Moreover, it would be even more useful to have a table that contains the relevant numbers from these figures and indicates any differences.

My reply: A list of figures is given on pages v, vi. The reviewer might have overlooked this, see page numbers have been added to give convenience to the reader.

(7) Section 5.3, page 66: Figure 5.12 (bored trainee that cannot hear and cannot understand Sign Language) is compared to Figure 5.10 (bored trainee who cannot hear). Surely it should be compared to Figure 5.7 (trainee who cannot hear and cannot understand Sign Language), given that this section is about the effect of incorporating feedback about the state of the trainee into the model?

My reply: Figure 5.12 is compared to figure 5.10. This was done to show that the bored trainee that cannot hear and cannot understand Sign Language is identical to the bored trainee who cannot hear if one excludes Sign Language as a variable. However, the comparison suggested has been done in section 5.4, see page 83, for example in section 5.4.5, page 87, the different states of a bored trainee who cannot hear and cannot understand Sign Language are compared.

(8) Section 5.3, page 82, second sentence from bottom: the term 'similar' is used. How close are the results referred to here?

My reply: This was an unwise choice of words. Instead of 'similar' the word 'identical' is now used as suggested by the reviewer.

(9) Section 5.3, page 82: The text refers to Table 5.4, but it contradicts the information in the table. I have indicated it in the hardcopy.

My reply: The reviewer is correct. The table indicates the touch screen device for an energetic trainee, while in Section 5.4.5, touch and feel device was stated. This device is incorrect and has been replaced by the touch screen.

(10) Section 5.3, page 82: The conclusion to the chapter is given as part of the section, instead of having a new heading, eg, Conclusion.

My reply: The reviewer is correct and a new heading has been added, see section 5.4.6, page 89.

(11) Conclusion, page 90: What does 'both systems predicted comparable results' mean?

My reply: The linear model by Coetzee et al and the non-linear model suggested similar modalities majority of the time.

(12) Conclusion, page 90: The motivation as to why the non-linear model is not convincing. I have elaborated on this in the hardcopy.

My reply: As stated before the reviewer suggested that the student should state objectively that this research is a first attempt to use a non-linear model (with feedback) for training of individuals. Thus the model gives results that can be interpreted in more than one way.

(13) Conclusion, page 91: The statement is made that the results obtained were realistic. In my opinion, the interpretation of the results was subjective; I have given several examples above.

My reply: Similar to my comment (12) above, the results can be interpreted in more than one way. From my view, the non-linear model is realistic in its predictions.

0.4 Comments and my reply

1. The basic grammar, spelling and presentation are unsatisfactory in numerous places. I have marked such errors in the first ten pages or so (starting with a subject-verb number disagreement in the first sentence of the abstract), but doing the task properly will require substantial effort, and probably calls for some professional assistance (as I suggest below). Issues that require attention include the following:

    a. Basic grammar (e.g. the distinction between 'trainees' and 'trainee's', or the use of definite and indefinite articles).

    b. Word choices - modal and model are not the same (heading of Section 3.3), mimic is not a synonym for implement (p. 2), 'literate in a spoken language' is nonsensical (the last sentence of Section 3.1.3).

    c. The section and subsection heading employed - for example, the sections of Chapter 2 certainly do not represent (even cursory) overviews over all of HCI, E-learning and Artificial Neural Networks. Hence, more restrictive headings are required.

    d. The completeness of citations in the list of references.

    My reply:

    a & b. The typographical errors and grammatical errors were addressed by reviewer 1. The thesis was read numerous times and corrections were made.

    c. More restrictive headings were employed in Chapter 2.

    d. The list of references has been updated.

2. At a higher level, the candidate often fails to make a cogent, linear argument even when he seems to have one up his sleeve. Two examples:

    a. In the second paragraph of Section 3.1.1, adoption of the Flemming & Kolb systems (not styles) may be proximally motivated by the use in the AbTi project - but in a scientific document the reader would like to know what motivated that use, at a conceptual level.

    b. In various places, e.g. Section 2.2, the candidate writes as if e-learning and on-line learning are synonymous - even though he clearly realizes that the former can be used on non-networked computers.

My reply:

a. The Flemming and Kolb systems were reported in the technical reports on the AbTi project. Since I was involved in the project at the C.S.I.R., the research was carried out with a similar thought pattern. The non-linear model suggested shows that it can predict similar modalities as the linear model majority of the time.

b. I have updated Section 2.2, see page 9 to indicate that e-learning and on-line learning are not synonymous.

3. Finally, the candidate seems genuinely confused on a few issues.

a. Section 4.3 defines backpropagation to be a gradient-decent method of training; in the next paragraph, several alternatives to gradient descent are listed as 'methods that can be used in backpropagation'. Both definitions of backpropagation are acceptable - but in single document, such contradictory usage is distracting.

b. In Section 4.4.2, the complexity and time cost of the training process are listed as major determinants of the size of the hidden layer(s) in an MLP. For tasks such as the one in the focus of this thesis, generalization is much more important than either of those issues.

My reply:

a. Section 4.4.2 has been rectified and Section 4.4 was added to show that the backpropagation can either be the gradient-decent method or the Guass-Newton method.

b. The hidden layer(s) were found by trial and error experimentation, similar to Baum & Haussle [55].