

Stockdale J, Sinclair M, Kernohan WG. (2014) Applying the ARCS design model to breastfeeding advice by midwives in order to motivate mothers to personalise their experience. *Evidence Based Midwifery* 12(1): 4-10

Applying the ARCS design model to breastfeeding advice by midwives in order to motivate mothers to personalise their experience

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This work was supported by the HSC Research and Development Office (NI). Grant number: EAT/1863/01.

The Research and Development Office (NI) however did not contribute to the design, implementation or publication of this research.

Abstract

Background. Improving the implementation of evidence-based practice is critical to achieving the public health agenda. However, progress is hampered by the lack of a comprehensive and coherent framework to guide the theoretical and systematic design of complex interventions. Breastfeeding is a good example; in spite of the immense public health value, no theoretically-designed, complex intervention exists that is capable of establishing persistence to breastfeed.

Objective. This paper reports how a complex intervention was designed by applying the systems approach of the Attention, Relevance, Confidence, Satisfaction (ARCS) model of motivational design, as a means of theoretically addressing low maternal persistence in the first three weeks of learning.

Design. Following an introduction to the model, a stepwise account of the diagnostic, design and evaluation phases applied within a suburban trust (3600 births annually) is reported. The diagnostic phase included nine structured observation studies of routine educational environments (167 hours observing 130 women and 20 midwives over a three-month period) and motivational profiling of 202 women who were learning to breastfeed in the early weeks using the Breastfeeding Motivational Instructional Measurement Scale. Diagnostic results identified a direct theoretical relationship between routine antenatal education and the lack of maternal goals and postnatal motivation to persist. The design phase reports how the motivational deficits mapped in the diagnostic phase were resolved through the application of theoretical motivational tactics and redesigned breastfeeding education. Evaluation phase summarises the findings from a feasibility trial (ISRCTN47056748) confirming as hypothesised. Following motivational enhancement of breastfeeding education, there was a significant increase ($p < 0.05$) for first-time mothers' confidence in their ability to breastfeed ($t = 4.81$; $df = 89.22$; $p < 0.001$) and in their perceived relevancy of the goal-structuring provided ($t = 7.21$; $df = 80.39$; $p < 0.001$). A significant increase in persistent breastfeeding at three weeks postnatal was also noted ($\chi^2 = 16.26$; $df = 1$; $p < 0.001$).

Conclusion. This paper contributes to our understanding of the value of theoretically and systematically designed complex interventions; the ARCS model offers health educators a robust approach to designing and implementing relevant and effective health education, therefore connecting the effects of health education with the causal links of 'what works' and 'for whom'.

Key words: ARCS model, breastfeeding, complex intervention, goals, motivation, theory, evidence-based midwifery

Introduction

Improving the implementation of evidence-based practice is critical to achieving the public health agenda. The Medical Research Council (2008) stated that for health interventions to be successful, they must be systematically and theoretically designed. Implementation has been hampered by the lack of comprehensive and coherent frameworks capable of systematically guiding the theoretical design process (Michie et al, 2011a). To determine 'what works' and 'for whom', so increasing the potential for effective replication, a suitable framework must address key characteristics. The process must be integrative and include a theoretical, systematic, comprehensive and responsive approach to the target audience, and be able to define the intervention content and identify the causal mechanisms that underlie behavioural success (Michie et al, 2011b). As a tested framework or model with these qualities is not currently available in health education, this paper proposes the ARCS and discusses the value of this model for future development and testing of complex health behavioural change interventions.

The example used is the 'Designer Breastfeeding Programme of Motivational Instruction Design' and this doctoral study was funded by the HSC Research and Development Office (Northern Ireland). Ethical approval was obtained from the Office of Research Ethics (NI) and the University of Ulster Ethics Committee in 2004.

Background to the public health challenge

Breastfeeding is a complex, sensitive and learned behaviour that has immense public health value for the individual and society, but it poses enormous challenges for policy-makers, public health activists and educators. Evidence demonstrates that many women within countries like the UK (Bolling et al, 2007), Ireland (Begley et al, 2008) and the US (Centre for Disease Control and Prevention, 2010) will stop breastfeeding within the first few weeks. Understanding what motivates women to continue the behaviour is essential if sustained breastfeeding is to be achieved.

Within current best instructional practice (UNICEF, 1998), breastfeeding is introduced to women as an instinctive,

natural behaviour which requires ‘learning’. Even though success requires that both mother and baby learn, the motivational energy required to sustain the learning episodes is exclusively maternal (Stockdale et al, 2011a). The behaviour of the baby can influence the motivational energy experienced within the complexity of the mother/baby dyad; however, it is the mother who interprets her baby’s behaviour, makes sense of it and adjusts her behaviour accordingly. Evidence indicates that, while many women who are learning to breastfeed may still value breastfeeding, their decision to stop early is related to their low expectancy for success as a result of their perceived experience (Thulier and Mercer, 2009; Schmied et al, 2001; Mazingo et al, 2000). In this research study, the authors addressed this problem by using the ARCS Model of Motivational Instructional Design (Keller, 1987a) as a means of building on current best practice by midwives. The motivational goal was to detect the source of women’s low confidence when learning to breastfeed and adjust current best educational practice to address this problem. This required a theoretically-driven programme of instruction and education. A summary of the stages in the systems process associated with the ARCS model is described in Figure 1.

The model has been validated and used extensively in Asia, Europe, and Latin America. Research reports include the testing of the model in diverse curricular areas, such as science education (Feng and Tuan, 2005), learning styles (Kapp and Ferguson, 2002), manufacturing and engineering (Shellnut et al, 1999), e-learning (Keller and Suzuki, 2003), reducing attrition (Chyung, 2001), and the relationship between mental effort and performance (Paas et al, 2005). The following account provides a summary of a five-year research project that applied the model in a health education context.

Diagnostic phase

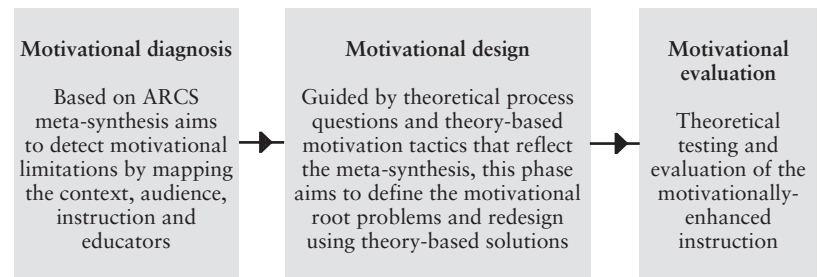
The diagnostic phase consisted of mapping key information that is likely to have a bearing on the motivational optimism of the learners. This included investigating the course (defined as all educational episodes) and the audience (defined as women who received the course).

Step 1: Course and audience information analysis

The course and audience information analysis provided the design team with an initial contextualisation and mapping of the audience, the instructional environment[s], the educator[s] and the scheduling of the educational episodes. The setting for the research was a teaching hospital with 3500 births per annum. Women came from the inner city, suburban and rural areas and consultant- and midwifery-led models of care were provided. The trust was fully accredited by the Baby Friendly Initiative (UNICEF, 1998).

The instruction provided was a combined antenatal/postnatal breastfeeding programme, facilitated by the midwives; two lactation midwives were available on request (Monday to Friday) for further instructional support.

Figure 1. The Systems Research Approach and Theoretical Guidance of the ARCS Model by Keller (1987)



Interviews with the midwifery manager and parent education midwife, combined with hospital audit data, confirmed that the instructional programme started at the antenatal booking visit and used mainly a one-to-one ‘drip-feed’ approach through to three weeks postnatal. Data collection was guided by an adapted version of the *ARCS handbook* and included information about maternal age, socio-demographic profile, the scheduling of the midwife-led education episodes in the antenatal and postnatal phases and the breastfeeding and educational expertise of the educators. A summary of the key information necessary to inform the design process is outlined here:

- Audit data confirmed that a motivational problem existed; reflecting the national *Infant-feeding survey* (Bolling et al, 2007), in which 54% of women started breastfeeding, dropping to 34% at the end of two weeks
- Women attending the antenatal education programmes represented all socio-economic backgrounds, yet women from lower socio-economic groups were the least likely to breastfeed
- Routine breastfeeding education started at the antenatal booking visit (10 to 12 weeks’ gestation) and continued to three weeks postnatal, when care was transferred to the health visitor
- A series of one-to-one episodes during the antenatal and postnatal phases and a two-hour free evening course for women and partners was provided. Women attending this class were approximately 32 weeks pregnant
- The majority of women attending the class were first-time mothers with no direct experience of learning to breastfeed. Women could choose to attend
- Women were not given a choice as to whether they wished to participate in the one-to-one educational episodes integrated into the antenatal care appointments. Midwives used checklists to record the transfer of all key information
- Women who had previous children but no breastfeeding experience were invited to attend the evening antenatal class, but their attendance was poor
- The education team consisted of a team of six midwives and a parent education midwife. None of the staff held a formal educational qualification and the majority had no personal experience of breastfeeding
- Data indicated a decline in attendance from the antenatal breastfeeding class in comparison with the class about pain relief in labour. Rescheduling the sequencing of the classes did not increase attendance.

On completion of the course and audience information analysis, it was concluded that a high intensity of antenatal and postnatal educational episodes were provided. However, many women chose not to use the two-hour evening class. This suggested a possible motivational problem associated with the perceived relevancy of the educational design. The audit data indicated that women's lack of motivation to sustain breastfeeding was potentially the result of instruction that failed to increase maternal confidence and satisfaction when learning. To investigate further, a more structured motivational analysis of the current instructional programme was completed.

Step 2: Motivational and instructional analysis

This step aimed to identify the motivational strengths, weaknesses and deficits of the instructional episodes already mapped. A series of structured observational studies were carried out that explored the goal structuring suggested to women across the antenatal and postnatal learning environments. Considering that women use the internet for confirming professional instruction (Dickerson, 2006; Dede and Fontana, 1995), this included a structured observational study of the instruction provided by 30 frequently accessed breastfeeding websites (Stockdale et al, 2007).

In keeping with the expectancy-value approach to motivation, a theoretical goal structure was imposed on the observations, in that '*goals serve to direct attention (attention), define what is important about engagement (relevance), influence competence valuation (confidence), task involvement, and perceived competence (satisfaction)*' (Harackiewicz and Sansone, 2000: 98). Guided mainly by the work of these authors, instruction designed to influence maternal goal setting was observed, with the aim of understanding the phenomena observed in step one.

The structure incorporated key motivational goal components related to persistence and attainment of breastfeeding as a learning goal; that is, suggestions for adopting breastfeeding (purpose goals), sub-goals for attaining the purpose goal (target goals) and associated performance feedback indicators (measures of progress and proximal target goal achievement).

A total of 167 hours of observation sampled all breastfeeding education. Over a 12-week period, this resulted in observing 130 women and 20 midwives who were providing breastfeeding education at different points in the educational trajectory. In addition to verbal instruction, 12 breastfeeding leaflets and two books routinely provided were analysed. On completion of the observational study, content analysis was applied in relation to the proposed goal structuring. The following summary of the results interpreted within the four theoretical components of the ARCS model, highlights the incongruent nature of the goal structures observed.

The main emphasis routinely communicated related to why women should 'value breastfeeding' (purpose goals). Pregnant women were introduced to the multiple benefits of breastfeeding eight to 15 times; for example, including increased maternal/infant bonding and optimal child intelligence. Only five target goals (feed in the first half an

hour, feed your baby when hungry, learn to position and attach correctly, breastfeed exclusively and seek help from a midwife) were communicated. Each was accompanied by an associated performance feedback indicator as a maternal reference value by which they could measure their success. A summary of the motivational limitations observed in the antenatal goal structures suggested:

- An over-emphasis on performance and getting breastfeeding 'right' from the outset. Throughout the antenatal phase, women were informed that breastfeeding was a learned behaviour, implying the need to master it (mastery-orientated goals). However, the target goals and performance feedback indicators were communicated using mainly performance-orientated language, such as 'when performed properly, breastfeeding will be easy, straightforward and satisfying'.
- Incomplete goal structures were observed, for example, where a specific target goal was introduced, such as 'learn how to position and attach your baby properly', the accompanying reinforcement schedule lacked synchronisation and representation of the learning stages of this particular target goal. Rather than women being given indicators that their baby was learning how to achieve an optimal latch, they were given an absolute performance-orientated measure of 'if it hurts, you are not doing it properly'. This incomplete goal structuring was likely to have a de-motivational effect on confidence, satisfaction and engagement with breastfeeding when difficulty was experienced.

It was theorised that the failure to provide a comprehensive mastery-orientated target goal structure would negate attention, relevance, confidence and satisfaction when learning to breastfeed. The emphasis on breastfeeding being easy and straightforward would reduce women's sense of challenge and curiosity to learn how to breastfeed (attention); encourage unrealistic expectations of what needed to be navigated to succeed (relevance); create a reference value system that, when applied postnatally, would lower women's confidence, resulting in an overall lack of satisfaction and disengagement in learning. The antenatal goal structure observed presumed that women would follow an expected learning path of successful, problem-free breastfeeding, where any deviation in experience indicated abnormal performance and underachievement.

Observation of the postnatal instructional goals offered by midwives when breastfeeding started, provided confirmation of the results of the antenatal analysis. A distinct shift in the suggested goal provision was noted. Purpose goals were no longer dominant post-birth; instead, midwives were observed introducing new target goals in response to managing women's unexpected and diverse breastfeeding experiences.

Incongruity between the new target goals observed and those introduced antenatally was evident. For example, pregnant women were advised to feed their baby when hungry, while in the postnatal phase, a new target goal instructed 'wake your baby and try to feed him'. Likewise, many babies did not spontaneously breastfeed within the first 30 minutes following birth, providing women with evidence of an antenatal target goal failure within the first hour of

motherhood. More direct discrepancies between the antenatal performance feedback indicators and women's postnatal experiences were noted. For example, women whose babies refused to settle after breastfeeding could not use the antenatal performance feedback indicator that 'if your baby is content, he/she is breastfed well'. Communication of purpose goals (reasons for breastfeeding) was limited in the postnatal phase to one-to-one discussion, when a woman expressed that she no longer wished to breastfeed. Anxiety, stress and emotional outbursts relating to learning to breastfeed were observed frequently in the early weeks, indicative of high relevance, low confidence and low satisfaction in the learning process. Theoretically, high anxiety is associated with helplessness, depressed curiosity and a lowered interest in learning (Day, 1968). However, to complete the diagnostic work, it was important to confirm the observed analysis by measuring the motivational profile of women who were learning to breastfeed under this instructional programme.

Step 3: Motivational audience analysis

To explore if the observed performance-orientated goal structure was having a detrimental effect on women's motivation to persist with learning, the Breastfeeding Motivational Instructional Measurement Scale (Stockdale, et al, 2008a) was developed and applied. The tool consisted of 51 Likert questions and one open-ended question inviting women to add further meaning to their experience. A convenience sample of 202 women self-reported the degree of motivation experienced when learning to breastfeed in the early weeks and when directed by the observed educational programme. Exploratory factor analysis, using Oblimin rotation, revealed a three factor solution (Figure 2) that was consistent with the expectancy-value theory of motivation (Stockdale et al, 2013).

In particular, first-time mothers demonstrated that they valued breastfeeding and placed importance on midwife support, but experienced lower expectancy for success (confidence); findings that were aligned with the observed relevancy of the goal structuring and overall satisfaction with their experience of learning to breastfeed. Many women perceived their breastfeeding experience to be problematic, resulting in high levels of anxiety and potential goal disengagement:

"The past days of trying to learn and manage breastfeeding have been incredibly difficult, very stressful. Breastfeeding was (and still is) important to me, but the trauma that my inability to breastfeed was causing me and my baby every meal time was just too much to bear" (Q132).

On completion of steps one to three of the ARCS process, the following key motivational diagnosis emerged:

- When women's experience of breastfeeding matched the antenatal goal structure of problem-free breastfeeding, their motivation and persistence was protected
- When women's experience deviated from the observed antenatal goal structure, women felt low expectancy for success (confidence) and lacked relevant goal direction
- While postnatal instruction provided compensatory target goals as a means of navigating problematic

breastfeeding, relevancy of the instruction and first-time mothers' expectancy for success (confidence) remained low as women continued to use the antenatal performance feedback indicators as evidence of their failure

- As women failed to receive relevant, confidence-building and satisfactory reinforcement of their progress, disengagement lowered the valence associated with the behaviour and breastfeeding cessation often occurred.

Although the results of phases one to three provided instructional design guidance in relation to addressing the incongruent antenatal and postnatal goal structuring, Keller (2010) outlines the importance of capturing the multidimensional impact of the observed instruction in relation to the main motivational dynamics of the learners. The systematic design process therefore focused on mapping the motivational problems outlined, in terms of attention, relevance, confidence and satisfaction (ARCS) experienced by first-time mothers as an audience group.

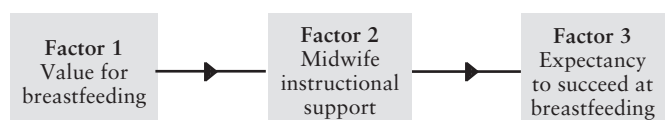
Design phase

To achieve the educational design goal of creating an educational experience that achieves optimal learner motivation (Keller, 2010), the motivational problems must be resolved through the setting of motivational design objectives and the creation of theoretically-based solutions.

Step 4: Outlining the motivational problems and setting the design objectives

A review of the nature of breastfeeding and the theoretical findings related to each step of the diagnostic phase was used to guide this part of the design process. The audience's motivation in relation to attention, relevance, confidence and satisfaction was mapped across the educational trajectory. When any of the ARCS dimensions were too low or high, this was recognised as detrimental to the audience's motivation to learn. Unlike other educational contexts where the educational episodes are simultaneous to the experience of learning, breastfeeding is unique as educational groundwork was completed eight to 10 weeks prior to the opportunity to experientially learn from the behaviour. For this reason, the motivational problems and objectives set reflect the direct relationship between the motivational nature of the antenatal goal setting and postnatal goal attainment of optimal breastfeeding. The antenatal summary therefore reports the dimensions of the ARCS, taking into consideration women's motivation as a result of the antenatal education and the reality of the [pending] experience of breastfeeding. It is important to remember that the motivational problems and objectives refer to the group characteristics, not the motivation of individual learners.

Figure 2. The three factor solution representing the motivational profile of first-time mothers who were learning to breastfeed (Stockdale et al, 2013)



As a result of the education and realities of breastfeeding, it was concluded that the attention was low, in that maternal curiosity or inquiry was generated. Women accepted breastfeeding as easy and this had a direct relationship to an unhelpfully high level of antenatal confidence; a confidence that was performance-orientated, as opposed to mastery-orientated. Relevancy during the antenatal phase was low due to the over-emphasis on the benefits of breastfeeding and the failure to provide the necessary target goals required for successful navigation of the diverse learning experiences. As women remained unaware of the challenges associated with learning to breastfeed, they experienced a high level of satisfaction in the antenatal period because they valued breastfeeding and felt confident in their ability to optimally achieve. No gap in knowledge was experienced (high confidence), neither were any performance feedback indicators active as a means of behavioural reinforcement, so satisfaction remained artificially high.

Women's experience of learning to breastfeed resulted in two motivational groups; those whose breastfeeding experience was straightforward and those who experienced unexpected challenges. This paper reports the motivational profile of those whose experience deviated from straightforward breastfeeding, resulting in behavioural cessation. In contradiction to the antenatal summary, attention was drawn towards breastfeeding, mainly through the role of breastfeeding difficulties and women's motivation to resolve their difficulties. Although attention was high, this interest was indicative of a high relevance that culminated in feelings of anxiety and stress in trying to breastfeed correctly (performance-orientation). As women used the antenatal performance feedback indicators that accompanied the five target goals, they interpreted their difficulties as evidence of their inability and failure to breastfeed. This negatively affected their satisfaction with breastfeeding, depleted as the continued difficulties reinforced their perceived failure. When midwives intervened and helped women to successfully attach their babies, confidence would continue to deplete as success was attributed to the health professional. As confidence and satisfaction depleted and attention and relevance increased, women's motivation to persist with learning would often decrease and cessation was frequently observed.

The main motivational root problem was defined as the creation of unrealistic expectations in the antenatal period of an easy breastfeeding experience that was not matched to the learning activity required in the postnatal period. This phenomenon was further supported by the provision of an incomplete target goal structure that was performance-orientated in design.

The design objectives were in response to the diagnostic work and the main motivational root problem – that the antenatal goal structure was having a detrimental effect on women's motivation to sustain their learning activity postnatally. The main objective was, therefore, to redesign the antenatal education to address the incongruity between antenatal learning goals and the diversity of postnatal experiences. Previous researchers have recommended that pregnant women are told the 'truth' about breastfeeding,

so they could psychologically prepare (Schmied et al, 2001; Mzingo et al, 2000). While it was anticipated that this approach to instructional design may support the development of a mastery-orientated goal structure for learning how to breastfeed, theoretical concern was raised in that pre-warning women about the 'problems' of breastfeeding had the potential to encourage the creation of an 'avoidance-orientated' goal, as opposed to an 'approach-orientated' goal. It was anticipated that where women's self-regulation focused on avoiding potential problems, there was a possibility that they would either avoid all breastfeeding or lose their intrinsic satisfaction associated with mastery (Stockdale et al, 2011a, 2011b; Linnenbrink and Pintrich, 2000). Influenced further by the results of a clustered randomised controlled trial (RCT) (Lavender et al, 2005) where pre-warning women within a professional support intervention did not significantly increase maternal persistence, it was decided that neither 'pre-warning' nor 'not warning' women about the 'reality' of breastfeeding, was sufficient in attaining effective mastery-orientated learning. Guided by theory application (ARCS meta-synthesis) and personal communication with previous researchers (Coombs, et al, 1998), it became evident that, to create the required mastery-orientated goal structuring for first-time mothers, additional design objectives needed to be achieved:

- Design new mastery-orientated antenatal target goals that provide women with the necessary target goal structure to support their experience of breastfeeding
- Redesign existing target goals so that each target goal met the requirements of a mastery-orientated goal, including the provision of relevant performance indicators.

Step 5: Applying the theoretical ARCS to achieve the desired instructional design objectives of mastery-orientated, goal-based instruction, the design process focused on the application of the ARCS process tactics (Keller, 2010). Guided by the process questions such as: 'How can we stimulate an attitude of inquiry?' And motivational tactics such as: 'Use visuals to stimulate curiosity or create mystery' (attention tactic), two expert midwives, three practitioners, two service-users and one midwifery researcher discussed possible solutions to the motivational objectives set. It was hypothesised that if the objectives set were achieved through the applied theoretical tactics of the ARCS model, women's demotivational state as a result of experiencing breastfeeding difficulties would be prevented.

Theoretical limitations surrounded the direct introduction of breastfeeding problems into routine antenatal education. To overcome these and still achieve a mastery-orientated goal structure, it was decided that the common 'problems' associated with learning to breastfeed, such as when the baby demonstrates difficulty attaching, should be motivationally redesigned as a mastery-orientated target goal and reintroduced into antenatal education as a 'normal challenge' associated with learning. It was anticipated that this instructional change from performance-orientated goal structures to mastery-orientated goal structures would

normalise multiple breastfeeding learning experiences and so achieve a psychological shift for women who were low in the ARCS achievement motivation. It was presumed, as in the case of Astlietner and Keller (1995), that only women low in outcome expectancies would benefit (those that experienced difficulties) and that those high in outcome expectancies would continue to attribute their success to their perceived ability and performance. This shift away from performance-orientated goals to that of mastery-orientated goals, as described by Linnenbrink and Pintrich (2000), became central to achieving optimal motivated breastfeeding behaviour for the audience investigated.

While it is beyond the scope of this paper to describe in detail each aspect of the complex intervention, an example is provided to illustrate how mastery-orientated learning was facilitated through the theoretical re-design of an antenatal target goal.

Some babies followed the expected feed-sleep pattern communicated through routine antenatal education. Women found that their babies either incessantly breastfed or refused to initiate breastfeeding. Whereas the postnatal midwives were observed providing different troubleshooting target goals to address this problem (observational data), evidence from the audience analysis (factor analysis data) indicated women used the antenatal performance feedback indicators as evidence of their 'breastfeeding failure'. To motivationally manage this instructional deficit, a new mastery-orientated target goal was designed by applying a selection of attention tactics (creating curiosity and interest), relevancy tactics (matching the goal to a personal aspect of the behaviour), confidence-building (giving women control over learning to achieve this target goal) and satisfaction-based tactics (providing women with reference values that enabled them to see their progress and experience intrinsic satisfaction in the process of learning). To achieve this, the new target goal introduced women to three feeding characteristics that their newborn baby was likely to display:

- Snacking mode – when their baby would breastfeed persistently over a set period, in order to increase maternal milk supply (commonly known as a growth spurt)
- Sleepy mode – when their baby preferred to sleep than breastfeed, commonly experienced within the first 48 hours following birth
- Systematic mode – those times when their baby would develop a regular pattern of breastfeeding and sleeping.

Introduced in the antenatal class as a large floor puzzle, women and their partners were challenged to recognise the characteristics of each mode and plan how they might map and manage their baby's own unique feeding pattern. Strategies for managing day-to-day life during any of these modes of neonatal behaviour were provided.

It was anticipated that personal relevance would be increased as all babies are unique in their feeding patterns. Likewise, it was concluded that unhelpful performance feedback indicators, such as social comparisons between mothers, would be reduced, as would the effects of the reference value: 'You will know your baby is well fed when he settles and sleeps well.' To ensure safety, each target goal

was reviewed by the lactation consultant and parameters inserted. For example, if snacking persisted beyond the recommended number of hours, women were advised to call the lactation midwife.

Through this new learning goal, the causal links could be mapped back to the application of relevant theories, in that a sense of inquiry, curiosity and mastery were created that reflected a parental approach to self-determination (Ryan and Deci, 2000), the need for affiliation, achievement and power (McClelland, 1976), intrinsic interest and effort (Hidi, 2000) and competence acquisition (Butler, 2000). This theoretically-designed, mastery-orientated goal was then re-embedded into the overall breastfeeding curriculum, alongside other new and revised target (and purpose) goals. The enhanced version of the breastfeeding curriculum was considered comprehensive as it provided motivational learning goals for multiple breastfeeding experiences. The final step in the application of the ARCS model was to test the effects of the motivational design process by completing a feasibility study.

Evaluation phase

In step with the ARCS design and evaluation process, the last phase of this research project was to evaluate the motivational impact of the theoretically-designed complex intervention. Measuring women's motivation and persistence as the primary outcomes, an RCT (Stockdale et al, 2008b) was conducted. A two-day staff training programme that focused on the motivational diagnosis and theoretical nature of motivation was developed and delivered to midwifery staff, whose remit it was to educate women in the experimental group (antenatal and postnatal education). Although the results of the trial are reported elsewhere (Stockdale et al, 2008b), it is important to point out that as hypothesised, the motivationally-enhanced goal-based education significantly increased first-time mothers' confidence in their ability to succeed in learning to breastfeed ($t=4.81$; $df=89.22$; $p<0.001$) through the increased relevancy of a redesigned goal structure ($t=7.21$; $df=80.39$; $p<0.001$). Theoretically, when an audience experiences greater levels of satisfaction when learning, increased persistence and task engagement result: this trial demonstrated greater persistence and task engagement in that a significant increase in breastfeeding rates was noted on discharge ($\chi^2=5.64$; $df=1$; $p<0.02$) and at three weeks post-birth when midwifery breastfeeding education ceased ($\chi^2=16.26$; $df=1$; $p<0.001$).

On completion of the trial, it was concluded that the motivational deficits associated with failure to breastfeed were in a direct response to a lack of motivational design and the performance-orientated goal structuring currently associated with breastfeeding education.

Conclusion

The ARCS model of instructional design offers health educators a potentially robust approach to designing and implementing relevant and effective health education that connects the effects of health education with the causal links of what works and for whom.

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